COMPENDIUM AMC 8

1985 – 2024

Índice.

1985 AJHSME Problems

1985 AJHSME (**Answer Key**)
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Instructions

1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
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Contents

Problem 1

$$\frac{3\times 5}{9\times 11}\times\frac{7\times 9\times 11}{3\times 5\times 7}=$$

$$\text{(A)}\ 1 \qquad \text{(B)}\ 0 \qquad \text{(C)}\ 49 \qquad \text{(D)}\frac{1}{49} \qquad \text{(E)}\ 50$$

Solution

Problem 2

$90+91+92+93+94+95+96+97+98+99=$

$\text{(A)}\ 845 \qquad \text{(B)}\ 945 \qquad \text{(C)}\ 1005 \qquad \text{(D)}\ 1025 \qquad \text{(E)}\ 1045$

Solution

Problem 3

$\frac{10^7}{5\times 10^4}=$

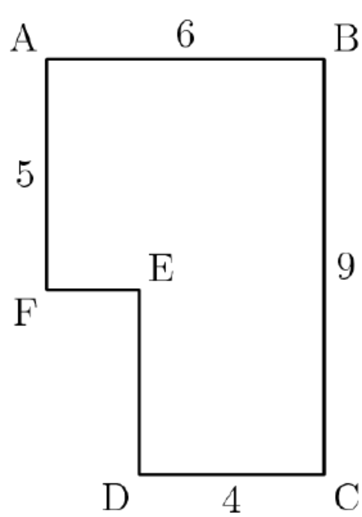
$\text{(A)}\ .002 \qquad \text{(B)}\ .2 \qquad \text{(C)}\ 20 \qquad \text{(D)}\ 200 \qquad \text{(E)}\ 2000$

Solution

Problem 4

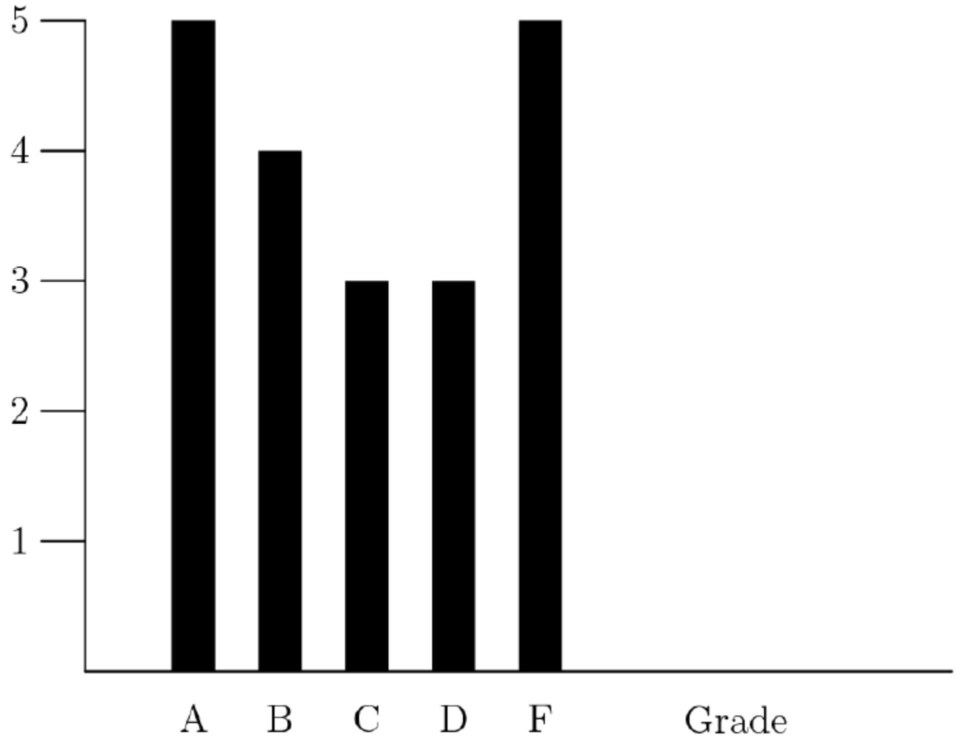
The area of polygon $ABCDEF$, in square units, is

$\text{(A)}\ 24 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 46 \qquad \text{(D)}\ 66 \qquad \text{(E)}\ 74$



Solution

Problem 5



The bar graph shows the grades in a mathematics class for the last grading period. If A, B, C, and D are satisfactory grades, what fraction of the grades shown in the graph are satisfactory?

$\text{(A)}\ \frac{1}{2} \qquad \text{(B)}\ \frac{2}{3} \qquad \text{(C)}\ \frac{3}{4} \qquad \text{(D)}\ \frac{4}{5} \qquad \text{(E)}\ \frac{9}{10}$

Solution

Problem 6

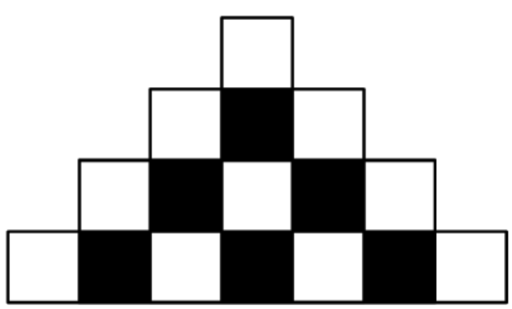
A stack of paper containing 500 sheets is 5 cm thick. Approximately how many sheets of this type of paper would there be in a stack 7.5 cm high?

$\text{(A)}\ 250 \qquad \text{(B)}\ 550 \qquad \text{(C)}\ 667 \qquad \text{(D)}\ 750 \qquad \text{(E)}\ 1250$

Solution

Problem 7

A "stair-step" figure is made of alternating black and white squares in each row. Rows 1 through 4 are shown. All rows begin and end with a white square. The number of black squares in the 37th row is



$\text{(A)}\ 34 \qquad \text{(B)}\ 35 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 37 \qquad \text{(E)}\ 38$

Solution

Problem 8

If $a=-2$, the largest number in the set $-3a, 4a, \frac{24}{a}, a^2, 1$ is

$\text{(A)}\ -3a \qquad \text{(B)}\ 4a \qquad \text{(C)}\ \frac{24}{a} \qquad \text{(D)}\ a^2 \qquad \text{(E)}\ 1$

Solution

Problem 9

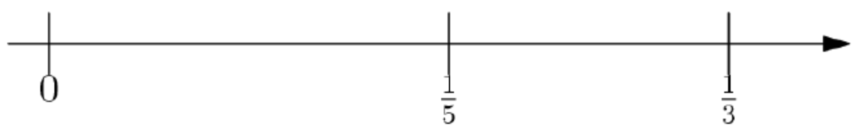
The product of the 9 factors $\Big(1 - \frac12\Big)\Big(1 - \frac13\Big)\Big(1 - \frac14\Big)\cdots\Big(1 - \frac {1}{10}\Big) =$

$\text{(A)}\ \frac{1}{10} \qquad \text{(B)}\ \frac{1}{9} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{10}{11} \qquad \text{(E)}\ \frac{11}{2}$

Solution

Problem 10

The fraction halfway between $\frac{1}{5}$ and $\frac{1}{3}$ (on the number line) is

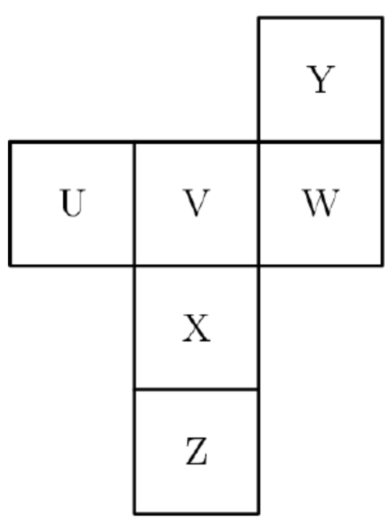


$\text{(A)}\ \frac{1}{4} \qquad \text{(B)}\ \frac{2}{15} \qquad \text{(C)}\ \frac{4}{15} \qquad \text{(D)}\ \frac{53}{200} \qquad \text{(E)}\ \frac{8}{15}$

Solution

Problem 11

A piece of paper containing six joined squares labeled as shown in the diagram is folded along the edges of the squares to form a cube. The label of the face opposite the face labeled X is



$\text{(A)}\ \text{Z} \qquad \text{(B)}\ \text{U} \qquad \text{(C)}\ \text{V} \qquad \text{(D)}\ \ \text{W} \qquad \text{(E)}\ \text{Y}$

Solution

Problem 12

A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 6.2 cm, 8.3 cm and 9.5 cm. The area of the square is

$\text{(A)}\ 24\text{ cm}^2 \qquad \text{(B)}\ 36\text{ cm}^2 \qquad \text{(C)}\ 48\text{ cm}^2 \qquad \text{(D)}\ 64\text{ cm}^2 \qquad \text{(E)}\ 144\text{ cm}^2$

Solution

Problem 13

If you walk for 45 minutes at a rate of 4 mph and then run for 30 minutes at a rate of 10 mph, how many miles will you have gone at the end of one hour and 15 minutes?

$\text{(A)}\ 3.5\text{ miles} \qquad \text{(B)}\ 8\text{ miles} \qquad \text{(C)}\ 9\text{ miles} \qquad \text{(D)}\ 25\frac{1}{3}\text{ miles} \qquad \text{(E)}\ 480\text{ miles}$

Solution

Problem 14

The difference between a 6.5% sales tax and a 6% sales tax on an item priced at $\$20$ before tax is

$\text{(A)}\$.01$

$\text{(B)}\$.10$

$\text{(C)}\$.50$

$\text{(D)}\$1$

$\text{(E)}\$10$

Solution

Problem 15

How many whole numbers between 100 and 400 contain the digit 2?

$\text{(A)}\ 100 \qquad \text{(B)}\ 120 \qquad \text{(C)}\ 138 \qquad \text{(D)}\ 140 \qquad \text{(E)}\ 148$

Solution

Problem 16

The ratio of boys to girls in Mr. Brown's math class is $2:3$. If there are 30 students in the class, how many more girls than boys are in the class?

$\text{(A)}\ 10 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 2$

Solution

Problem 17

If your average score on your first six mathematics tests was 84 and your average score on your first seven mathematics tests was 85, then your score on the seventh test was

$\text{(A)}\ 86 \qquad \text{(B)}\ 88 \qquad \text{(C)}\ 90 \qquad \text{(D)}\ 91 \qquad \text{(E)}\ 92$

Solution

Problem 18

Nine copies of a certain pamphlet cost less than $\$10.00$ while ten copies of the same pamphlet (at the same price) cost more than $\$11.00$. How much does one copy of this pamphlet cost?

$\text{(A)}\$1.07$

$\text{(B)}\$1.08$

$\text{(C)}\$1.09$

$\text{(D)}\$1.10$

$\text{(E)}\$1.11$

Solution

Problem 19

If the length and width of a rectangle are each increased by 10%, then the perimeter of the rectangle is increased by

$\text{(A)}\ 1\% \qquad \text{(B)}\ 10\% \qquad \text{(C)}\ 20\% \qquad \text{(D)}\ 21\% \qquad \text{(E)}\ 40\%$

Solution

Problem 20

In a certain year, January had exactly four Tuesdays and four Saturdays. On what day did January 1 fall that year?

$\text{(A)}\ \text{Monday} \qquad \text{(B)}\ \text{Tuesday} \qquad \text{(C)}\ \text{Wednesday} \qquad \text{(D)}\ \text{Friday} \qquad \text{(E)}\ \text{Saturday}$

Solution

Problem 21

Mr. Green receives a 10% raise every year. His salary after four such raises has gone up by what percent?

$\text{(A)}\ \text{less than }40\% \qquad \text{(B)}\ 40\% \qquad \text{(C)}\ 44\% \qquad \text{(D)}\ 45\% \qquad \text{(E)}\ \text{more than }45\%$

Solution

Problem 22

Assume every 7-digit whole number is a possible telephone number except those that begin with 0 or 1. What fraction of telephone numbers begin with 9 and end with 0?

$\text{(A)}\ \frac{1}{63} \qquad \text{(B)}\ \frac{1}{80} \qquad \text{(C)}\ \frac{1}{81} \qquad \text{(D)}\ \frac{1}{90} \qquad \text{(E)}\ \frac{1}{100}$

Note: All telephone numbers are 7-digit whole numbers.

Solution

Problem 23

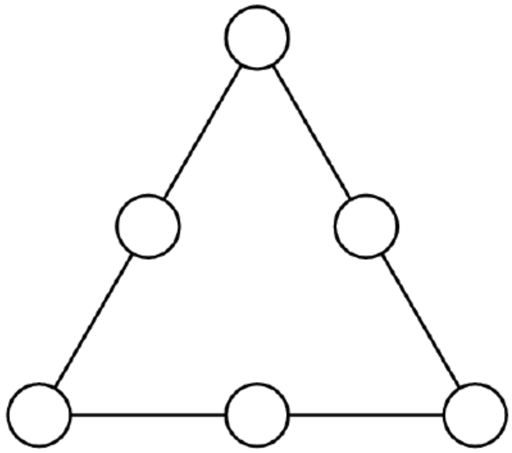
King Middle School has 1200 students. Each pupil takes 5 classes a day. Each teacher teaches 4 classes. Each class has 30 students and 1 teacher. How many teachers are there at King Middle School?

$\text{(A)}\ 30 \qquad \text{(B)}\ 32 \qquad \text{(C)}\ 40 \qquad \text{(D)}\ 45 \qquad \text{(E)}\ 50$

Solution

Problem 24

In a magic triangle, each of the six whole numbers $10-15$ is placed in one of the circles so that the sum, S, of the three numbers on each side of the triangle is the same. The largest possible value for S is

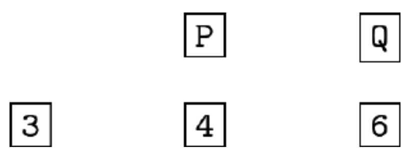


$\text{(A)}\ 36 \qquad \text{(B)}\ 37 \qquad \text{(C)}\ 38 \qquad \text{(D)}\ 39 \qquad \text{(E)}\ 40$

Solution

Problem 25

Five cards are lying on a table as shown.



Each card has a letter on one side and a whole number on the other side. Jane said, "If a vowel is on one side of any card, then an even number is on the other side." Mary showed Jane was wrong by turning over one card. Which card did Mary turn over?

$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ \text{P} \qquad \text{(E)}\ \text{Q}$

Solution

See Also

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Contents

Problem 1

In July 1861, 366 inches of rain fell in Cherrapunji, India. What was the average rainfall in inches per hour during that month?

$\text{(A)}\ \frac{366}{31 \times 24} \qquad \text{(B)}\ \frac{366 \times 31}{24} \qquad \text{(C)}\ \frac{366 \times 24}{31} \qquad \text{(D)}\ \frac{31 \times 24}{366} \qquad \text{(E)}\ 366 \times 31 \times 24$

Solution

Problem 2

Which of the following numbers has the largest reciprocal?

$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{2}{5} \qquad \text{(C)}\ 1 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 1986$

Solution

Problem 3

The smallest sum one could get by adding three different numbers from the set $\{7, 25, -1, 12, -3\}$ is

$\text{(A)}\ -3 \qquad \text{(B)}\ -1 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 21$

Solution

Problem 4

The product $(1.8)(40.3 + .07)$ is closest to

$\text{(A)}\ 7 \qquad \text{(B)}\ 42 \qquad \text{(C)}\ 74 \qquad \text{(D)}\ 84 \qquad \text{(E)}\ 737$

Solution

Problem 5

A contest began at noon one day and ended 1000 minutes later. At what time did the contest end?

$\text{(A)}\ \text{10:00 p.m.} \qquad \text{(B)}\ \text{midnight} \qquad \text{(C)}\ \text{2:30 a.m.} \qquad \text{(D)}\ \text{4:40 a.m.} \qquad \text{(E)}\ \text{6:40 a.m.}$

Solution

Problem 6

$$\frac{2}{1 - \frac{2}{3}} =$$

$\text{(A)}\ -3 \qquad \text{(B)}\ -\frac{4}{3} \qquad \text{(C)}\ \frac{2}{3} \qquad \text{(D)}\ 2 \qquad \text{(E)}\ 6$

Solution

Problem 7

How many whole numbers are between $\sqrt{8}$ and $\sqrt{80}$?

$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 9$

Solution

Problem 8

In the product shown, B is a digit. The value of B is

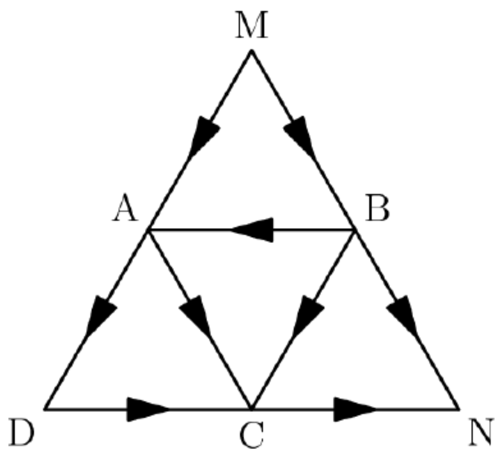
$$\begin{array}{rr} & B2 \\ \times & 7B \\ \hline & 6396 \end{array}$$

$\text{(A)}\ 3 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 8$

Solution

Problem 9

Using only the paths and the directions shown, how many different routes are there from M to N?



$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$

Solution

Problem 10

A picture 3 feet across is hung in the center of a wall that is 19 feet wide. How many feet from the end of the wall is the nearest edge of the picture?

$\text{(A)}\ 1\frac{1}{2} \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 9\frac{1}{2} \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 22$

Solution

Problem 11

If $\text{A}*\text{B}$ means $\frac{\text{A}+\text{B}}{2}$, then $(3*5)*8$ is

$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 30$

Solution

Problem 12

The table below displays the grade distribution of the 30 students in a mathematics class on the last two tests. For example, exactly one student received a 'D' on Test 1 and a 'C' on Test 2 (see circled entry). What percent of the students received the same grade on both tests?

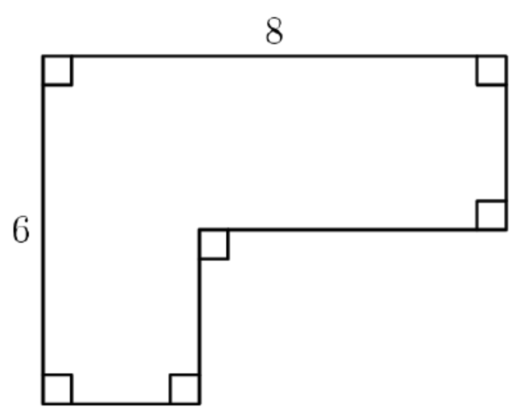
Test 1 \ Test 2	A	B	C	D	F
A	2	2	1	0	0
B	1	4	3	0	0
C	1	3	5	2	0
D	0	0	1	1	1
F	0	0	2	1	0

$\text{(A)}\ 12\% \qquad \text{(B)}\ 25\% \qquad \text{(C)}\ 33\frac{1}{3}\% \qquad \text{(D)}\ 40\% \qquad \text{(E)}\ 50\%$

Solution

Problem 13

The perimeter of the polygon shown is



$\text{(A)}\ 14 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 28 \qquad \text{(D)}\ 48$

$\text{(E)}\ \text{cannot be determined from the information given}$

Solution

Problem 14

If $200 \leq a \leq 400$ and $600 \leq b \leq 1200$, then the largest value of the quotient $\frac{b}{a}$ is

$\text{(A)}\ \frac{3}{2} \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 300 \qquad \text{(E)}\ 600$

Solution

Problem 15

Sale prices at the Ajax Outlet Store are 50% below original prices. On Saturdays an additional discount of 20% off the sale price is given. What is the Saturday price of a coat whose original price is \$$180$?

(A) \$$54$

$(\text{B})\, \$72$

$(\text{C})\, \$90$

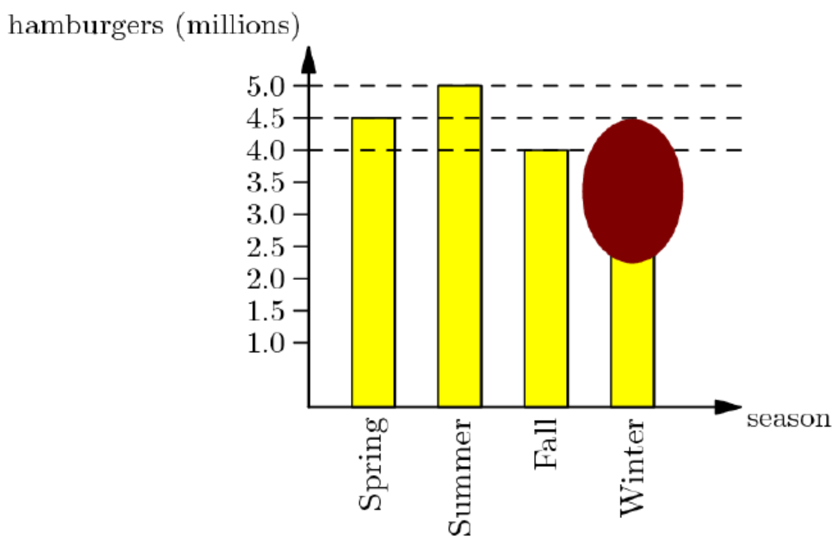
$(\text{D})\, \$108$

$(\text{D})\, \$110$

Solution

Problem 16

A bar graph shows the number of hamburgers sold by a fast food chain each season. However, the bar indicating the number sold during the winter is covered by a smudge. If exactly 25% of the chain's hamburgers are sold in the fall, how many million hamburgers are sold in the winter?



$\text{(A)}\ 2.5 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 3.5 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 4.5$

Solution

Problem 17

Let o be an odd whole number and let n be any whole number. Which of the following statements about the whole number (o^2+no) is always true?

$\text{(A)}\ \text{it is always odd} \qquad \text{(B)}\ \text{it is always even}$

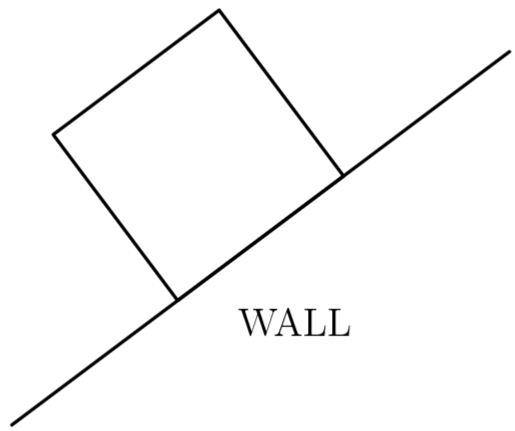
$\text{(C)}\ \text{it is even only if n is even} \qquad \text{(D)}\ \text{it is odd only if n is odd}$

$\text{(E)}\ \text{it is odd only if n is even}$

Solution

Problem 18

A rectangular grazing area is to be fenced off on three sides using part of a 100 meter rock wall as the fourth side. Fence posts are to be placed every 12 meters along the fence including the two posts where the fence meets the rock wall. What is the fewest number of posts required to fence an area 36 m by 60 m?



$\text{(A)}\ 11 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 13 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 16$

Solution

Problem 19

At the beginning of a trip, the mileage odometer read $56,200$ miles. The driver filled the gas tank with 6 gallons of gasoline. During the trip, the driver filled his tank again with 12 gallons of gasoline when the odometer read $56,560$. At the end of the trip, the driver filled his tank again with 20 gallons of gasoline. The odometer read $57,060$. To the nearest tenth, what was the car's average miles-per-gallon for the entire trip?

$\text{(A)}\ 22.5 \qquad \text{(B)}\ 22.6 \qquad \text{(C)}\ 24.0 \qquad \text{(D)}\ 26.9 \qquad \text{(E)}\ 27.5$

Solution

Problem 20

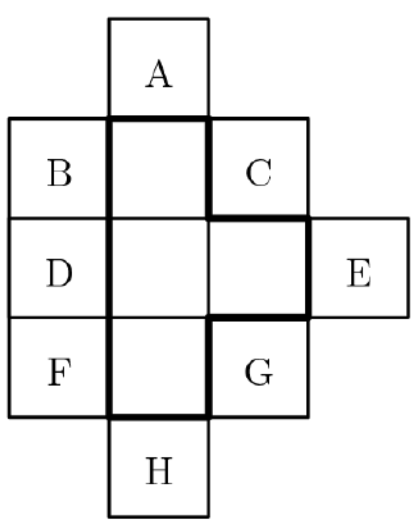
The value of the expression $\frac{(304)^5}{(29.7)(399)^4}$ is closest to

$\text{(A)}\ .003 \qquad \text{(B)}\ .03 \qquad \text{(C)}\ .3 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ 30$

Solution

Problem 21

Suppose one of the eight lettered identical squares is included with the four squares in the T-shaped figure outlined. How many of the resulting figures can be folded into a topless cubical box?



$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$

Solution

Problem 22

Alan, Beth, Carlos, and Diana were discussing their possible grades in mathematics class this grading period. Alan said, "If I get an A, then Beth will get an A." Beth said, "If I get an A, then Carlos will get an A." Carlos said, "If I get an A, then Diana will get an A." All of these statements were true, but only two of the students received an A. Which two received A's?

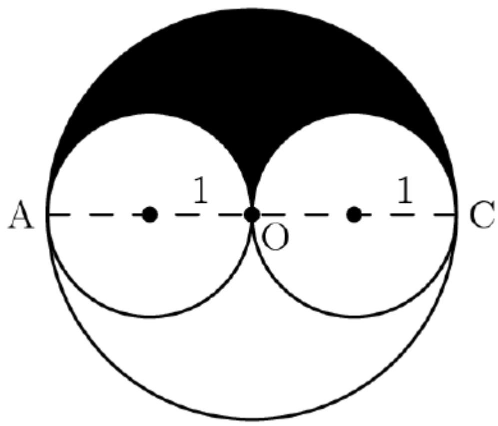
$\text{(A)}\ \text{Alan, Beth} \qquad \text{(B)}\ \text{Beth, Carlos} \qquad \text{(C)}\ \text{Carlos, Diana}$

$\text{(D)}\ \text{Alan, Diana} \qquad \text{(E)}\ \text{Beth, Diana}$

Solution

Problem 23

The large circle has diameter AC. The two small circles have their centers on AC and just touch at O, the center of the large circle. If each small circle has radius 1, what is the value of the ratio of the area of the shaded region to the area of one of the small circles?



$\text{(A)}\ \text{between }\frac{1}{2}\text{ and }1 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ \text{between }1\text{ and }\frac{3}{2}$

$\text{(D)}\ \text{between }\frac{3}{2}\text{ and }2 \qquad \text{(E)}\ \text{cannot be determined from the information given}$

Solution

Problem 24

The 600 students at King Middle School are divided into three groups of equal size for lunch. Each group has lunch at a different time. A computer randomly assigns each student to one of three lunch groups. The probability that three friends, Al, Bob, and Carol, will be assigned to the same lunch group is approximately

$\text{(A)}\ \frac{1}{27} \qquad \text{(B)}\ \frac{1}{9} \qquad \text{(C)}\ \frac{1}{8} \qquad \text{(D)}\ \frac{1}{6} \qquad \text{(E)}\ \frac{1}{3}$

Solution

Problem 25

Which of the following sets of whole numbers has the largest average?

$\text{(A)}\ \text{multiples of 2 between 1 and 101} \qquad \text{(B)}\ \text{multiples of 3 between 1 and 101}$

$\text{(C)}\ \text{multiples of 4 between 1 and 101} \qquad \text{(D)}\ \text{multiples of 5 between 1 and 101}$

(E) multiples of 6 between 1 and 101

Solution

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Contents

Problem 1

$.4+.02+.006=$

$\text{(A)}\ .012 \qquad \text{(B)}\ .066 \qquad \text{(C)}\ .12 \qquad \text{(D)}\ .24 \qquad \text{(E)} .426$

Solution

Problem 2

$\frac{2}{25} =$

$\text{(A)}\ .008 \qquad \text{(B)}\ .08 \qquad \text{(C)}\ .8 \qquad \text{(D)} 1.25 \qquad \text{(E)}\ 12.5$

Solution

Problem 3

$2(81+83+85+87+89+91+93+95+97+99)=$

$\text{(A)}\ 1600 \qquad \text{(B)}\ 1650 \qquad \text{(C)}\ 1700 \qquad \text{(D)}\ 1750 \qquad \text{(E)}\ 1800$

Solution

Problem 4

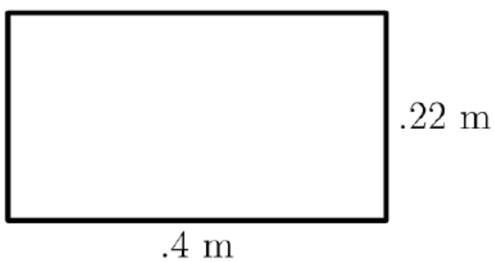
Martians measure angles in clerts. There are 500 clerts in a full circle. How many clerts are there in a right angle?

$\text{(A)}\ 90 \qquad \text{(B)}\ 100 \qquad \text{(C)}\ 125 \qquad \text{(D)}\ 180 \qquad \text{(E)}\ 250$

Solution

Problem 5

The area of the rectangular region is



$\text{(A)}\ .088\ \text{m}^2 \qquad \text{(B)}\ .62\ \text{m}^2 \qquad \text{(C)}\ .88\ \text{m}^2 \qquad \text{(D)}\ 1.24\ \text{m}^2 \qquad \text{(E)}\ 4.22\ \text{m}^2$

Solution

Problem 6

The smallest product one could obtain by multiplying two numbers in the set $\{ -7,-5,-1,1,3 \}$ is

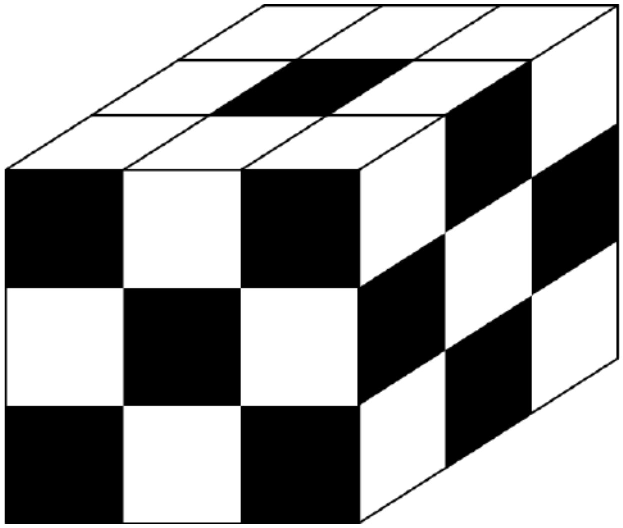
$\text{(A)}\ -35 \qquad \text{(B)}\ -21 \qquad \text{(C)}\ -15 \qquad \text{(D)}\ -1 \qquad \text{(E)}\ 3$

Solution

Problem 7

The large cube shown is made up of 27 identical sized smaller cubes. For each face of the large cube, the opposite face is shaded the same way. The total number of smaller cubes that must have at least one face shaded is

$\text{(A)}\ 10 \qquad \text{(B)}\ 16 \qquad \text{(C)}\ 20 \qquad \text{(D)}\ 22 \qquad \text{(E)}\ 24$



Solution

Problem 8

If A and B are nonzero digits, then the number of digits (not necessarily different) in the sum of the three whole numbers is

$$\begin{array}{cccc} 9 & 8 & 7 & 6 \\ & \text{A} & 3 & 2 \\ & & \text{B} & 1 \\ \hline \end{array}$$

$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ \text{depends on the values of A and B}$

Solution

Problem 9

When finding the sum $\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}+\frac{1}{7}$, the least common denominator used is

$\text{(A)}\ 120 \qquad \text{(B)}\ 210 \qquad \text{(C)}\ 420 \qquad \text{(D)}\ 840 \qquad \text{(E)}\ 5040$

Solution

Problem 10

$4(299)+3(299)+2(299)+298=$

$\text{(A)}\ 2889 \qquad \text{(B)}\ 2989 \qquad \text{(C)}\ 2991 \qquad \text{(D)}\ 2999 \qquad \text{(E)}\ 3009$

Solution

Problem 11

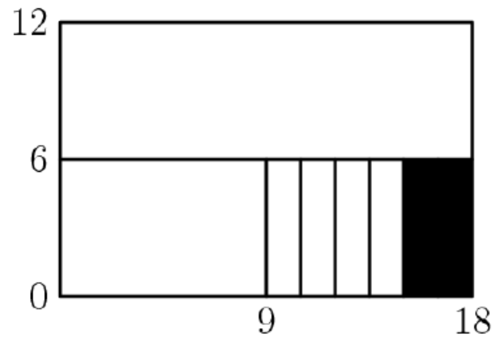
The sum $2\frac{1}{7}+3\frac{1}{2}+5\frac{1}{19}$ is between

$\text{(A)}\ 10\text{ and }10\frac{1}{2} \qquad \text{(B)}\ 10\frac{1}{2}\text{ and }11 \qquad \text{(C)}\ 11\text{ and }11\frac{1}{2} \qquad \text{(D)}\ 11\frac{1}{2}\text{ and }12 \qquad \text{(E)}\ 12\text{ and }12\frac{1}{2}$

Solution

Problem 12

What fraction of the large 12 by 18 rectangular region is shaded?



$$\text{(A)}\ \frac{1}{108} \qquad \text{(B)}\ \frac{1}{18} \qquad \text{(C)}\ \frac{1}{12} \qquad \text{(D)}\ \frac{2}{9} \qquad \text{(E)}\ \frac{1}{3}$$

Solution

Problem 13

Which of the following fractions has the largest value?

$$\text{(A)}\ \frac{3}{7} \qquad \text{(B)}\ \frac{4}{9} \qquad \text{(C)}\ \frac{17}{35} \qquad \text{(D)}\ \frac{100}{201} \qquad \text{(E)}\ \frac{151}{301}$$

Solution

Problem 14

A computer can do $10,000$ additions per second. How many additions can it do in one hour?

$$\text{(A)}\ 6\text{ million} \qquad \text{(B)}\ 36\text{ million} \qquad \text{(C)}\ 60\text{ million} \qquad \text{(D)}\ 216\text{ million} \qquad \text{(E)}\ 360\text{ million}$$

Solution

Problem 15

The sale ad read: "Buy three tires at the regular price and get the fourth tire for three dollars;." Sam paid 240 dollars for a set of four tires at the sale. What was the regular price of one tire?

$$\text{(A)}\ 59.25\text{ dollars} \qquad \text{(B)}\ 60\text{ dollars} \qquad \text{(C)}\ 70\text{ dollars} \qquad \text{(D)}\ 79\text{ dollars} \qquad \text{(E)}\ 80\text{ dollars}$$

Solution

Problem 16

Joyce made 12 of her first 30 shots in the first three games of this basketball game, so her seasonal shooting average was 40%. In her next game, she took 10 shots and raised her seasonal shooting average to 50%. How many of these 10 shots did she make?

$$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 8$$

Solution

Problem 17

Abby, Bret, Carl, and Dana are seated in a row of four seats numbered #1 to #4. Joe looks at them and says:

```
"Bret is next to Carl."
"Abby is between Bret and Carl."
```

However each one of Joe's statements is false. Bret is actually sitting in seat #3. Who is sitting in seat #2?

$\text{(A)}\ \text{Abby} \qquad \text{(B)}\ \text{Bret} \qquad \text{(C)}\ \text{Carl} \qquad \text{(D)}\ \text{Dana} \qquad \text{(E)}\ \text{There is not enough information to be sure.}$

Solution

Problem 18

Half the people in a room left. One third of those remaining started to dance. There were then 12 people who were not dancing. The original number of people in the room was what?

$\text{(A)}\ 24 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 42 \qquad \text{(E)}\ 72$

Solution

Problem 19

A calculator has a squaring key $\boxed{x^2}$ which replaces the current number displayed with its square. For example, if the display is $\boxed{000003}$ and the $\boxed{x^2}$ key is depressed, then the display becomes $\boxed{000009}$. If the display reads $\boxed{000002}$, how many times must you depress the $\boxed{x^2}$ key to produce a displayed number greater than 500?

$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ 250$

Solution

Problem 20

"If a whole number n is not prime, then the whole number $n-2$ is not prime." A value of n which shows this statement to be false is

$\text{(A)}\ 9 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 13 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 23$

Solution

Problem 21

Suppose n^* means $\frac{1}{n}$, the reciprocal of n. For example, $5^* = \frac{1}{5}$. How many of the following statements are true?

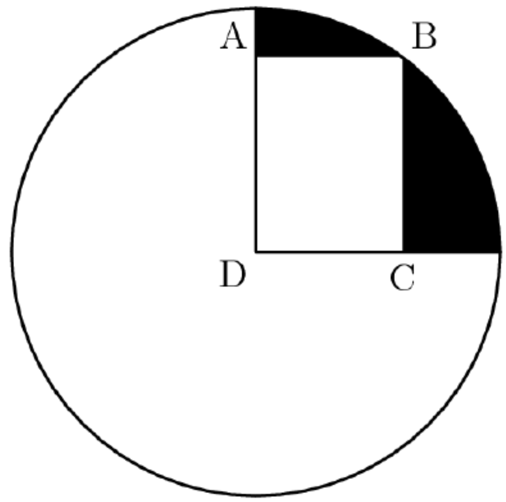
```
i) 3* + 6* = 9*
ii) 6* - 4* = 2*
iii) 2* · 6* = 12*
iv) 10* ÷ 2* = 5*
```

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ 4$

Solution

Problem 22

ABCD is a rectangle, D is the center of the circle, and B is on the circle. If $\text{AD}=4$ and $\text{CD}=3$, then the area of the shaded region is between



$\text{(A)}\ 4\text{ and }5 \qquad \text{(B)}\ 5\text{ and }6 \qquad \text{(C)}\ 6\text{ and }7 \qquad \text{(D)}\ 7\text{ and }8 \qquad \text{(E)}\ 8\text{ and }9$

Solution

Problem 23

Assume the adjoining chart shows the 1980 U.S. population, in millions, for each region by ethnic group. To the nearest percent, what percent of the U.S. Black population lived in the South?

	NE	MW	South	West
White	42	52	57	35
Black	5	5	15	2
Asian	1	1	1	3
Other	1	1	2	4

$\text{(A)}\ 20\% \qquad \text{(B)}\ 25\% \qquad \text{(C)}\ 40\% \qquad \text{(D)}\ 56\% \qquad \text{(E)}\ 80\%$

Solution

Problem 24

A multiple choice examination consists of 20 questions. The scoring is $+5$ for each correct answer, -2 for each incorrect answer, and 0 for each unanswered question. John's score on the examination is 48. What is the maximum number of questions he could have answered correctly?

$\text{(A)}\ 9 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 11 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 16$

Solution

Problem 25

Ten balls numbered 1 to 10 are in a jar. Jack reaches into the jar and randomly removes one of the balls. Then Jill reaches into the jar and randomly removes a different ball. The probability that the sum of the two numbers on the balls removed is even is

$\text{(A)}\ \frac{4}{9} \qquad \text{(B)}\ \frac{9}{19} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{10}{19} \qquad \text{(E)}\ \frac{5}{9}$

Solution

See Also

1987 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1987))	
Preceded by **1986 AJHSME**	Followed by **1988 AJHSME**
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All AJHSME/AMC 8 Problems and Solutions	

- AJHSME
- AJHSME Problems and Solutions
- Mathematics competition resources

1988 AJHSME Problems

1988 AJHSME (**Answer Key**)
Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=1988) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_10-1988-43)

Instructions

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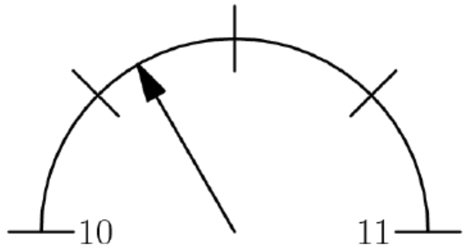
Contents

Problem 1

The diagram shows part of a scale of a measuring device. The arrow indicates an approximate reading of



$\text{(A)}\ 10.05 \qquad \text{(B)}\ 10.15 \qquad \text{(C)}\ 10.25 \qquad \text{(D)}\ 10.3 \qquad \text{(E)}\ 10.6$

Solution

Problem 2

The product $8 \times .25 \times 2 \times .125 =$

$\text{(A)}\ \frac{1}{8} \qquad \text{(B)}\ \frac{1}{4} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ 1 \qquad \text{(E)}\ 2$

Solution

Problem 3

$\frac{1}{10} + \frac{2}{20} + \frac{3}{30} =$

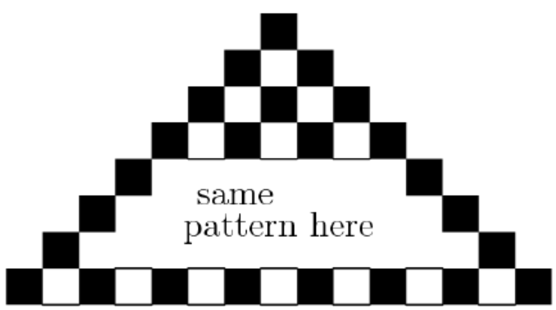
$\text{(A)}\ .1 \qquad \text{(B)}\ .123 \qquad \text{(C)}\ .2 \qquad \text{(D)}\ .3 \qquad \text{(E)}\ .6$

Solution

Problem 4

The figure consists of alternating light and dark squares. The number of dark squares exceeds the number of light squares by

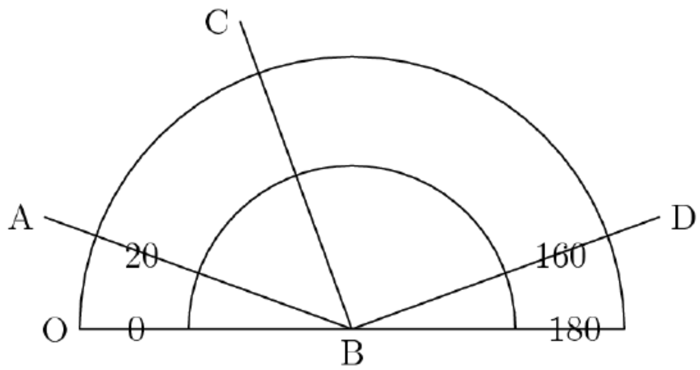
$\text{(A)}\ 7 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 11$



Solution

Problem 5

If $\angle \text{CBD}$ is a right angle, then this protractor indicates that the measure of $\angle \text{ABC}$ is approximately



$\text{(A)}\ 20^\circ \qquad \text{(B)}\ 40^\circ \qquad \text{(C)}\ 50^\circ \qquad \text{(D)}\ 70^\circ \qquad \text{(E)}\ 120^\circ$

Solution

Problem 6

$\frac{(.2)^3}{(.02)^2} =$

$\text{(A)}\ .2 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 10 \qquad \text{(D)}\ 15 \qquad \text{(E)}\ 20$

Solution

Problem 7

$2.46\times 8.163\times (5.17+4.829)$ is closest to

$\text{(A)}\ 100 \qquad \text{(B)}\ 200 \qquad \text{(C)}\ 300 \qquad \text{(D)}\ 400 \qquad \text{(E)}\ 500$

Solution

Problem 8

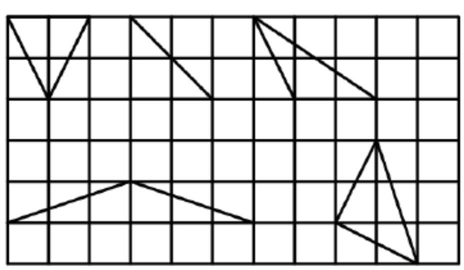
Betty used a calculator to find the product 0.075×2.56. She forgot to enter the decimal points. The calculator showed 19200. If Betty had entered the decimal points correctly, the answer would have been

$\text{(A)}\ .0192 \qquad \text{(B)}\ .192 \qquad \text{(C)}\ 1.92 \qquad \text{(D)}\ 19.2 \qquad \text{(E)}\ 192$

Solution

Problem 9

An isosceles triangle is a triangle with two sides of equal length. How many of the five triangles on the square grid below are isosceles?



$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

Solution

Problem 10

Chris's birthday is on a Thursday this year. What day of the week will it be 60 days after her birthday?

$\text{(A)}\ \text{Monday} \qquad \text{(B)}\ \text{Wednesday} \qquad \text{(C)}\ \text{Thursday} \qquad \text{(D)}\ \text{Friday} \qquad \text{(E)}\ \text{Saturday}$

Solution

Problem 11

$\sqrt{164}$ is

$\text{(A)}\ 42 \qquad \text{(B)}\ \text{less than }10 \qquad \text{(C)}\ \text{between }10\text{ and }11 \qquad \text{(D)}\ \text{between }11\text{ and }12 \qquad \text{(E)}\ \text{between }12\text{ and }13$

Solution

Problem 12

Suppose the estimated 20 billion dollar cost to send a person to the planet Mars is shared equally by the 250 million people in the U.S. Then each person's share is

$\text{(A)}\ 40\text{ dollars} \qquad \text{(B)}\ 50\text{ dollars} \qquad \text{(C)}\ 80\text{ dollars} \qquad \text{(D)}\ 100\text{ dollars} \qquad \text{(E)}\ 125\text{ dollars}$

Solution

Problem 13

If rose bushes are spaced about 1 foot apart, approximately how many bushes are needed to surround a circular patio whose radius is 12 feet?

$\text{(A)}\ 12 \qquad \text{(B)}\ 38 \qquad \text{(C)}\ 48 \qquad \text{(D)}\ 75 \qquad \text{(E)}\ 450$

Solution

Problem 14

$\diamondsuit$ and Δ are whole numbers and $\diamondsuit \times \Delta = 36$. The largest possible value of $\diamondsuit + \Delta$ is

$\text{(A)}\ 12 \qquad \text{(B)}\ 13 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 20 \qquad \text{(E)}\ 37$

Solution

Problem 15

The reciprocal of $\left(\frac{1}{2}+\frac{1}{3}\right)$ is

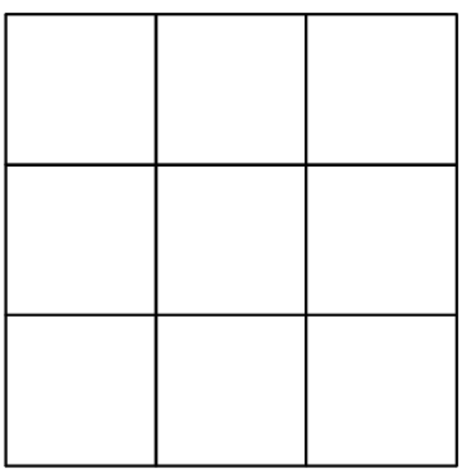
$\text{(A)}\ \frac{1}{6} \qquad \text{(B)}\ \frac{2}{5} \qquad \text{(C)}\ \frac{6}{5} \qquad \text{(D)}\ \frac{5}{2} \qquad \text{(E)}\ 5$

Solution

Problem 16

Placing no more than one X in each small square, what is the greatest number of X's that can be put on the grid shown without getting three X's in a row vertically, horizontally, or diagonally?

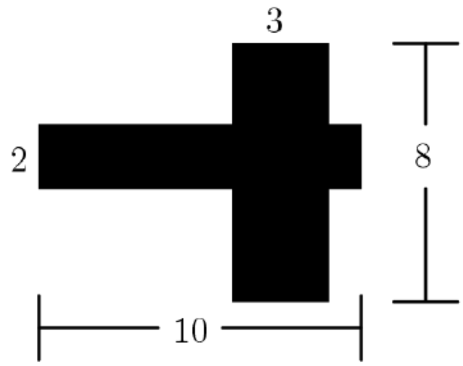
$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$



Solution

Problem 17

The shaded region formed by the two intersecting perpendicular rectangles, in square units, is



$\text{(A)}\ 23 \qquad \text{(B)}\ 38 \qquad \text{(C)}\ 44 \qquad \text{(D)}\ 46 \qquad \text{(E)}\ \text{unable to be determined from the information given}$

Solution

Problem 18

The average weight of 6 boys is 150 pounds and the average weight of 4 girls is 120 pounds. The average weight of the 10 children is

$\text{(A)}\ 135\text{ pounds} \qquad \text{(B)}\ 137\text{ pounds} \qquad \text{(C)}\ 138\text{ pounds} \qquad \text{(D)}\ 140\text{ pounds} \qquad \text{(E)}\ 141\text{ pounds}$

Solution

Problem 19

What is the 100th number in the arithmetic sequence: $1,5,9,13,17,21,25,...$?

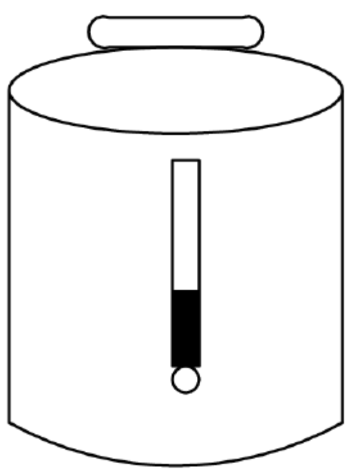
$\text{(A)}\ 397 \qquad \text{(B)}\ 399 \qquad \text{(C)}\ 401 \qquad \text{(D)}\ 403 \qquad \text{(E)}\ 405$

Solution

Problem 20

The glass gauge on a cylindrical coffee maker shows that there are 45 cups left when the coffee maker is 36% full. How many cups of coffee does it hold when it is full?

$\text{(A)}\ 80 \qquad \text{(B)}\ 100 \qquad \text{(C)}\ 125 \qquad \text{(D)}\ 130 \qquad \text{(E)}\ 262$



Solution

Problem 21

A fifth number, n, is added to the set $\{3,6,9,10\}$ to make the mean of the set of five numbers equal to its median. The number of possible values of n is

$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ \text{more than }4$

Solution

Problem 22

Tom's Hat Shoppe increased all original prices by 25%. Now the shoppe is having a sale where all prices are 20% off these increased prices. Which statement best describes the sale price of an item?

$\text{(A)}\ \text{The sale price is }5\% \text{ higher than the original price.}$

$\text{(B)}\ \text{The sale price is higher than the original price, but by less than }5\% .$

$\text{(C)}\ \text{The sale price is higher than the original price, but by more than }5\% .$

$\text{(D)}\ \text{The sale price is lower than the original price.}$

$\text{(E)}\ \text{The sale price is the same as the original price.}$

Solution

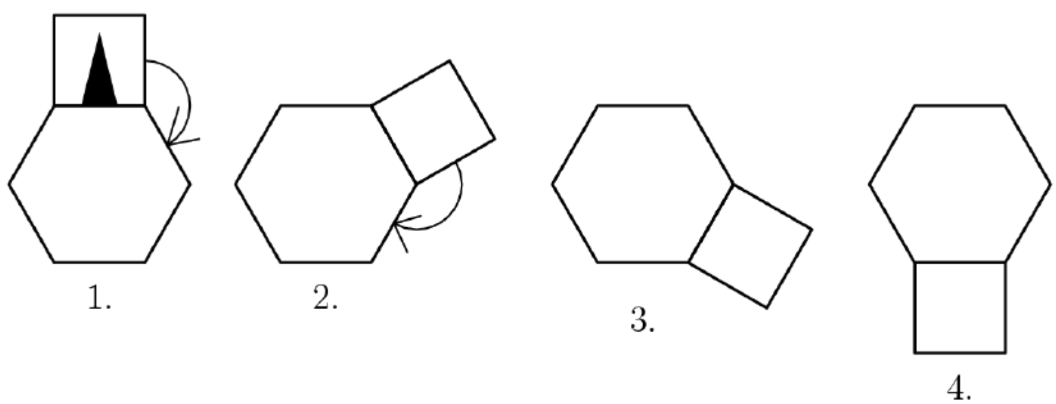
Problem 23

Maria buys computer disks at a price of 4 for $\$5$ and sells them at a price of 3 for $\$5$. How many computer disks must she sell in order to make a profit of $\$100$?

$\text{(A)}\ 100 \qquad \text{(B)}\ 120 \qquad \text{(C)}\ 200 \qquad \text{(D)}\ 240 \qquad \text{(E)}\ 1200$

Solution

Problem 24



The square in the first diagram "rolls" clockwise around the fixed regular hexagon until it reaches the bottom. In which position will the solid triangle be in diagram 4?

Solution

Problem 25

A **palindrome** is a whole number that reads the same forwards and backwards. If one neglects the colon, certain times displayed on a digital watch are palindromes. Three examples are: $\boxed{1:01}$, $\boxed{4:44}$, and $\boxed{12:21}$. How many times during a 12-hour period will be palindromes?

$\text{(A)}\ 57 \qquad \text{(B)}\ 60 \qquad \text{(C)}\ 63 \qquad \text{(D)}\ 90 \qquad \text{(E)}\ 93$

Solution

See also

1988 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1988))	
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Contents

Problem 1

$(1+11+21+31+41)+(9+19+29+39+49)=$

$\text{(A)}\ 150 \qquad \text{(B)}\ 199 \qquad \text{(C)}\ 200 \qquad \text{(D)}\ 249 \qquad \text{(E)}\ 250$

Solution

Problem 2

$$\frac{2}{10}+\frac{4}{100}+\frac{6}{1000}=$$

$\text{(A)}\ .012 \qquad \text{(B)}\ .0246 \qquad \text{(C)}\ .12 \qquad \text{(D)}\ .246 \qquad \text{(E)}\ 246$

Solution

Problem 3

Which of the following numbers is the largest?

$\text{(A)}\ .99 \qquad \text{(B)}\ .9099 \qquad \text{(C)}\ .9 \qquad \text{(D)}\ .909 \qquad \text{(E)}\ .9009$

Solution

Problem 4

Estimate to determine which of the following numbers is closest to $\frac{401}{.205}$.

$\text{(A)}\ .2 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 20 \qquad \text{(D)}\ 200 \qquad \text{(E)}\ 2000$

Solution

Problem 5

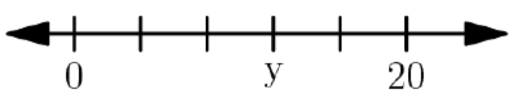
$-15+9\times (6\div 3) =$

$\text{(A)}\ -48 \qquad \text{(B)}\ -12 \qquad \text{(C)}\ -3 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ 12$

Solution

Problem 6

If the markings on the number line are equally spaced, what is the number y?



$\text{(A)}\ 3 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 15 \qquad \text{(E)}\ 16$

Solution

Problem 7

If the value of 20 quarters and 10 dimes equals the value of 10 quarters and n dimes, then $n=$

$\text{(A)}\ 10 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 35 \qquad \text{(E)}\ 45$

Solution

Problem 8

$$(2\times 3\times 4)\left(\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\right) =$$

$\text{(A)}\ 1 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 24 \qquad \text{(E)}\ 26$

Solution

Problem 9

There are 2 boys for every 3 girls in Ms. Johnson's math class. If there are 30 students in her class, what percent of them are boys?

$\text{(A)}\ 12\% \qquad \text{(B)}\ 20\% \qquad \text{(C)}\ 40\% \qquad \text{(D)}\ 60\% \qquad \text{(E)}\ 66\frac{2}{3}\%$

Solution

Problem 10

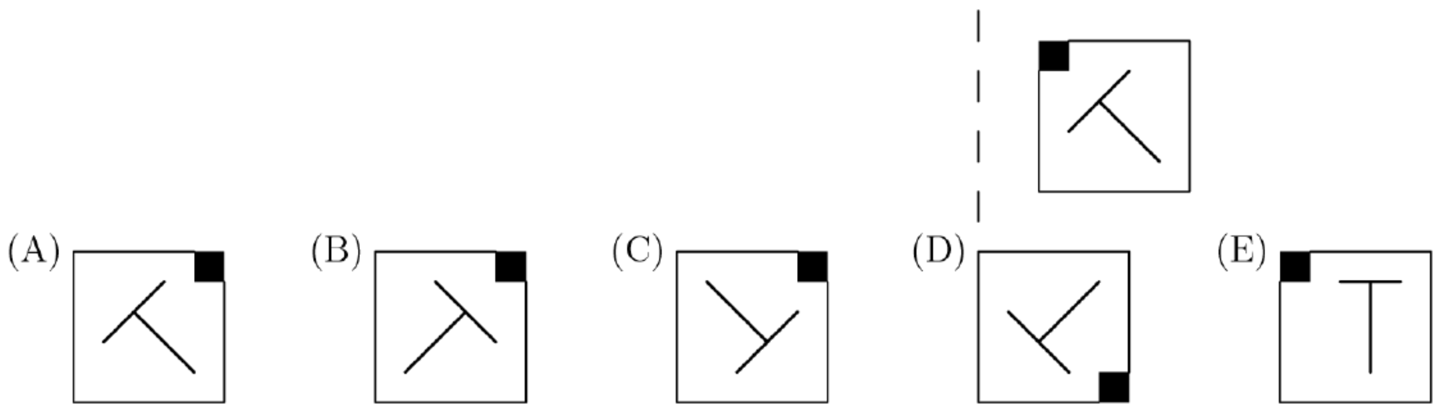
What is the number of degrees in the smaller angle between the hour hand and the minute hand on a clock that reads seven o'clock?

$\text{(A)}\ 50^\circ \qquad \text{(B)}\ 120^\circ \qquad \text{(C)}\ 135^\circ \qquad \text{(D)}\ 150^\circ \qquad \text{(E)}\ 165^\circ$

Solution

Problem 11

Which of the five "T-like shapes" would be symmetric to the one shown with respect to the dashed line?



Solution

Problem 12

$$\frac{1-\frac{1}{3}}{1-\frac{1}{2}} =$$

$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{2}{3} \qquad \text{(C)}\ \frac{3}{4} \qquad \text{(D)}\ \frac{3}{2} \qquad \text{(E)}\ \frac{4}{3}$

Solution

Problem 13

$$\frac{9}{7\times 53} =$$

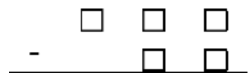
$\text{(A)}\ \frac{.9}{.7\times 53} \qquad \text{(B)}\ \frac{.9}{.7\times .53} \qquad \text{(C)}\ \frac{.9}{.7\times 5.3} \qquad \text{(D)}\ \frac{.9}{7\times .53} \qquad \text{(E)}\ \frac{.09}{.07\times .53}$

Solution

Problem 14

When placing each of the digits $2, 4, 5, 6, 9$ in exactly one of the boxes of this subtraction problem, what is the smallest difference that is possible?

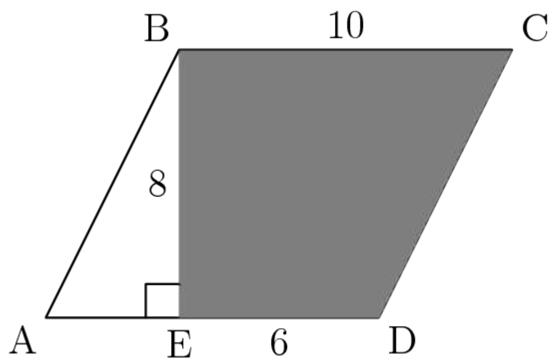
$\text{(A)}\ 58 \qquad \text{(B)}\ 123 \qquad \text{(C)}\ 149 \qquad \text{(D)}\ 171 \qquad \text{(E)}\ 176$



Solution

Problem 15

The area of the shaded region BEDC in parallelogram ABCD is



$\text{(A)}\ 24 \qquad \text{(B)}\ 48 \qquad \text{(C)}\ 60 \qquad \text{(D)}\ 64 \qquad \text{(E)}\ 80$

Solution

Problem 16

In how many ways can 47 be written as the sum of two primes?

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ \text{more than 3}$

Solution

Problem 17

The number N is between 9 and 17. The average of 6, 10, and N could be

$\text{(A)}\ 8 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 16$

Solution

Problem 18

Many calculators have a reciprocal key $\boxed{\frac{1}{x}}$ that replaces the current number displayed with its reciprocal. For example, if the display is $\boxed{00004}$ and the $\boxed{\frac{1}{x}}$ key is pressed, then the display becomes $\boxed{000.25}$. If $\boxed{00032}$ is currently displayed, what is the fewest positive number of times you must depress the $\boxed{\frac{1}{x}}$ key so the display again reads $\boxed{00032}$?

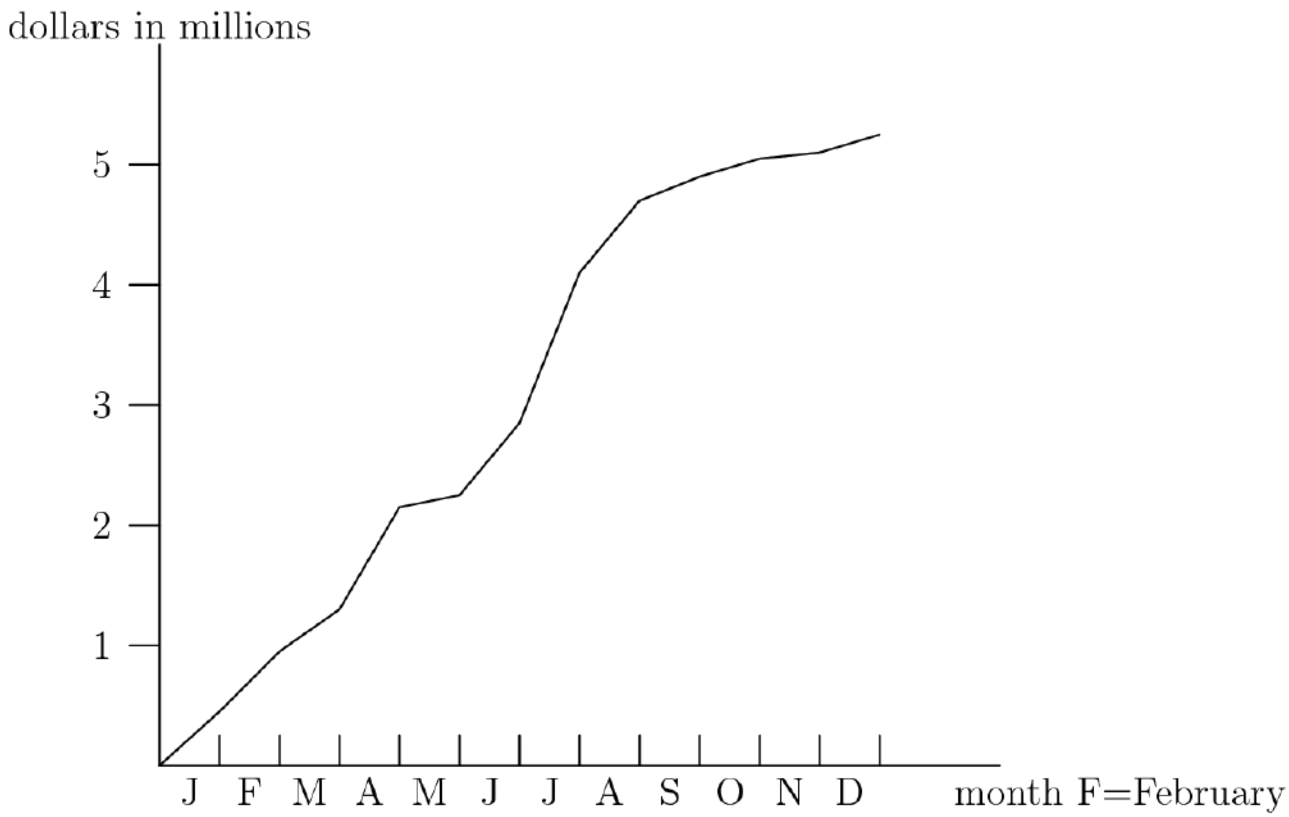
$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

Solution

Problem 19

The graph below shows the total accumulated dollars (in millions) spent by the Surf City government during 1988. For example, about $.5$ million had been spent by the beginning of February and approximately 2 million by the end of April. Approximately how many millions of dollars were spent during the summer months of June, July, and August?

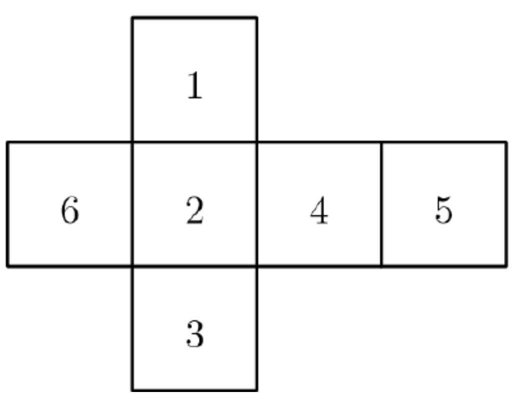
$\text{(A)}\ 1.5 \qquad \text{(B)}\ 2.5 \qquad \text{(C)}\ 3.5 \qquad \text{(D)}\ 4.5 \qquad \text{(E)}\ 5.5$



Solution

Problem 20

The figure may be folded along the lines shown to form a number cube. Three number faces come together at each corner of the cube. What is the largest sum of three numbers whose faces come together at a corner?



$\text{(A)}\ 11 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 13 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 15$

Solution

Problem 21

Jack had a bag of 128 apples. He sold 25% of them to Jill. Next he sold 25% of those remaining to June. Of those apples still in his bag, he gave the shiniest one to his teacher. How many apples did Jack have then?

$\text{(A)}\ 7 \qquad \text{(B)}\ 63 \qquad \text{(C)}\ 65 \qquad \text{(D)}\ 71 \qquad \text{(E)}\ 111$

Solution

Problem 22

The letters A, J, H, S, M, E and the digits 1, 9, 8, 9 are "cycled" separately as follows and put together in a numbered list:

$$\begin{array}{rlll} & & \text{AJHSME} & 1989 \\ & & & \\ 1. & & \text{JHSMEA} & 9891 \\ 2. & & \text{HSMEAJ} & 8919 \\ 3. & & \text{SMEAJH} & 9198 \\ & & \ldots\ldots\ldots & \end{array}$$

What is the number of the line on which AJHSME 1989 will appear for the first time?

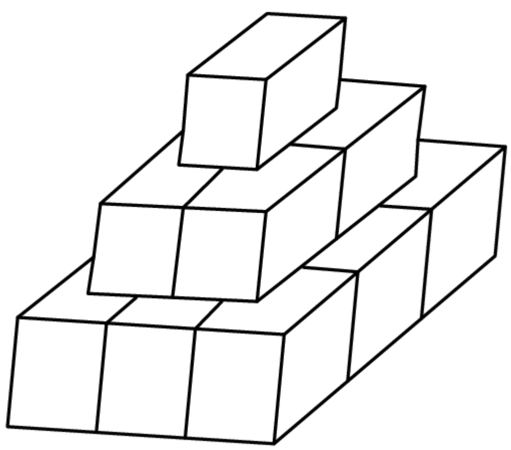
$\text{(A)}\ 6 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 18 \qquad \text{(E)}\ 24$

Solution

Problem 23

An artist has 14 cubes, each with an edge of 1 meter. She stands them on the ground to form a sculpture as shown. She then paints the exposed surface of the sculpture. How many square meters does she paint?

$\text{(A)}\ 21 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 33 \qquad \text{(D)}\ 37 \qquad \text{(E)}\ 42$

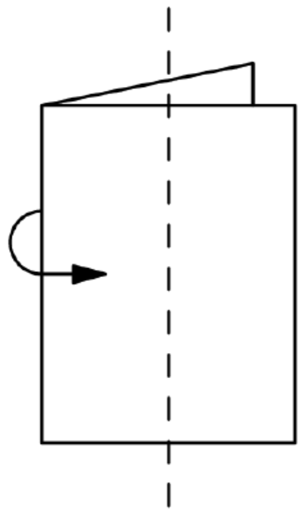


Solution

Problem 24

Suppose a square piece of paper is folded in half vertically. The folded paper is then cut in half along the dashed line. Three rectangles are formed-a large one and two small ones. What is the ratio of the perimeter of one of the small rectangles to the perimeter of the large rectangle?

$\text{(A)}\ \frac{1}{2} \qquad \text{(B)}\ \frac{2}{3} \qquad \text{(C)}\ \frac{3}{4} \qquad \text{(D)}\ \frac{4}{5} \qquad \text{(E)}\ \frac{5}{6}$

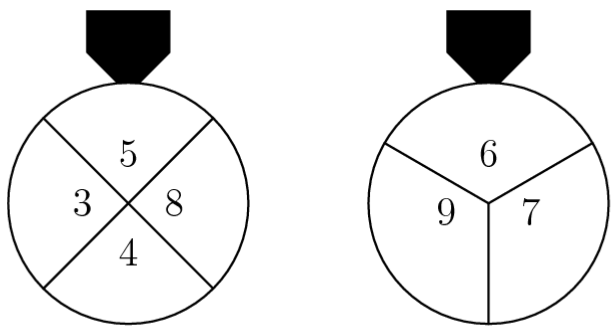


Solution

Problem 25

Every time these two wheels are spun, two numbers are selected by the pointers. What is the probability that the sum of the two selected numbers is even?

$\text{(A)}\ \frac{1}{6} \qquad \text{(B)}\ \frac{3}{7} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{2}{3} \qquad \text{(E)}\ \frac{5}{7}$



Solution

See also

1989 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1989))	
Preceded by **1988 AJHSME**	Followed by **1990 AJHSME**
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All AJHSME/AMC 8 Problems and Solutions	

- AJHSME
- AJHSME Problems and Solutions
- Mathematics competition resources

1990 AJHSME Problems

1990 AJHSME (**Answer Key**)
Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=1990) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_10-1990-43)

Instructions

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2. You will receive ? points for each correct answer, ? points for each problem left unanswered, and ? points for each incorrect answer.
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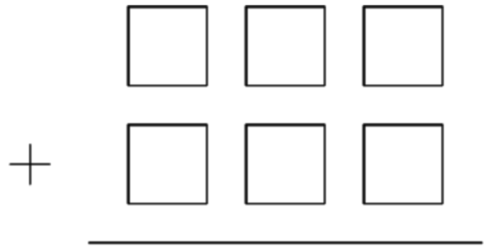
4. Figures are not necessarily drawn to scale.
5. You will have **? minutes** working time to complete the test.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25

Contents

Problem 1

What is the smallest sum of two 3-digit numbers that can be obtained by placing each of the six digits $4, 5, 6, 7, 8, 9$ in one of the six boxes in this addition problem?



(A) 947 (B) 1037 (C) 1047 (D) 1056 (E) 1245

Solution

Problem 2

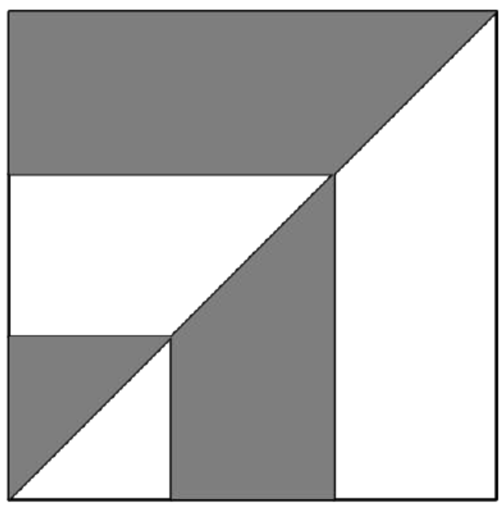
Which digit of $.12345$, when changed to 9, gives the largest number?

(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

Solution

Problem 3

What fraction of the square is shaded?



(A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{5}{12}$ (D) $\frac{3}{7}$ (E) $\frac{1}{2}$

Solution

Problem 4

Which of the following could **not** be the unit's digit [one's digit] of the square of a whole number?

(A) 1 (B) 4 (C) 5 (D) 6 (E) 8

Solution

Problem 5

Which of the following is closest to the product $(.48017)(.48017)(.48017)$?

(A) 0.011 (B) 0.110 (C) 1.10 (D) 11.0 (E) 110

Solution

Problem 6

Which of these five numbers is the largest?

$\text{(A)}\ 13579+\frac{1}{2468} \qquad \text{(B)}\ 13579-\frac{1}{2468} \qquad \text{(C)}\ 13579\times \frac{1}{2468}$

$\text{(D)}\ 13579\div \frac{1}{2468} \qquad \text{(E)}\ 13579.2468$

Solution

Problem 7

When three different numbers from the set $\{-3,-2,-1,4,5\}$ are multiplied, the largest possible product is

$\text{(A)}\ 10 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 40 \qquad \text{(E)}\ 60$

Solution

Problem 8

A dress originally priced at 80 dollars was put on sale for 25% off. If 10% tax was added to the sale price, then the total selling price (in dollars) of the dress was

$\text{(A)}\ \text{45 dollars} \qquad \text{(B)}\ \text{52 dollars} \qquad \text{(C)}\ \text{54 dollars} \qquad \text{(D)}\ \text{66 dollars} \qquad \text{(E)}\ \text{68 dollars}$

Solution

Problem 9

The grading scale shown is used at Jones Junior High. The fifteen scores in Mr. Freeman's class were:

$$\begin{array}{ccccccccc} 89, & 72, & 54, & 97, & 77, & 92, & 85, & 74, & 75, \\ 63, & 84, & 78, & 71, & 80, & 90. \end{array}$$

In Mr. Freeman's class, what percent of the students received a grade of C?

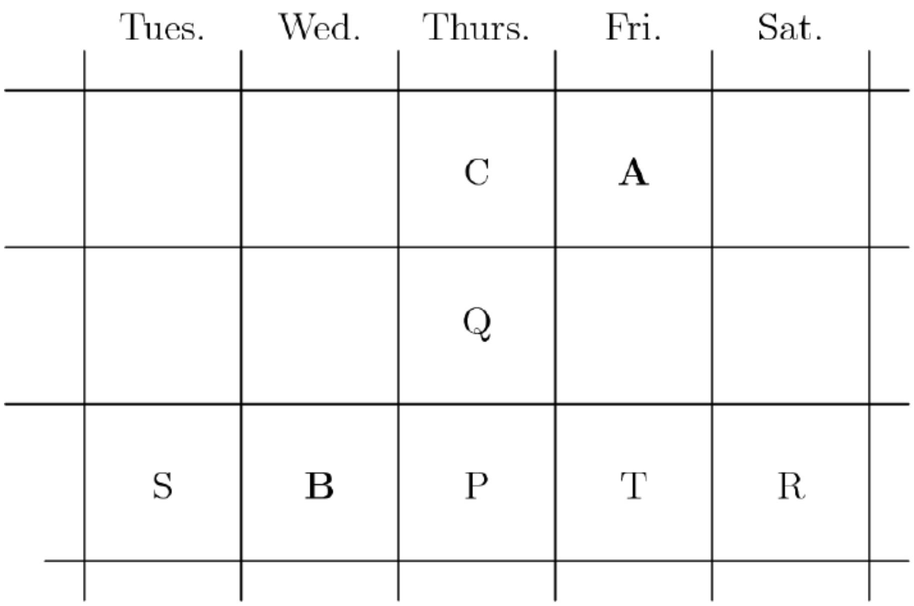
A:	93 - 100
B:	85 - 92
C:	75 - 84
D:	70 - 74
F:	0 - 69

$\text{(A)}\ 20\% \qquad \text{(B)}\ 25\% \qquad \text{(C)}\ 30\% \qquad \text{(D)}\ 33\frac{1}{3}\% \qquad \text{(E)}\ 40\%$

Solution

Problem 10

On this monthly calendar, the date behind one of the letters is added to the date behind C. If this sum equals the sum of the dates behind A and B, then the letter is

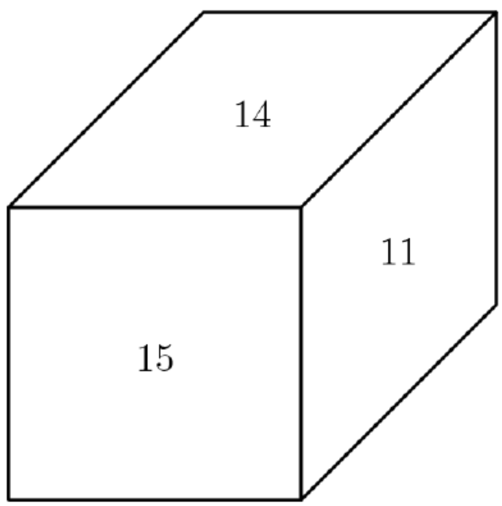


$\text{(A)}\ \text{P} \qquad \text{(B)}\ \text{Q} \qquad \text{(C)}\ \text{R} \qquad \text{(D)}\ \text{S} \qquad \text{(E)}\ \text{T}$

Solution

Problem 11

The numbers on the faces of this cube are consecutive whole numbers. The sums of the two numbers on each of the three pairs of opposite faces are equal. The sum of the six numbers on this cube is



$\text{(A)}\ 75 \qquad \text{(B)}\ 76 \qquad \text{(C)}\ 78 \qquad \text{(D)}\ 80 \qquad \text{(E)}\ 81$

Solution

Problem 12

There are twenty-four 4-digit numbers that use each of the four digits 2, 4, 5, and 7 exactly once. Listed in numerical order from smallest to largest, the number in the 17th position in the list is

$\text{(A)}\ 4527 \qquad \text{(B)}\ 5724 \qquad \text{(C)}\ 5742 \qquad \text{(D)}\ 7245 \qquad \text{(E)}\ 7524$

Solution

Problem 13

One proposal for new postage rates for a letter was 30 cents for the first ounce and 22 cents for each additional ounce (or fraction of an ounce). The postage for a letter weighing 4.5 ounces was

$\text{(A)}\ \text{96 cents} \qquad \text{(B)}\ \text{1.07 dollars} \qquad \text{(C)}\ \text{1.18 dollars} \qquad \text{(D)}\ \text{1.20 dollars} \qquad \text{(E)}\ \text{1.40 dollars}$

Solution

Problem 14

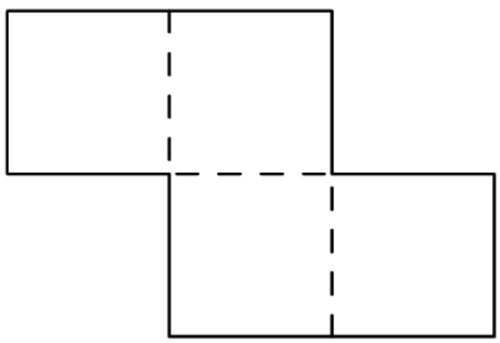
A bag contains only blue balls and green balls. There are 6 blue balls. If the probability of drawing a blue ball at random from this bag is $\frac{1}{4}$, then the number of green balls in the bag is

$\text{(A)}\ 12 \qquad \text{(B)}\ 18 \qquad \text{(C)}\ 24 \qquad \text{(D)}\ 30 \qquad \text{(E)}\ 36$

Solution

Problem 15

The area of this figure is 100 cm^2. Its perimeter is



[figure consists of four identical squares]

$\text{(A)}\ \text{20 cm} \qquad \text{(B)}\ \text{25 cm} \qquad \text{(C)}\ \text{30 cm} \qquad \text{(D)}\ \text{40 cm} \qquad \text{(E)}\ \text{50 cm}$

Solution

Problem 16

$1990-1980+1970-1960+\cdots -20+10 =$

$\text{(A)}\ -990 \qquad \text{(B)}\ -10 \qquad \text{(C)}\ 990 \qquad \text{(D)}\ 1000 \qquad \text{(E)}\ 1990$

Solution

Problem 17

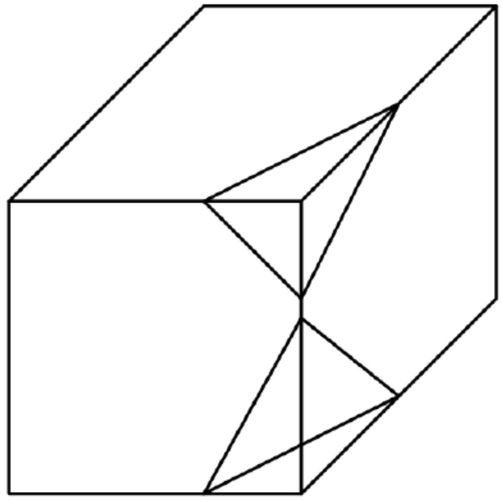
A straight concrete sidewalk is to be 3 feet wide, 60 feet long, and 3 **inches** thick. How many cubic yards of concrete must a contractor order for the sidewalk if concrete must be ordered in a whole number of cubic yards?

$\text{(A)}\ 2 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 20 \qquad \text{(E)}\ \text{more than 20}$

Solution

Problem 18

Each corner of a rectangular prism is cut off. Two (of the eight) cuts are shown. How many edges does the new figure have?



$\text{(A)}\ 24 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 42 \qquad \text{(E)}\ 48$

Assume that the planes cutting the prism do not intersect anywhere in or on the prism.

Solution

Problem 19

There are 120 seats in a row. What is the fewest number of seats that must be occupied so the next person to be seated must sit next to someone?

$\text{(A)}\ 30 \qquad \text{(B)}\ 40 \qquad \text{(C)}\ 41 \qquad \text{(D)}\ 60 \qquad \text{(E)}\ 119$

Solution

Problem 20

The annual incomes of $1,000$ families range from 8200 dollars to $98,000$ dollars. In error, the largest income was entered on the computer as $980,000$ dollars. The difference between the mean of the incorrect data and the mean of the actual data is

$\text{(A)}\ \text{882 dollars} \qquad \text{(B)}\ \text{980 dollars} \qquad \text{(C)}\ \text{1078 dollars} \qquad \text{(D)}\ \text{482,000 dollars} \qquad \text{(E)}\ \text{882,000 dollars}$

Solution

Problem 21

A list of 8 numbers is formed by beginning with two given numbers. Each new number in the list is the product of the two previous numbers. Find the first number if the last three are shown:

$$\underline{\ \ ?\ \ }, \underline{\ \ \ \ \ }, \underline{\ \ \ \ \ }, \underline{\ \ \ \ \ }, \underline{\ \ \ \ \ }, \underline{\ 16\ }, \underline{\ 64\ }, \underline{\ 1024\ }$$

$\text{(A)}\ \frac{1}{64} \qquad \text{(B)}\ \frac{1}{4} \qquad \text{(C)}\ 1 \qquad \text{(D)}\ 2 \qquad \text{(E)}\ 4$

Solution

Problem 22

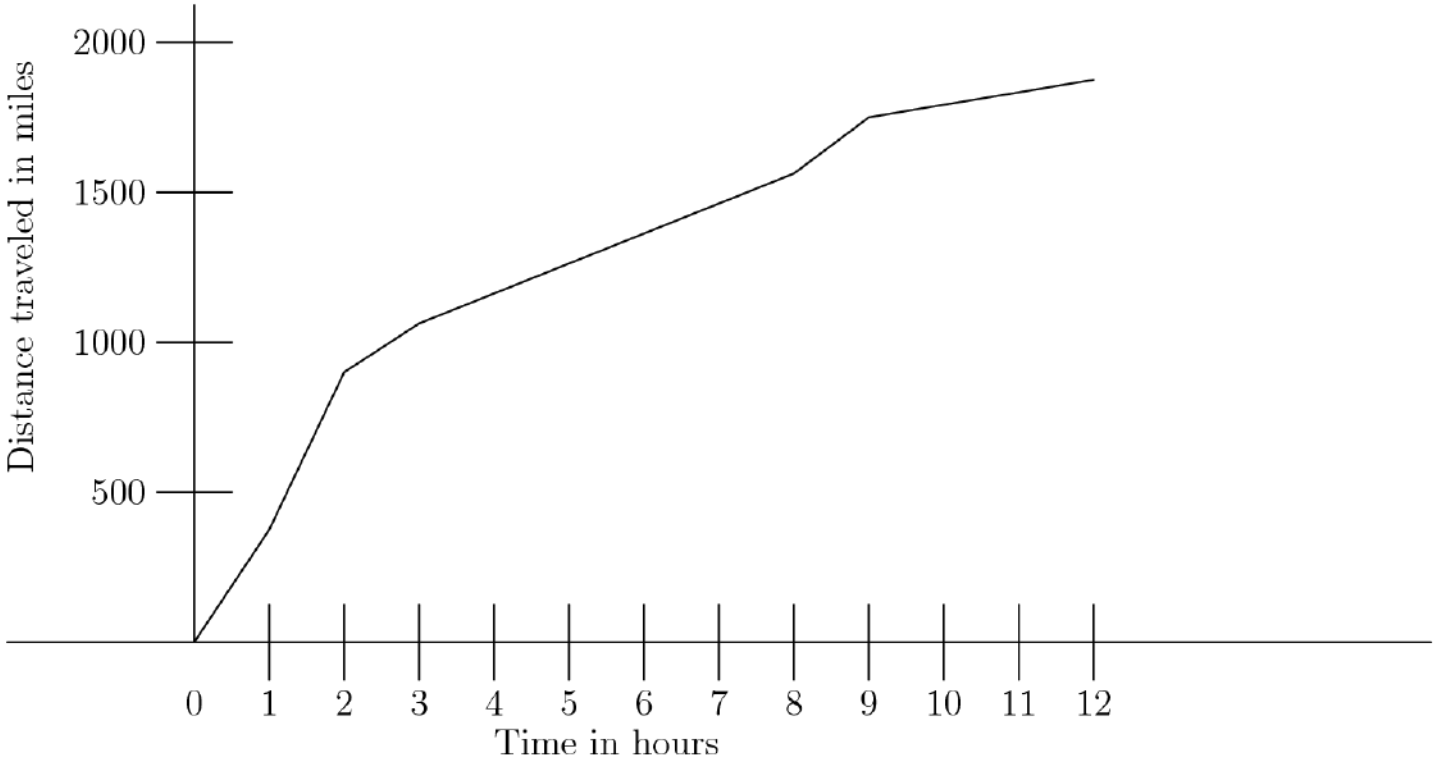
Several students are seated at a large circular table. They pass around a bag containing 100 pieces of candy. Each person receives the bag, takes one piece of candy and then passes the bag to the next person. If Chris takes the first and last piece of candy, then the number of students at the table could be

$\text{(A)}\ 10 \qquad \text{(B)}\ 11 \qquad \text{(C)}\ 19 \qquad \text{(D)}\ 20 \qquad \text{(E)}\ 25$

Solution

Problem 23

The graph relates the distance traveled [in miles] to the time elapsed [in hours] on a trip taken by an experimental airplane. During which hour was the average speed of this airplane the largest?

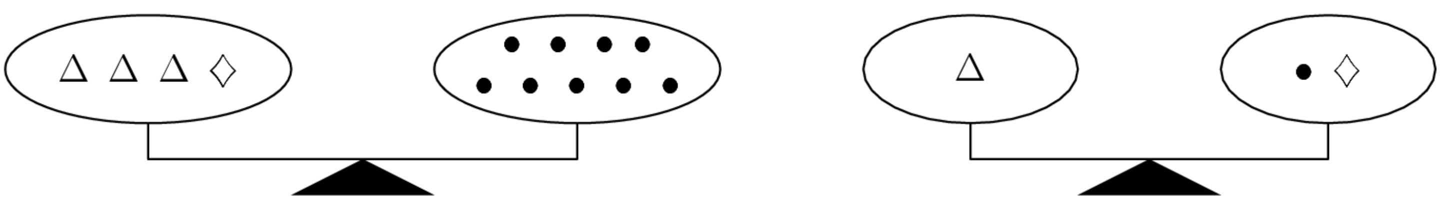


$\text{(A)}\ \text{first (0-1)} \qquad \text{(B)}\ \text{second (1-2)} \qquad \text{(C)}\ \text{third (2-3)} \qquad \text{(D)}\ \text{ninth (8-9)} \qquad \text{(E)}\ \text{last (11-12)}$

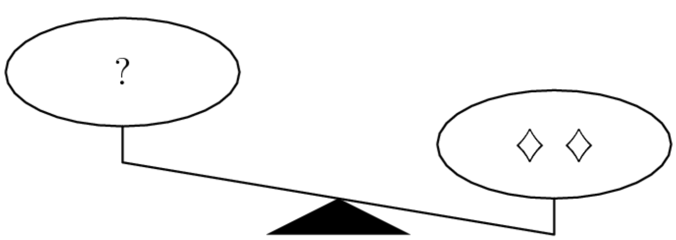
Solution

Problem 24

Three Δ's and a $\diamondsuit$ will balance nine $\bullet$'s. One Δ will balance a $\diamondsuit$ and a $\bullet$.



How many $\bullet$'s will balance the two $\diamondsuit$'s in this balance?

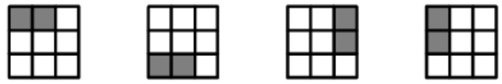


$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

Solution

Problem 25

How many different patterns can be made by shading exactly two of the nine squares? Patterns that can be matched by flips and/or turns are not considered different. For example, the patterns shown below are **not** considered different.



$\text{(A)}\ 3 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 18$

Solution

See also

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1991 AJHSME Problems

1991 AJHSME (**Answer Key**)
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Contents

Problem 1

$1,000,000,000,000 - 777,777,777,777 =$

$\text{(A)}\ 222,222,222,222 \qquad \text{(B)}\ 222,222,222,223 \qquad \text{(C)}\ 233,333,333,333$
$\text{(D)}\ 322,222,222,223 \qquad \text{(E)}\ 333,333,333,333$

Solution

Problem 2

$$\frac{16+8}{4-2}=$$

$\text{(A)}\ 4 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 20$

Solution

Problem 3

Two hundred thousand times two hundred thousand equals

$\text{(A)}\ \text{four hundred thousand} \qquad \text{(B)}\ \text{four million} \qquad \text{(C)}\ \text{forty thousand}$
$\text{(D)}\ \text{four hundred million} \qquad \text{(E)}\ \text{forty billion}$

Solution

Problem 4

If $991+993+995+997+999=5000-N$, then $N=$

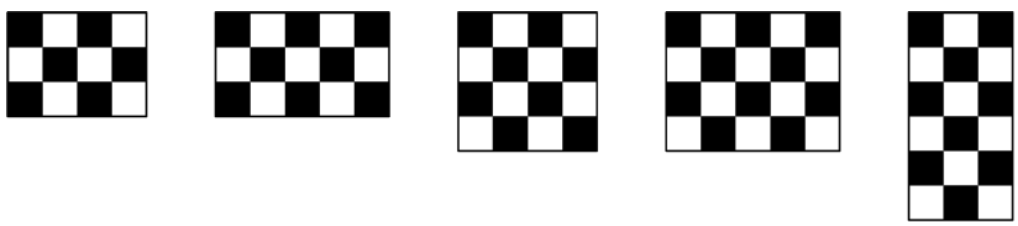
$\text{(A)}\ 5 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 20 \qquad \text{(E)}\ 25$

Solution

Problem 5

A "domino" is made up of two small squares:

Which of the "checkerboards" illustrated below CANNOT be covered exactly and completely by a whole number of non-overlapping dominoes?



$\text{(A)}\ 3\times 4 \qquad \text{(B)}\ 3\times 5 \qquad \text{(C)}\ 4\times 4 \qquad \text{(D)}\ 4\times 5 \qquad \text{(E)}\ 6\times 3$

Solution

Problem 6

Which number in the array below is both the largest in its column and the smallest in its row? (Columns go up and down, rows go right and left.)

$$\begin{array}{ccccc} 10 & 6 & 4 & 3 & 2 \\ 11 & 7 & 14 & 10 & 8 \\ 8 & 3 & 4 & 5 & 9 \\ 13 & 4 & 15 & 12 & 1 \\ 8 & 2 & 5 & 9 & 3 \end{array}$$

$\text{(A)}\ 1 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 15$

Solution

Problem 7

The value of $\dfrac{(487,000)(12,027,300)+(9,621,001)(487,000)}{(19,367)(.05)}$ is closest to

$\text{(A)}\ 10,000,000 \qquad \text{(B)}\ 100,000,000 \qquad \text{(C)}\ 1,000,000,000 \qquad \text{(D)}\ 10,000,000,000 \qquad \text{(E)}\ 100,000,000,00$

Solution

Problem 8

What is the largest quotient that can be formed using two numbers chosen from the set $\{-24,-3,-2,1,2,8\}$?

$\text{(A)}\ -24 \qquad \text{(B)}\ -3 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 24$

Solution

Problem 9

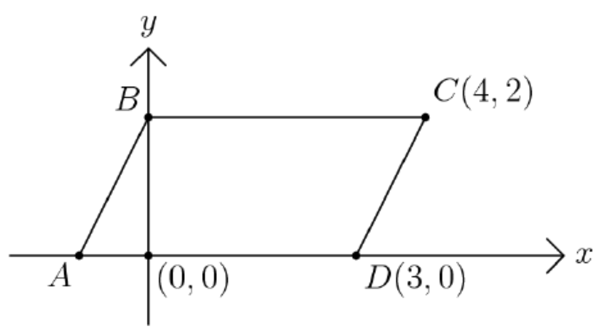
How many whole numbers from 1 through 46 are divisible by either 3 or 5 or both?

$\text{(A)}\ 18 \qquad \text{(B)}\ 21 \qquad \text{(C)}\ 24 \qquad \text{(D)}\ 25 \qquad \text{(E)}\ 27$

Solution

Problem 10

The area in square units of the region enclosed by parallelogram $ABCD$ is



$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 15 \qquad \text{(E)}\ 18$

Solution

Problem 11

There are several sets of three different numbers whose sum is 15 which can be chosen from $\{1,2,3,4,5,6,7,8,9\}$. How many of these sets contain a 5?

$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 7$

Solution

Problem 12

If $\frac{2+3+4}{3}=\frac{1990+1991+1992}{N}$, then $N=$

$\text{(A)}\ 3 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 1990 \qquad \text{(D)}\ 1991 \qquad \text{(E)}\ 1992$

Solution

Problem 13

How many zeros are at the end of the product

$$25\times 25\times 25\times 25\times 25\times 25\times 25\times 8\times 8\times 8?$$

$\text{(A)}\ 3 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 12$

Solution

Problem 14

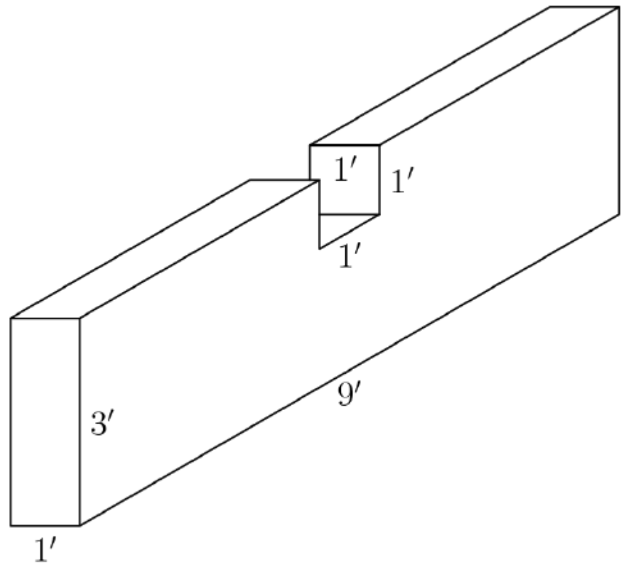
Several students are competing in a series of three races. A student earns 5 points for winning a race, 3 points for finishing second and 1 point for finishing third. There are no ties. What is the smallest number of points that a student must earn in the three races to be guaranteed of earning more points than any other student?

$\text{(A)}\ 9 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 11 \qquad \text{(D)}\ 13 \qquad \text{(E)}\ 15$

Solution

Problem 15

All six sides of a rectangular solid were rectangles. A one-foot cube was cut out of the rectangular solid as shown. The total number of square feet in the surface of the new solid is how many more or less than that of the original solid?



$\text{(A)}\ 2\text{ less} \qquad \text{(B)}\ 1\text{ less} \qquad \text{(C)}\ \text{the same} \qquad \text{(D)}\ 1\text{ more} \qquad \text{(E)}\ 2\text{ more}$

Solution

Problem 16

The 16 squares on a piece of paper are numbered as shown in the diagram. While lying on a table, the paper is folded in half four times in the following sequence:

(1) fold the top half over the bottom half

(2) fold the bottom half over the top half

(3) fold the right half over the left half

(4) fold the left half over the right half.

Which numbered square is on top after step 4?

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

$\text{(A)}\ 1 \qquad \text{(B)}\ 9 \qquad \text{(C)}\ 10 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 16$

Solution

Problem 17

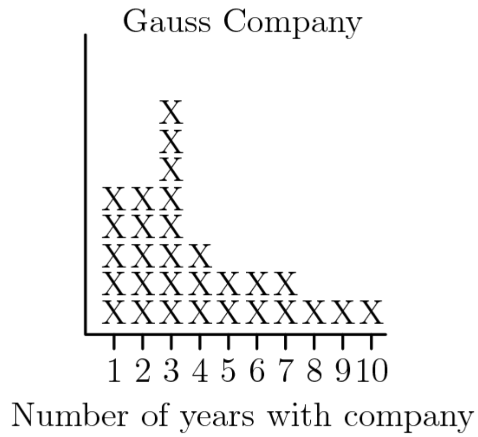
An auditorium with 20 rows of seats has 10 seats in the first row. Each successive row has one more seat than the previous row. If students taking an exam are permitted to sit in any row, but not next to another student in that row, then the maximum number of students that can be seated for an exam is

$\text{(A)}\ 150 \qquad \text{(B)}\ 180 \qquad \text{(C)}\ 200 \qquad \text{(D)}\ 400 \qquad \text{(E)}\ 460$

Solution

Problem 18

The vertical axis indicates the number of employees, but the scale was accidentally omitted from this graph. What percent of the employees at the Gauss company have worked there for 5 years or more?



$\text{(A)}\ 9\% \qquad \text{(B)}\ 23\frac{1}{3}\% \qquad \text{(C)}\ 30\% \qquad \text{(D)}\ 42\frac{6}{7}\% \qquad \text{(E)}\ 50\%$

Solution

Problem 19

The average (arithmetic mean) of 10 different positive whole numbers is 10. The largest possible value of any of these numbers is

$\text{(A)}\ 10 \qquad \text{(B)}\ 50 \qquad \text{(C)}\ 55 \qquad \text{(D)}\ 90 \qquad \text{(E)}\ 91$

Solution

Problem 20

In the addition problem, each digit has been replaced by a letter. If different letters represent different digits then $C =$

$$\begin{array}{cccc} & A & B & C \\ & & A & B \\ + & & & A \\ \hline & 3 & 0 & 0 \end{array}$$

$\text{(A)}\ 1 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 9$

Solution

Problem 21

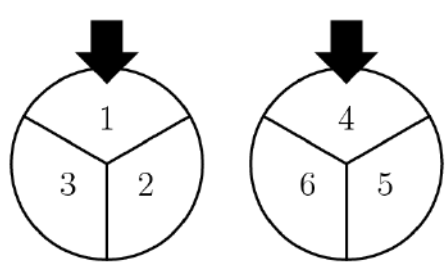
For every 3° rise in temperature, the volume of a certain gas expands by 4 cubic centimeters. If the volume of the gas is 24 cubic centimeters when the temperature is 32°, what was the volume of the gas in cubic centimeters when the temperature was 20°?

$\text{(A)}\ 8 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 40$

Solution

Problem 22

Each spinner is divided into 3 equal parts. The results obtained from spinning the two spinners are multiplied. What is the probability that this product is an even number?



$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{1}{2} \qquad \text{(C)}\ \frac{2}{3} \qquad \text{(D)}\ \frac{7}{9} \qquad \text{(E)}\ 1$

Solution

Problem 23

The Pythagoras High School band has 100 female and 80 male members. The Pythagoras High School orchestra has 80 female and 100 male members. There are 60 females who are members in both band and orchestra. Altogether, there are 230 students who are in either band or orchestra or both. The number of males in the band who are NOT in the orchestra is

$\text{(A)}\ 10 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 50 \qquad \text{(E)}\ 70$

Solution

Problem 24

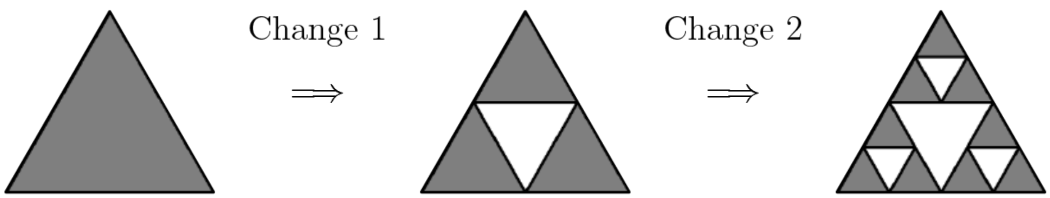
A cube of edge 3 cm is cut into N smaller cubes, not all the same size. If the edge of each of the smaller cubes is a whole number of centimeters, then $N =$

$\text{(A)}\ 4 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 20$

Solution

Problem 25

An equilateral triangle is originally painted black. Each time the triangle is changed, the middle fourth of each black triangle turns white. After five changes, what fractional part of the original area of the black triangle remains black?



$\text{(A)}\ \frac{1}{1024} \qquad \text{(B)}\ \frac{15}{64} \qquad \text{(C)}\ \frac{243}{1024} \qquad \text{(D)}\ \frac{1}{4} \qquad \text{(E)}\ \frac{81}{256}$

Solution

See also

1991 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1991))	
Preceded by **1990 AJHSME**	Followed by **1992 AJHSME**
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1992 AJHSME Problems

1992 AJHSME (**Answer Key**)
Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=1992) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_10-1992-43)

Instructions

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Contents

Problem 1

$$\frac{10-9+8-7+6-5+4-3+2-1}{1-2+3-4+5-6+7-8+9} =$$

$\text{(A)}\ -1 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ 10$

Solution

Problem 2

Which of the following is not equal to $\dfrac{5}{4}$?

$\text{(A)}\ \frac{10}{8} \qquad \text{(B)}\ 1\frac{1}{4} \qquad \text{(C)}\ 1\frac{3}{12} \qquad \text{(D)}\ 1\frac{1}{5} \qquad \text{(E)}\ 1\frac{10}{40}$

Solution

Problem 3

What is the largest difference that can be formed by subtracting two numbers chosen from the set $\{ -16,-4,0,2,4,12 \}$?

$\text{(A)}\ 10 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 16 \qquad \text{(D)}\ 28 \qquad \text{(E)}\ 48$

Solution

Problem 4

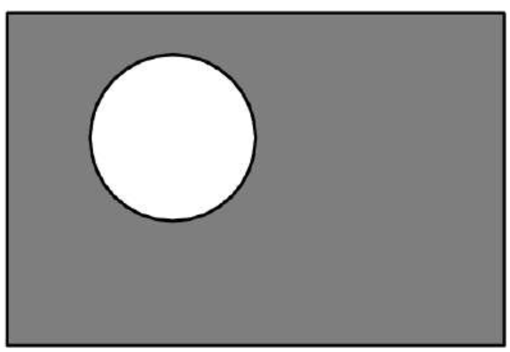
During the softball season, Judy had 35 hits. Among her hits were 1 home run, 1 triple and 5 doubles. The rest of her hits were singles. What percent of her hits were singles?

$\text{(A)}\ 28\% \qquad \text{(B)}\ 35\% \qquad \text{(C)}\ 70\% \qquad \text{(D)}\ 75\% \qquad \text{(E)}\ 80\%$

Solution

Problem 5

A circle of diameter 1 is removed from a 2×3 rectangle, as shown. Which whole number is closest to the area of the shaded region?

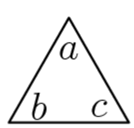


$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

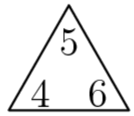
Solution

Problem 6

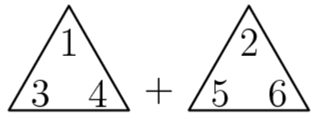
Suppose that



means $a+b-c$. For example,



is $5 + 4 - 6 = 3$. Then the sum



is

$\text{(A)}\ -2 \qquad \text{(B)}\ -1 \qquad \text{(C)}\ 0 \qquad \text{(D)}\ 1 \qquad \text{(E)}\ 2$

Solution

Problem 7

The digit-sum of 998 is $9+9+8=26$. How many 3-digit whole numbers, whose digit-sum is 26, are even?

$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

Solution

Problem 8

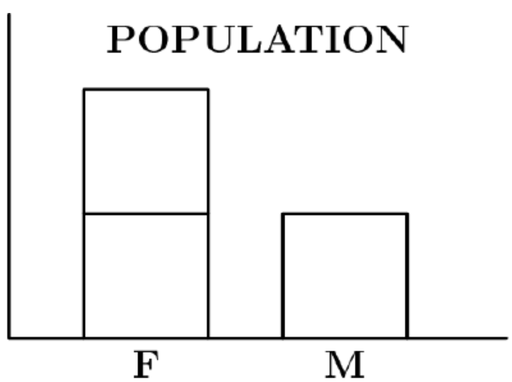
A store owner bought 1500 pencils at $\$0.10$ each. If he sells them for $\$0.25$ each, how many of them must he sell to make a profit of exactly $\$100.00$?

$\text{(A)}\ 400 \qquad \text{(B)}\ 667 \qquad \text{(C)}\ 1000 \qquad \text{(D)}\ 1500 \qquad \text{(E)}\ 1900$

Solution

Problem 9

The population of a small town is 480. The graph indicates the number of females and males in the town, but the vertical scale-values are omitted. How many males live in the town?

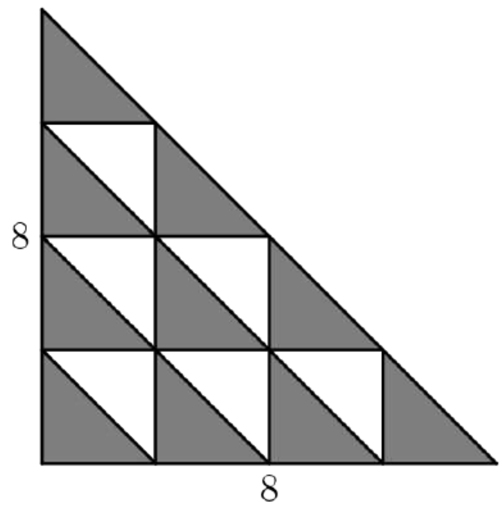


$\text{(A)}\ 120 \qquad \text{(B)}\ 160 \qquad \text{(C)}\ 200 \qquad \text{(D)}\ 240 \qquad \text{(E)}\ 360$

Solution

Problem 10

An isosceles right triangle with legs of length 8 is partitioned into 16 congruent triangles as shown. The shaded area is

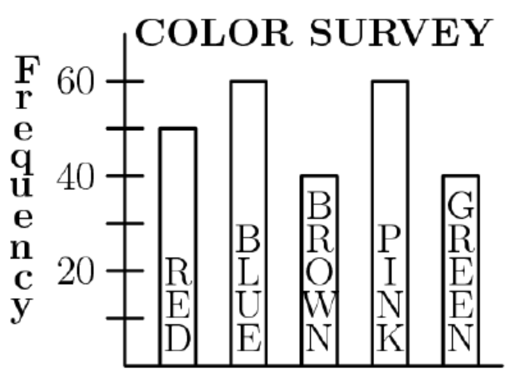


$\text{(A)}\ 10 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 40 \qquad \text{(E)}\ 64$

Solution

Problem 11

The bar graph shows the results of a survey on color preferences. What percent preferred blue?



$\text{(A)}\ 20\% \qquad \text{(B)}\ 24\% \qquad \text{(C)}\ 30\% \qquad \text{(D)}\ 36\% \qquad \text{(E)}\ 42\%$

Solution

Problem 12

The five tires of a car (four road tires and a full-sized spare) were rotated so that each tire was used the same number of miles during the first $30,000$ miles the car traveled. For how many miles was each tire used?

$\text{(A)}\ 6000 \qquad \text{(B)}\ 7500 \qquad \text{(C)}\ 24,000 \qquad \text{(D)}\ 30,000 \qquad \text{(E)}\ 37,500$

Solution

Problem 13

Five test scores have a mean (average score) of 90, a median (middle score) of 91 and a mode (most frequent score) of 94. The sum of the two lowest test scores is

$\text{(A)}\ 170 \qquad \text{(B)}\ 171 \qquad \text{(C)}\ 176 \qquad \text{(D)}\ 177 \qquad \text{(E)}\ \text{not determined by the information given}$

Solution

Problem 14

When four gallons are added to a tank that is one-third full, the tank is then one-half full. The capacity of the tank in gallons is

$\text{(A)}\ 8 \qquad \text{(B)}\ 12 \qquad \text{(C)}\ 20 \qquad \text{(D)}\ 24 \qquad \text{(E)}\ 48$

Solution

Problem 15

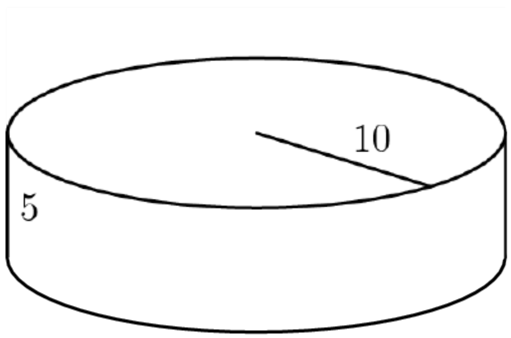
What is the 1992^nd letter in this sequence?

$$\text{ABCDEDCBAABCDEDCBAABCDEDCBAABCDEDC}\cdots$$

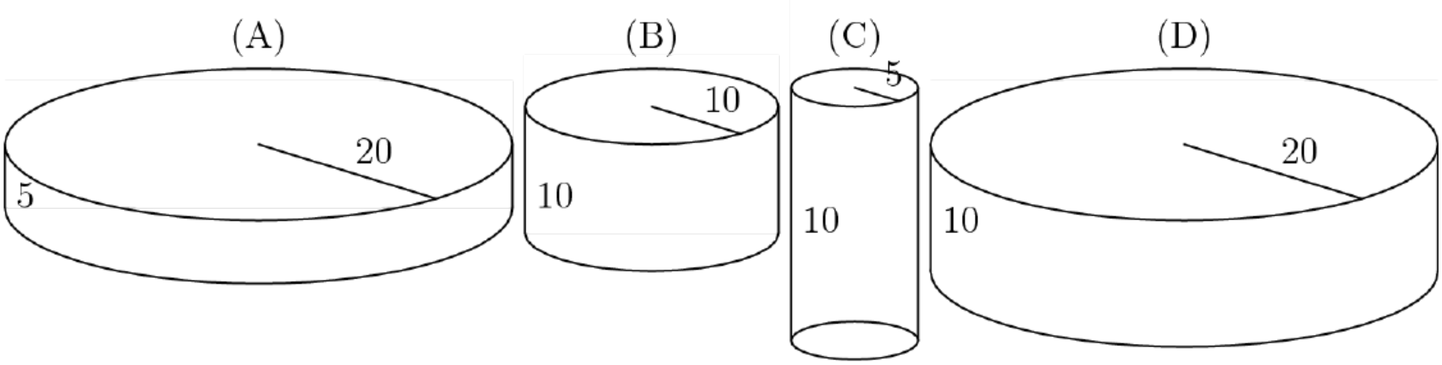
$\text{(A)}\ \text{A} \qquad \text{(B)}\ \text{B} \qquad \text{(C)}\ \text{C} \qquad \text{(D)}\ \text{D} \qquad \text{(E)}\ \text{E}$

Solution

Problem 16



Which cylinder has twice the volume of the cylinder shown above?

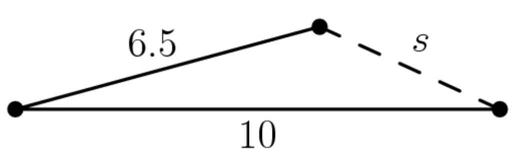


$\text{(E)}\ \text{None of the above}$

Solution

Problem 17

The sides of a triangle have lengths 6.5, 10, and s, where s is a whole number. What is the smallest possible value of s?



$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 7$

Solution

Problem 18

On a trip, a car traveled 80 miles in an hour and a half, then was stopped in traffic for 30 minutes, then traveled 100 miles during the next 2 hours. What was the car's average speed in miles per hour for the 4-hour trip?

$\text{(A)}\ 45 \qquad \text{(B)}\ 50 \qquad \text{(C)}\ 60 \qquad \text{(D)}\ 75 \qquad \text{(E)}\ 90$

Solution

Problem 19

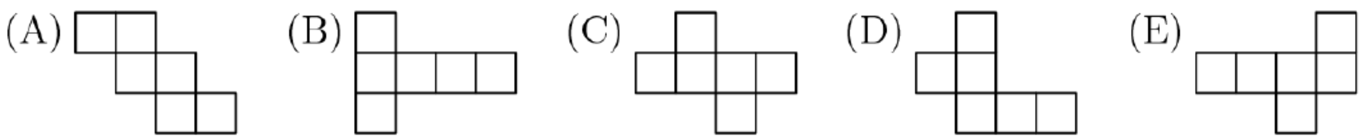
The distance between the 5^th and 26^th exits on an interstate highway is 118 miles. If any two exits are at least 5 miles apart, then what is the largest number of miles there can be between two consecutive exits that are between the 5^th and 26^th exits?

$\text{(A)}\ 8 \qquad \text{(B)}\ 13 \qquad \text{(C)}\ 18 \qquad \text{(D)}\ 47 \qquad \text{(E)}\ 98$

Solution

Problem 20

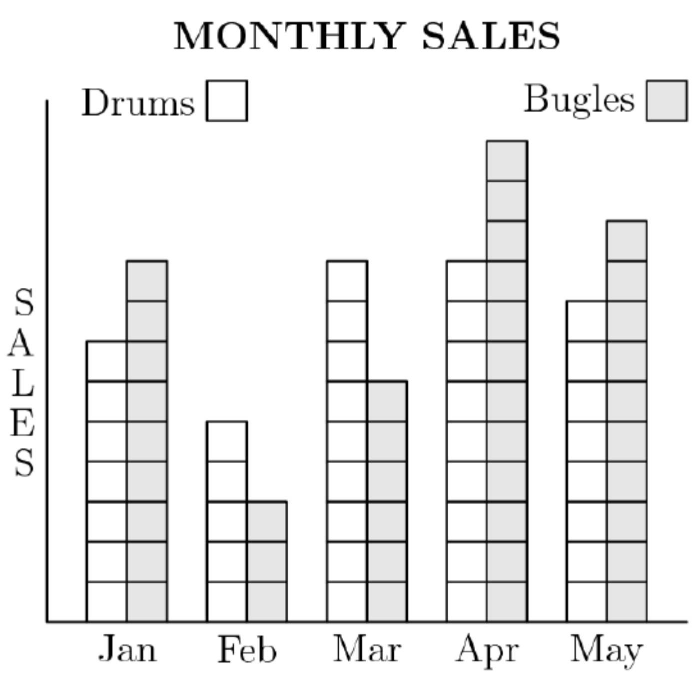
Which pattern of identical squares could NOT be folded along the lines shown to form a cube?



Solution

Problem 21

Northside's Drum and Bugle Corps raised money for a trip. The drummers and bugle players kept separate sales records. According to the double bar graph, in what month did one group's sales exceed the other's by the greatest percent?

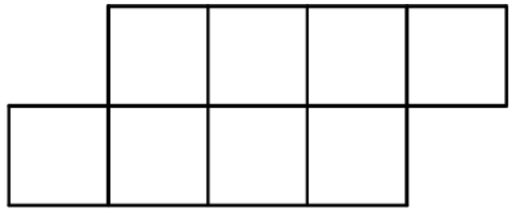


$\text{(A)}\ \text{Jan} \qquad \text{(B)}\ \text{Feb} \qquad \text{(C)}\ \text{Mar} \qquad \text{(D)}\ \text{Apr} \qquad \text{(E)}\ \text{May}$

Solution

Problem 22

Eight 1×1 square tiles are arranged as shown so their outside edges form a polygon with a perimeter of 14 units. Two additional tiles of the same size are added to the figure so that at least one side of each tile is shared with a side of one of the squares in the original figure. Which of the following could be the perimeter of the new figure?



$\text{(A)}\ 15 \qquad \text{(B)}\ 17 \qquad \text{(C)}\ 18 \qquad \text{(D)}\ 19 \qquad \text{(E)}\ 20$

Solution

Problem 23

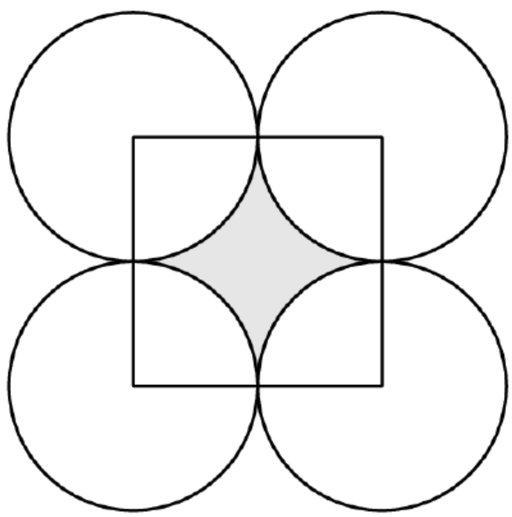
If two dice are tossed, the probability that the product of the numbers showing on the tops of the dice is greater than 10 is

$\text{(A)}\ \frac{3}{7} \qquad \text{(B)}\ \frac{17}{36} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{5}{8} \qquad \text{(E)}\ \frac{11}{12}$

Solution

Problem 24

Four circles of radius 3 are arranged as shown. Their centers are the vertices of a square. The area of the shaded region is closest to



$\text{(A)}\ 7.7 \qquad \text{(B)}\ 12.1 \qquad \text{(C)}\ 17.2 \qquad \text{(D)}\ 18 \qquad \text{(E)}\ 27$

Solution

Problem 25

One half of the water is poured out of a full container. Then one third of the remainder is poured out. Continue the process: one fourth of the remainder for the third pouring, one fifth of the remainder for the fourth pouring, etc. After how many pourings does exactly one tenth of the original water remain?

$\text{(A)}\ 6 \qquad \text{(B)}\ 7 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ 10$

Solution

See also

1992 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1992))	
Preceded by **1991 AJHSME**	Followed by **1993 AJHSME**
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1993 AJHSME Problems

1993 AJHSME (**Answer Key**)
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Instructions

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Contents

Problem 1

Which pair of numbers does NOT have a product equal to 36?

$\text{(A)}\ \{-4,-9\} \qquad \text{(B)}\ \{-3,-12\} \qquad \text{(C)}\ \left\{\frac{1}{2},-72\right\} \qquad \text{(D)}\ \{1,36\} \qquad \text{(E)}\ \left\{\frac{3}{2},24\right\}$

Solution

Problem 2

When the fraction $\frac{49}{84}$ is expressed in simplest form, then the sum of the numerator and the denominator will be

$\text{(A)}\ 11 \qquad \text{(B)}\ 17 \qquad \text{(C)}\ 19 \qquad \text{(D)}\ 33 \qquad \text{(E)}\ 133$

Solution

Problem 3

Which of the following numbers has the largest prime factor?

$\text{(A)}\ 39 \qquad \text{(B)}\ 51 \qquad \text{(C)}\ 77 \qquad \text{(D)}\ 91 \qquad \text{(E)}\ 121$

Solution

Problem 4

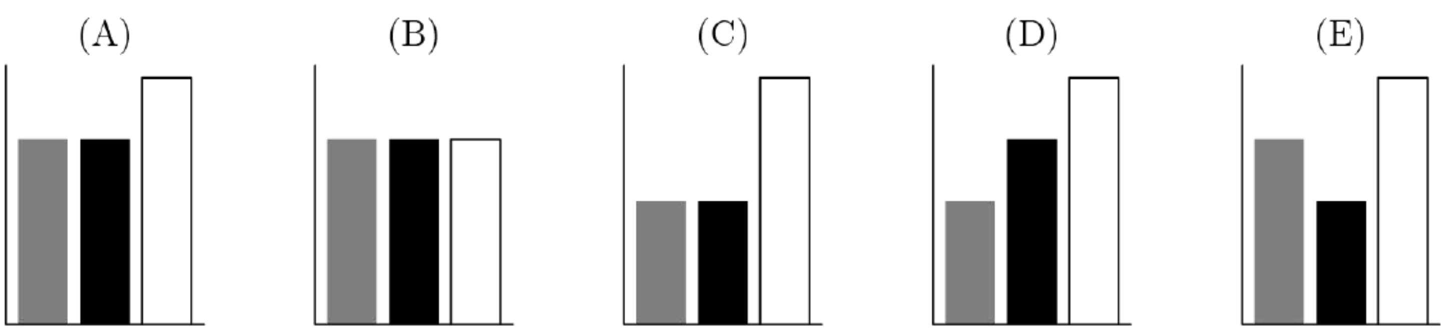
$1000\times 1993 \times 0.1993 \times 10 =$

$\text{(A)}\ 1.993\times 10^3 \qquad \text{(B)}\ 1993.1993 \qquad \text{(C)}\ (199.3)^2 \qquad \text{(D)}\ 1,993,001.993 \qquad \text{(E)}\ (1993)^2$

Solution

Problem 5

Which one of the following bar graphs could represent the data from the circle graph?



Solution

Problem 6

A can of soup can feed 3 adults or 5 children. If there are 5 cans of soup and 15 children are fed, then how many adults would the remaining soup feed?

$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 25$

Solution

Problem 7

$3^3 + 3^3 + 3^3 =$

$\text{(A)}\ 3^4 \qquad \text{(B)}\ 9^3 \qquad \text{(C)}\ 3^9 \qquad \text{(D)}\ 27^3 \qquad \text{(E)}\ 3^{27}$

Solution

Problem 8

To control her blood pressure, Jill's grandmother takes one half of a pill every other day. If one supply of medicine contains 60 pills, then the supply of medicine would last approximately

$\text{(A)}\ 1\text{ month} \qquad \text{(B)}\ 4\text{ months} \qquad \text{(C)}\ 6\text{ months} \qquad \text{(D)}\ 8\text{ months} \qquad \text{(E)}\ 1\text{ year}$

Solution

Problem 9

Consider the operation $*$ defined by the following table:

$*$	1	2	3	4
1	1	2	3	4
2	2	4	1	3
3	3	1	4	2
4	4	3	2	1

For example, $3*2=1$. Then $(2*4)*(1*3)=$

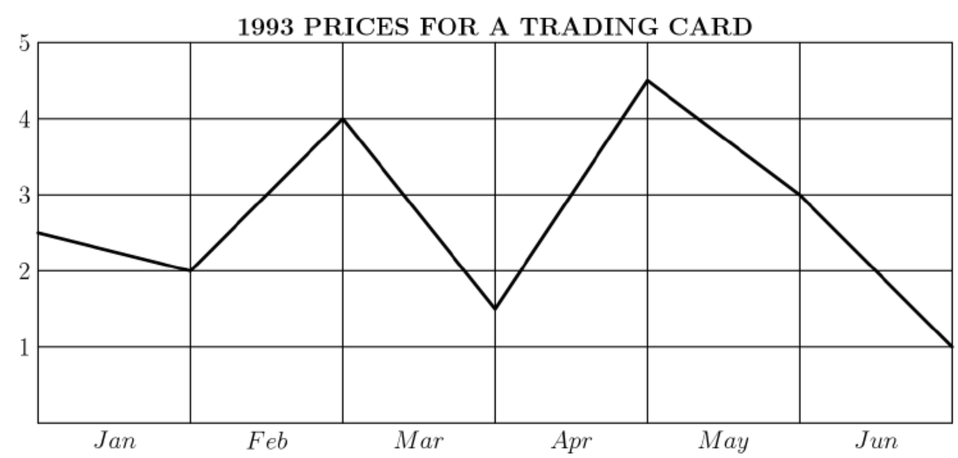
$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

Solution

Problem 10

This line graph represents the price of a trading card during the first 6 months of 1993.

P ¡br /¿ **R** ¡br /¿ **I** ¡br /¿ **C** ¡br /¿ **E**



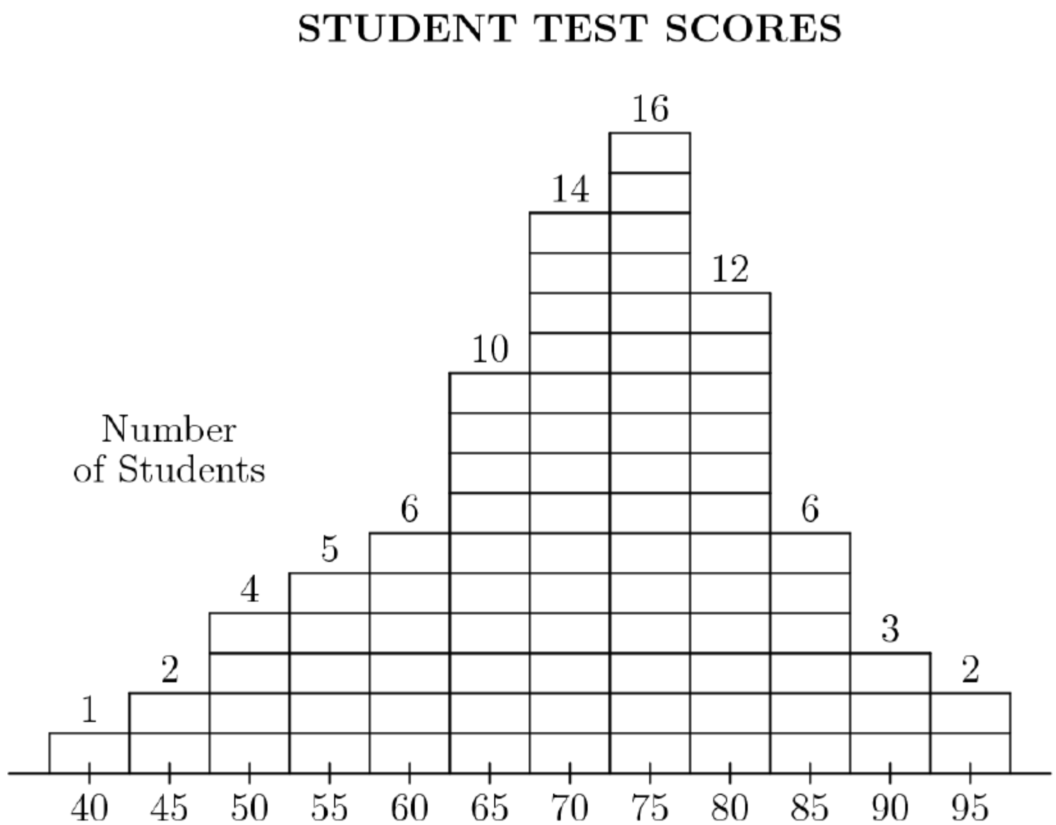
The greatest monthly drop in price occurred during

$\text{(A)}\ \text{January} \qquad \text{(B)}\ \text{March} \qquad \text{(C)}\ \text{April} \qquad \text{(D)}\ \text{May} \qquad \text{(E)}\ \text{June}$

Solution

Problem 11

Consider this histogram of the scores for 81 students taking a test:



The median is in the interval labeled

$\text{(A)}\ 60 \qquad \text{(B)}\ 65 \qquad \text{(C)}\ 70 \qquad \text{(D)}\ 75 \qquad \text{(E)}\ 80$

Solution

Problem 12

If each of the three operation signs, $+$, $-$, $\times$, is used exactly ONCE in one of the blanks in the expression

$$5\_\_4\_\_6\_\_3$$

then the value of the result could equal

$\text{(A)}\ 9 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 19$

Solution

Problem 13

The word "**HELP**" in block letters is painted in black with strokes 1 unit wide on a 5 by 15 rectangular white sign with dimensions as shown. The area of the white portion of the sign, in square units, is

$\text{(A)}\ 30 \qquad \text{(B)}\ 32 \qquad \text{(C)}\ 34 \qquad \text{(D)}\ 36 \qquad \text{(E)}\ 38$

Solution

Problem 14

The nine squares in the table shown are to be filled so that every row and every column contains each of the numbers $1, 2, 3$. Then $A+B=$

1		
	2	A
		B

$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$

Solution

Problem 15

The arithmetic mean (average) of four numbers is 85. If the largest of these numbers is 97, then the mean of the remaining three numbers is

$\text{(A)}\ 81.0 \qquad \text{(B)}\ 82.7 \qquad \text{(C)}\ 83.0 \qquad \text{(D)}\ 84.0 \qquad \text{(E)}\ 84.3$

Solution

Problem 16

$$\frac{1}{1+\frac{1}{2+\frac{1}{3}}}=$$

$\text{(A)}\ \frac{1}{6} \qquad \text{(B)}\ \frac{3}{10} \qquad \text{(C)}\ \frac{7}{10} \qquad \text{(D)}\ \frac{5}{6} \qquad \text{(E)}\ \frac{10}{3}$

Solution

Problem 17

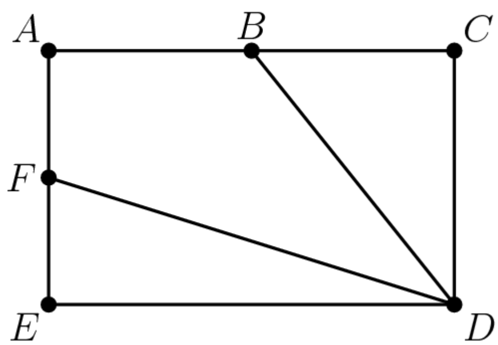
Square corners, 5 units on a side, are removed from a 20 unit by 30 unit rectangular sheet of cardboard. The sides are then folded to form an open box. The surface area, in square units, of the interior of the box is

$\text{(A)}\ 300 \qquad \text{(B)}\ 500 \qquad \text{(C)}\ 550 \qquad \text{(D)}\ 600 \qquad \text{(E)}\ 1000$

Solution

Problem 18

The rectangle shown has length $AC = 32$, width $AE = 20$, and B and F are midpoints of $\overline{AC}$ and $\overline{AE}$, respectively. The area of quadrilateral $ABDF$ is



$\text{(A)}\ 320 \qquad \text{(B)}\ 325 \qquad \text{(C)}\ 330 \qquad \text{(D)}\ 335 \qquad \text{(E)}\ 340$

Solution

Problem 19

$(1901 + 1902 + 1903 + \cdots + 1993) - (101 + 102 + 103 + \cdots + 193) =$

$\text{(A)}\ 167,400 \qquad \text{(B)}\ 172,050 \qquad \text{(C)}\ 181,071 \qquad \text{(D)}\ 199,300 \qquad \text{(E)}\ 362,142$

Solution

Problem 20

When $10^{93} - 93$ is expressed as a single whole number, the sum of the digits is

$\text{(A)}\ 10 \qquad \text{(B)}\ 93 \qquad \text{(C)}\ 819 \qquad \text{(D)}\ 826 \qquad \text{(E)}\ 833$

Solution

Problem 21

If the length of a rectangle is increased by 20% and its width is increased by 50%, then the area is increased by

$\text{(A)}\ 10\% \qquad \text{(B)}\ 30\% \qquad \text{(C)}\ 70\% \qquad \text{(D)}\ 80\% \qquad \text{(E)}\ 100\%$

Solution

Problem 22

Pat Peano has plenty of 0's, 1's, 3's, 4's, 5's, 6's, 7's, 8's and 9's, but he has only twenty-two 2's. How far can he number the pages of his scrapbook with these digits?

$\text{(A)}\ 22 \qquad \text{(B)}\ 99 \qquad \text{(C)}\ 112 \qquad \text{(D)}\ 119 \qquad \text{(E)}\ 199$

Solution

Problem 23

Five runners, P, Q, R, S, T, have a race, and P beats Q, P beats R, Q beats S, and T finishes after P and before Q. Who could NOT have finished third in the race?

$\text{(A)}\ P\text{ and }Q \qquad \text{(B)}\ P\text{ and }R \qquad \text{(C)}\ P\text{ and }S \qquad \text{(D)}\ P\text{ and }T \qquad \text{(E)}\ P,S\text{ and }T$

Solution

Problem 24

What number is directly above 142 in this array of numbers?

$$\begin{array}{cccccc}& & & 1 & &\\ & & 2 & 3 & 4 &\\ & 5 & 6 & 7 & 8 & 9\\ 10 & 11 & 12 &\cdots & &\\ \end{array}$$

$\text{(A)}\ 99 \qquad \text{(B)}\ 119 \qquad \text{(C)}\ 120 \qquad \text{(D)}\ 121 \qquad \text{(E)}\ 122$

Solution

Problem 25

A checkerboard consists of one-inch squares. A square card, 1.5 inches on a side, is placed on the board so that it covers part or all of the area of each of n squares. The maximum possible value of n is

$\text{(A)}\ 4\text{ or }5 \qquad \text{(B)}\ 6\text{ or }7 \qquad \text{(C)}\ 8\text{ or }9 \qquad \text{(D)}\ 10\text{ or }11 \qquad \text{(E)}\ 12\text{ or more}$

Solution

See also

1993 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1993))	
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1994 AJHSME Problems

1994 AJHSME (Answer Key) Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=1994) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_10-1994-43)
Instructions 1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct. 2. You will receive ? points for each correct answer, ? points for each problem left unanswered, and ? points for each incorrect answer. 3. No aids are permitted other than scratch paper, graph paper, ruler, compass, protractor and erasers. 4. Figures are not necessarily drawn to scale. 5. You will have **? minutes** working time to complete the test.
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Contents

Problem 1

Which of the following is the largest?

$$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{1}{4} \qquad \text{(C)}\ \frac{3}{8} \qquad \text{(D)}\ \frac{5}{12} \qquad \text{(E)}\ \frac{7}{24}$$

Solution

Problem 2

$$\frac{1}{10}+\frac{2}{10}+\frac{3}{10}+\frac{4}{10}+\frac{5}{10}+\frac{6}{10}+\frac{7}{10}+\frac{8}{10}+\frac{9}{10}+\frac{55}{10}=$$

$\text{(A)}\ 4\frac{1}{2} \qquad \text{(B)}\ 6.4 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 11$

Solution

Problem 3

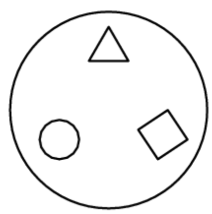
Each day Maria must work 8 hours. This does not include the 45 minutes she takes for lunch. If she begins working at 7:25 A.M. and takes her lunch break at noon, then her working day will end at

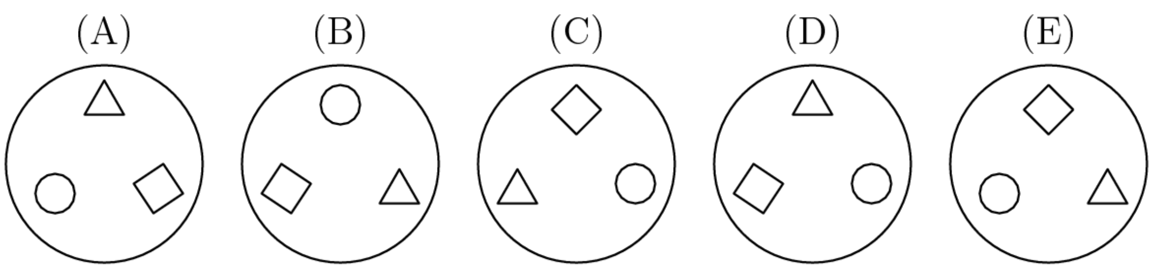
$\text{(A)}\ \text{3:40 P.M.} \qquad \text{(B)}\ \text{3:55 P.M.} \qquad \text{(C)}\ \text{4:10 P.M.} \qquad \text{(D)}\ \text{4:25 P.M.} \qquad \text{(E)}\ \text{4:40 P.M.}$

Solution

Problem 4

Which of the following represents the result when the figure shown below is rotated clockwise 120° around its center?





Solution

Problem 5

Given that $1\text{ mile} = 8\text{ furlongs}$ and $1\text{ furlong} = 40\text{ rods}$, the number of rods in one mile is

$\text{(A)}\ 5 \qquad \text{(B)}\ 320 \qquad \text{(C)}\ 660 \qquad \text{(D)}\ 1760 \qquad \text{(E)}\ 5280$

Solution

Problem 6

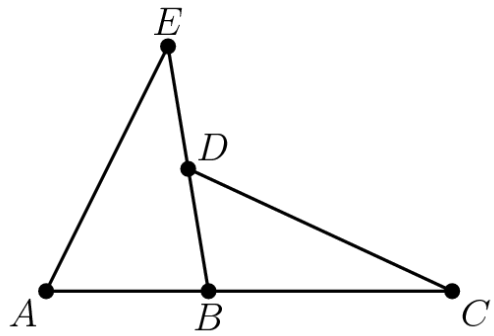
The unit's digit (one's digit) of the product of any six consecutive positive whole numbers is

$\text{(A)}\ 0 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 8$

Solution

Problem 7

If $\angle A = 60^\circ$, $\angle E = 40^\circ$ and $\angle C = 30^\circ$, then $\angle BDC =$



$\text{(A)}\ 40^\circ \qquad \text{(B)}\ 50^\circ \qquad \text{(C)}\ 60^\circ \qquad \text{(D)}\ 70^\circ \qquad \text{(E)}\ 80^\circ$

Solution

Problem 8

For how many three-digit whole numbers does the sum of the digits equal 25?

$\text{(A)}\ 2 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 10$

Solution

Problem 9

A shopper buys a 100 dollar coat on sale for 20% off. An additional 5 dollars are taken off the sale price by using a discount coupon. A sales tax of 8% is paid on the final selling price. The total amount the shopper pays for the coat is

$\text{(A)}\ \text{81.00 dollars} \qquad \text{(B)}\ \text{81.40 dollars} \qquad \text{(C)}\ \text{82.00 dollars} \qquad \text{(D)}\ \text{82.08 dollars} \qquad \text{(E)}\ \text{82.40 dollars}$

Solution

Problem 10

For how many positive integer values of N is the expression $\dfrac{36}{N+2}$ an integer?

$\text{(A)}\ 7 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 12$

Solution

Problem 11

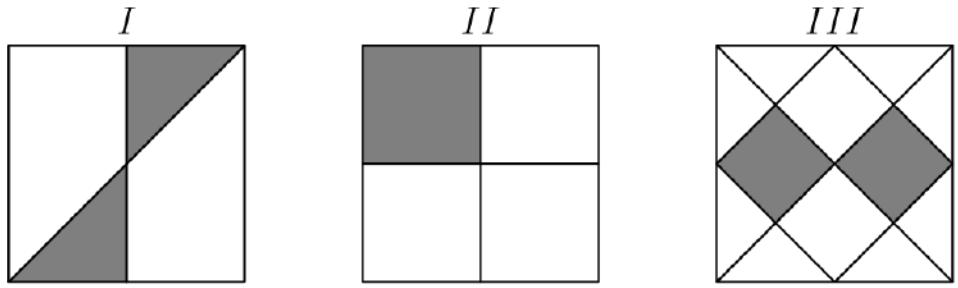
Last summer 100 students attended basketball camp. Of those attending, 52 were boys and 48 were girls. Also, 40 students were from Jonas Middle School and 60 were from Clay Middle School. Twenty of the girls were from Jonas Middle School. How many of the boys were from Clay Middle School?

$\text{(A)}\ 20 \qquad \text{(B)}\ 32 \qquad \text{(C)}\ 40 \qquad \text{(D)}\ 48 \qquad \text{(E)}\ 52$

Solution

Problem 12

Each of the three large squares shown below is the same size. Segments that intersect the sides of the squares intersect at the midpoints of the sides. How do the shaded areas of these squares compare?



(A) The shaded areas in all three are equal.

(B) Only the shaded areas of I and II are equal.

(C) Only the shaded areas of I and III are equal.

(D) Only the shaded areas of II and III are equal.

(E) The shaded areas of I, II and III are all different.

Solution

Problem 13

The number halfway between $\frac{1}{6}$ and $\frac{1}{4}$ is

$\text{(A)}\ \frac{1}{10} \qquad \text{(B)}\ \frac{1}{5} \qquad \text{(C)}\ \frac{5}{24} \qquad \text{(D)}\ \frac{7}{24} \qquad \text{(E)}\ \frac{5}{12}$

Solution

Problem 14

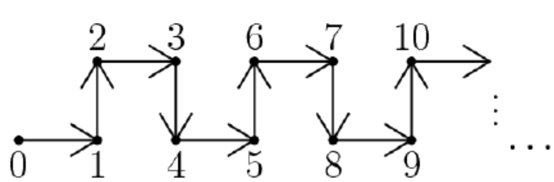
Two children at a time can play pairball. For 90 minutes, with only two children playing at a time, five children take turns so that each one plays the same amount of time. The number of minutes each child plays is

$\text{(A)}\ 9 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 18 \qquad \text{(D)}\ 20 \qquad \text{(E)}\ 36$

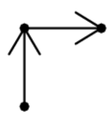
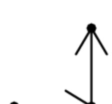
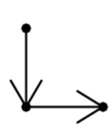
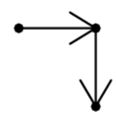
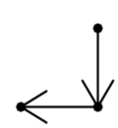
Solution

Problem 15

If this path is to continue in the same pattern:



then which sequence of arrows goes from point 425 to point 427?

(A)  (B)  (C)  (D)  (E) 

Solution

Problem 16

The perimeter of one square is 3 times the perimeter of another square. The area of the larger square is how many times the area of the smaller square?

$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 9$

Solution

Problem 17

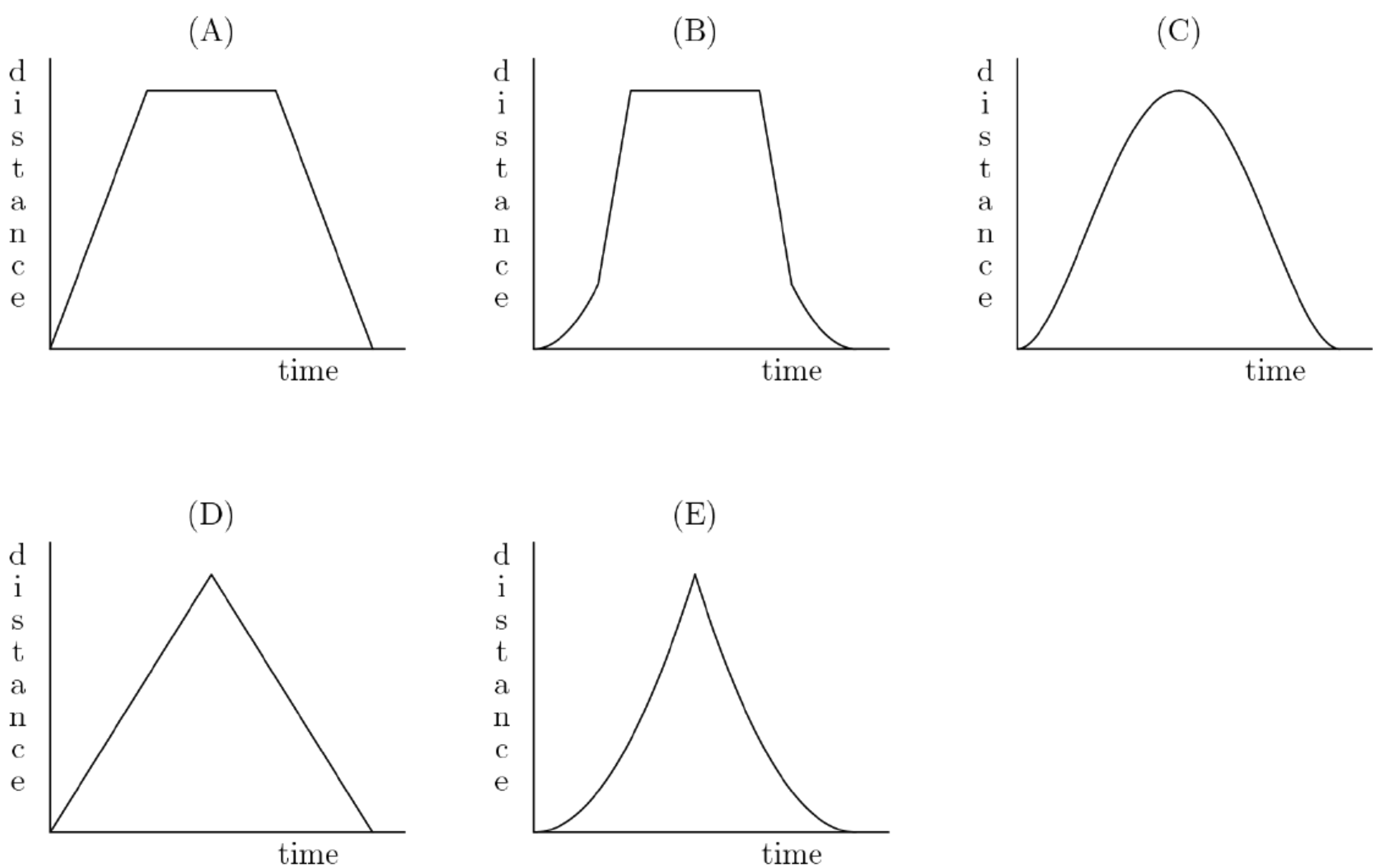
Pauline Bunyan can shovel snow at the rate of 20 cubic yards for the first hour, 19 cubic yards for the second, 18 for the third, etc., always shoveling one cubic yard less per hour than the previous hour. If her driveway is 4 yards wide, 10 yards long, and covered with snow 3 yards deep, then the number of hours it will take her to shovel it clean is closest to

$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 12$

Solution

Problem 18

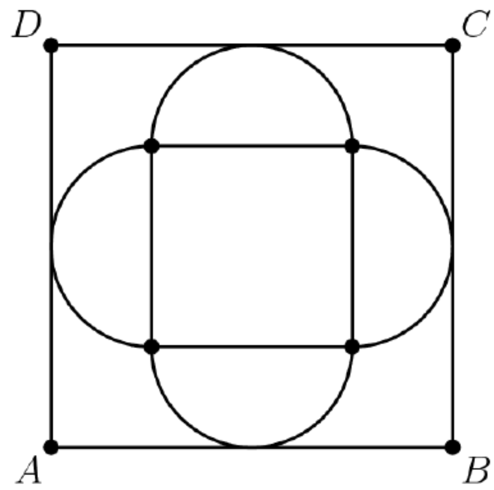
Mike leaves home and drives slowly east through city traffic. When he reaches the highway he drives east more rapidly until he reaches the shopping mall where he stops. He shops at the mall for an hour. Mike returns home by the same route as he came, driving west rapidly along the highway and then slowly through city traffic. Each graph shows the distance from home on the vertical axis versus the time elapsed since leaving home on the horizontal axis. Which graph is the best representation of Mike's trip?



Solution

Problem 19

Around the outside of a 4 by 4 square, construct four semicircles (as shown in the figure) with the four sides of the square as their diameters. Another square, $ABCD$, has its sides parallel to the corresponding sides of the original square, and each side of $ABCD$ is tangent to one of the semicircles. The area of the square $ABCD$ is



$$\text{(A)}\ 16 \qquad \text{(B)}\ 32 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 48 \qquad \text{(E)}\ 64$$

Solution

Problem 20

Let W, X, Y and Z be four different digits selected from the set

$$\{1, 2, 3, 4, 5, 6, 7, 8, 9\}.$$

If the sum $\dfrac{W}{X} + \dfrac{Y}{Z}$ is to be as small as possible, then $\dfrac{W}{X} + \dfrac{Y}{Z}$ must equal

$$\text{(A)}\ \frac{2}{17} \qquad \text{(B)}\ \frac{3}{17} \qquad \text{(C)}\ \frac{17}{72} \qquad \text{(D)}\ \frac{25}{72} \qquad \text{(E)}\ \frac{13}{36}$$

Solution

Problem 21

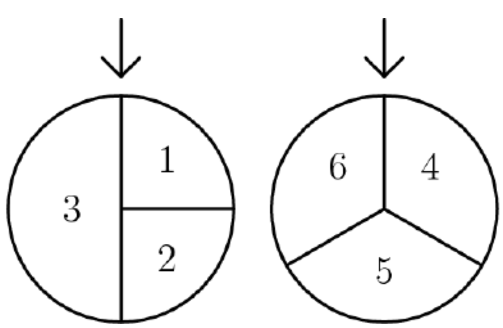
A gumball machine contains 9 red, 7 white, and 8 blue gumballs. The least number of gumballs a person must buy to be sure of getting four gumballs of the same color is

$$\text{(A)}\ 8 \qquad \text{(B)}\ 9 \qquad \text{(C)}\ 10 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 18$$

Solution

Problem 22

The two wheels shown below are spun and the two resulting numbers are added. The probability that the sum is even is



$$\text{(A)}\ \frac{1}{6} \qquad \text{(B)}\ \frac{1}{4} \qquad \text{(C)}\ \frac{1}{3} \qquad \text{(D)}\ \frac{5}{12} \qquad \text{(E)}\ \frac{4}{9}$$

Solution

Problem 23

If X, Y and Z are different digits, then the largest possible $3-$digit sum for

$$\begin{array}{cccc} & X & X & X \\ & & Y & X \\ + & & & X \\ \hline \end{array}$$

has the form

$\text{(A)}\ XXY \qquad \text{(B)}\ XYZ \qquad \text{(C)}\ YYX \qquad \text{(D)}\ YYZ \qquad \text{(E)}\ ZZY$

Solution

Problem 24

A 2 by 2 square is divided into four 1 by 1 squares. Each of the small squares is to be painted either green or red. In how many different ways can the painting be accomplished so that no green square shares its top or right side with any red square? There may be as few as zero or as many as four small green squares.

$\text{(A)}\ 4 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 16$

Solution

Problem 25

Find the sum of the digits in the answer to

$$\underbrace{9999\cdots 99}_{94\text{ nines}} \times \underbrace{4444\cdots 44}_{94\text{ fours}}$$

where a string of 94 nines is multiplied by a string of 94 fours.

$\text{(A)}\ 846 \qquad \text{(B)}\ 855 \qquad \text{(C)}\ 945 \qquad \text{(D)}\ 954 \qquad \text{(E)}\ 1072$

Solution

See also

1994 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1994))	
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1995 AJHSME Problems

1995 AJHSME (**Answer Key**)
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Instructions

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Contents

Problem 1

Walter has exactly one penny, one nickel, one dime and one quarter in his pocket. What percent of one dollar is in his pocket?

$\text{(A)}\ 4\% \qquad \text{(B)}\ 25\% \qquad \text{(C)}\ 40\% \qquad \text{(D)}\ 41\% \qquad \text{(E)}\ 59\%$

Solution

Problem 2

Jose is 4 years younger than Zack. Zack is 3 years older than Inez. Inez is 15 years old. How old is Jose?

$\text{(A)}\ 8 \qquad \text{(B)}\ 11 \qquad \text{(C)}\ 14 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 22$

Solution

Problem 3

Which of the following operations has the same effect on a number as multiplying by $\frac{3}{4}$ and then dividing by $\frac{3}{5}$?

$\text{(A)}\ \text{dividing by }\frac{4}{3} \qquad \text{(B)}\ \text{dividing by }\frac{9}{20} \qquad \text{(C)}\ \text{multiplying by }\frac{9}{20} \qquad \text{(D)}\ \text{dividing by }\frac{5}{4} \qquad \text{(E)}\ \text{multiplying by }\frac{5}{4}$

Solution

Problem 4

A teacher tells the class,

"Think of a number, add 1 to it, and double the result. Give the answer to your partner. Partner, subtract 1 from the number you are given and double the result to get your answer."

Ben thinks of 6, and gives his answer to Sue. What should Sue's answer be?

$\text{(A)}\ 18 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 26 \qquad \text{(D)}\ 27 \qquad \text{(E)}\ 30$

Solution

Problem 5

Find the smallest whole number that is larger than the sum

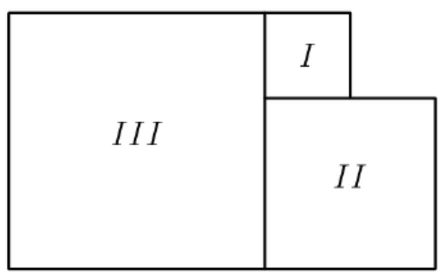
$$2\dfrac{1}{2}+3\dfrac{1}{3}+4\dfrac{1}{4}+5\dfrac{1}{5}.$$

$\text{(A)}\ 14 \qquad \text{(B)}\ 15 \qquad \text{(C)}\ 16 \qquad \text{(D)}\ 17 \qquad \text{(E)}\ 18$

Solution

Problem 6

Figures I, II, and III are squares. The perimeter of I is 12 and the perimeter of II is 24. The perimeter of III is



$\text{(A)}\ 9 \qquad \text{(B)}\ 18 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 72 \qquad \text{(D)}\ 81$

Solution

Problem 7

At Clover View Junior High, one half of the students go home on the school bus. One fourth go home by automobile. One tenth go home on their bicycles. The rest walk home. What fractional part of the students walk home?

$\text{(A)}\ \dfrac{1}{16} \qquad \text{(B)}\ \dfrac{3}{20} \qquad \text{(C)}\ \dfrac{1}{3} \qquad \text{(D)}\ \dfrac{17}{20} \qquad \text{(E)}\ \dfrac{9}{10}$

Solution

Problem 8

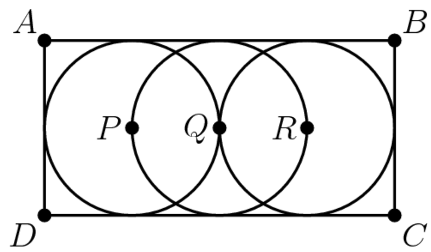
An American traveling in Italy wishes to exchange American money (dollars) for Italian money (lire). If 3000 lire = $1.60, how much lire will the traveler receive in exchange for $1.00?

$\text{(A)}\ 180 \qquad \text{(B)}\ 480 \qquad \text{(C)}\ 1800 \qquad \text{(D)}\ 1875 \qquad \text{(E)}\ 4875$

Solution

Problem 9

Three congruent circles with centers P, Q, and R are tangent to the sides of rectangle $ABCD$ as shown. The circle centered at Q has diameter 4 and passes through points P and R. The area of the rectangle is



$\text{(A)}\ 16 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 64 \qquad \text{(E)}\ 128$

Solution

Problem 10

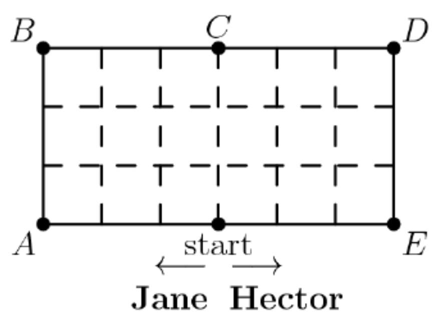
A jacket and a shirt originally sold for 80 dollars and 40 dollars, respectively. During a sale Chris bought the 80 dollar jacket at a 40% discount and the 40 dollar shirt at a 55% discount. The total amount saved was what percent of the total of the original prices?

$\text{(A)}\ 45\% \qquad \text{(B)}\ 47\frac{1}{2}\% \qquad \text{(C)}\ 50\% \qquad \text{(D)}\ 79\frac{1}{6}\% \qquad \text{(E)}\ 95\%$.

Solution

Problem 11

Jane can walk any distance in half the time it takes Hector to walk the same distance. They set off in opposite directions around the outside of the 18-block area as shown. When they meet for the first time, they will be closest to



$\text{(A)}\ A \qquad \text{(B)}\ B \qquad \text{(C)}\ C \qquad \text{(D)}\ D \qquad \text{(E)}\ E$

Solution

Problem 12

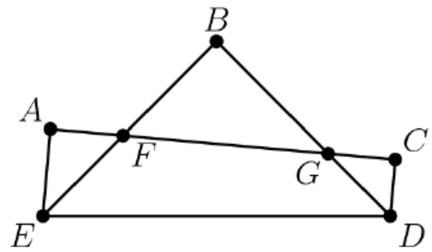
A *lucky* year is one in which at least one date, when written in the form month/day/year, has the following property: *The product of the month times the day equals the last two digits of the year*. For example, 1956 is a lucky year because it has the date 7/8/56 and $7 \times 8 = 56$. Which of the following is NOT a lucky year?

$\text{(A)}\ 1990 \qquad \text{(B)}\ 1991 \qquad \text{(C)}\ 1992 \qquad \text{(D)}\ 1993 \qquad \text{(E)}\ 1994$

Solution

Problem 13

In the figure, $\angle A$, $\angle B$, and $\angle C$ are right angles. If $\angle AEB = 40^\circ$ and $\angle BED = \angle BDE$, then $\angle CDE =$



$\text{(A)}\ 75^\circ \qquad \text{(B)}\ 80^\circ \qquad \text{(C)}\ 85^\circ \qquad \text{(D)}\ 90^\circ \qquad \text{(E)}\ 95^\circ$

Solution

Problem 14

A team won 40 of its first 50 games. How many of the remaining 40 games must this team win so it will have won exactly 70% of its games for the season?

$\text{(A)}\ 20 \qquad \text{(B)}\ 23 \qquad \text{(C)}\ 28 \qquad \text{(D)}\ 30 \qquad \text{(E)}\ 35$

Solution

Problem 15

What is the 100^th digit to the right of the decimal point in the decimal form of $4/37$?

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 8$

Solution

Problem 16

Students from three middle schools worked on a summer project.

- Seven students from Allen school worked for 3 days.
- Four students from Balboa school worked for 5 days.
- Five students from Carver school worked for 9 days.

The total amount paid for the students' work was 774. Assuming each student received the same amount for a day's work, how much did the students from Balboa school earn altogether?

$\text{(A)}\ 9.00\text{ dollars} \qquad \text{(B)}\ 48.38\text{ dollars} \qquad \text{(C)}\ 180.00\text{ dollars} \qquad \text{(D)}\ 193.50\text{ dollars} \qquad \text{(E)}\ 258.00\text{ dollars}$

Solution

Problem 17

The table below gives the percent of students in each grade at Annville and Cleona elementary schools:

	K	**1**	**2**	**3**	**4**	**5**	**6**
Annville:	16%	15%	15%	14%	13%	16%	11%
Cleona:	12%	15%	14%	13%	15%	14%	17%

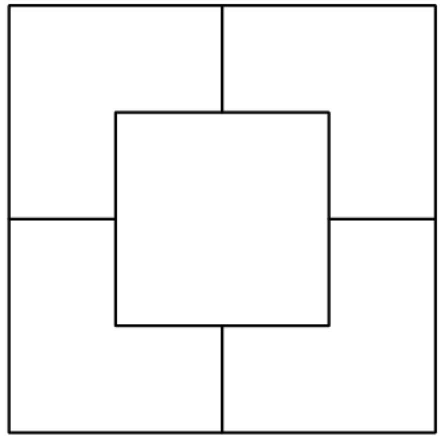
Annville has 100 students and Cleona has 200 students. In the two schools combined, what percent of the students are in grade 6?

$\text{(A)}\ 12\% \qquad \text{(B)}\ 13\% \qquad \text{(C)}\ 14\% \qquad \text{(D)}\ 15\% \qquad \text{(E)}\ 28\%$

Solution

Problem 18

The area of each of the four congruent L-shaped regions of this 100-inch by 100-inch square is 3/16 of the total area. How many inches long is the side of the center square?

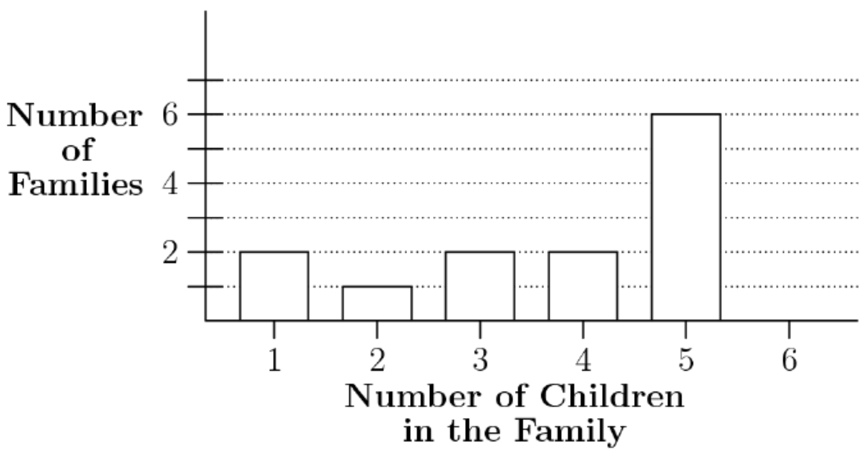


(A) 25 (B) 44 (C) 50 (D) 62 (E) 75

Solution

Problem 19

The graph shows the distribution of the number of children in the families of the students in Ms. Jordan's English class. The median number of children in the family for this distribution is



(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

Solution

Problem 20

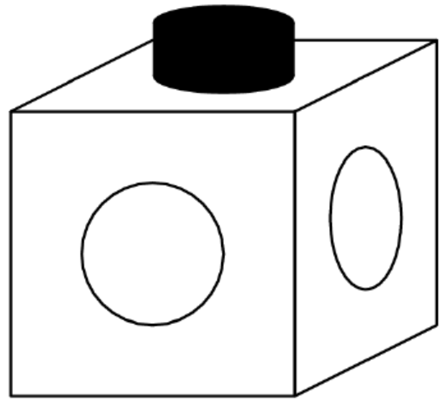
Diana and Apollo each roll a standard die obtaining a number at random from 1 to 6. What is the probability that Diana's number is larger than Apollo's number?

(A) $\frac{1}{3}$ (B) $\frac{5}{12}$ (C) $\frac{4}{9}$ (D) $\frac{17}{36}$ (E) $\frac{1}{2}$

Solution

Problem 21

A plastic snap-together cube has a protruding snap on one side and receptacle holes on the other five sides as shown. What is the smallest number of these cubes that can be snapped together so that only receptacle holes are showing?



$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 8$

Solution

Problem 22

The number 6545 can be written as a product of a pair of positive two-digit numbers. What is the sum of this pair of numbers?

$\text{(A)}\ 162 \qquad \text{(B)}\ 172 \qquad \text{(C)}\ 173 \qquad \text{(D)}\ 174 \qquad \text{(E)}\ 222$

Solution

Problem 23

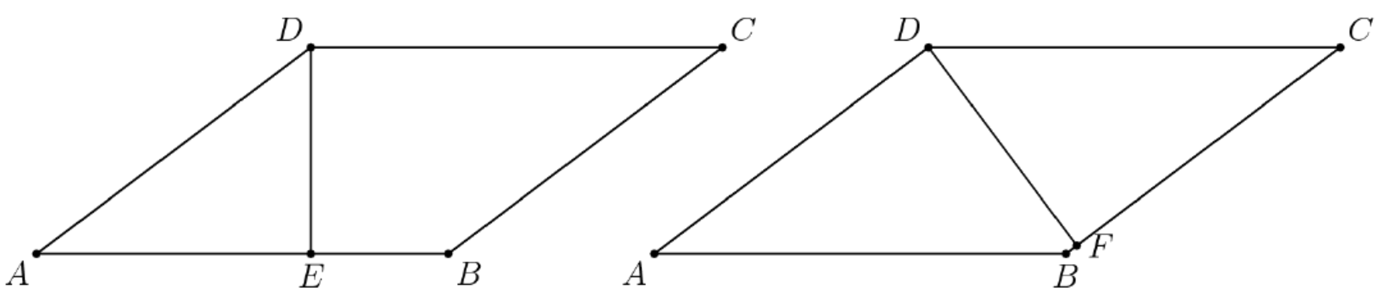
How many four-digit whole numbers are there such that the leftmost digit is odd, the second digit is even, and all four digits are different?

$\text{(A)}\ 1120 \qquad \text{(B)}\ 1400 \qquad \text{(C)}\ 1800 \qquad \text{(D)}\ 2025 \qquad \text{(E)}\ 2500$

Solution

Problem 24

In parallelogram $ABCD$, $\overline{DE}$ is the altitude to the base $\overline{AB}$ and $\overline{DF}$ is the altitude to the base $\overline{BC}$. [**Note:** *Both pictures represent the same parallelogram.*] If $DC=12$, $EB=4$, and $DE=6$, then $DF=$



$\text{(A)}\ 6.4 \qquad \text{(B)}\ 7 \qquad \text{(C)}\ 7.2 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 10$

Solution

Problem 25

Buses from Dallas to Houston leave every hour on the hour. Buses from Houston to Dallas leave every hour on the half hour. The trip from one city to the other takes 5 hours. Assuming the buses travel on the same highway, how many Dallas-bound buses does a Houston-bound bus pass in the highway (not in the station)?

$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 11$

Solution

See also

1995 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1995))	
Preceded by **1994 AJHSME**	Followed by **1996 AJHSME**
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1996 AJHSME Problems

1996 AJHSME (Answer Key)
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Instructions

1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
2. You will receive ? points for each correct answer, ? points for each problem left unanswered, and ? points for each incorrect answer.
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Contents

Problem 1

How many positive factors of 36 are also multiples of 4?

$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$

Solution

Problem 2

Jose, Thuy, and Kareem each start with the number 10. Jose subtracts 1 from the number 10, doubles his answer, and then adds 2. Thuy doubles the number 10, subtracts 1 from her answer, and then adds 2. Kareem subtracts 1 from the number 10, adds 2 to his number, and then doubles the result. Who gets the largest final answer?

$\text{(A)}\ \text{Jose} \qquad \text{(B)}\ \text{Thuy} \qquad \text{(C)}\ \text{Kareem} \qquad \text{(D)}\ \text{Jose and Thuy} \qquad \text{(E)}\ \text{Thuy and Kareem}$

Solution

Problem 3

The 64 whole numbers from 1 through 64 are written, one per square, on a checkerboard (an 8 by 8 array of 64 squares). The first 8 numbers are written in order across the first row, the next 8 across the second row, and so on. After all 64 numbers are written, the sum of the numbers in the four corners will be

$\text{(A)}\ 130 \qquad \text{(B)}\ 131 \qquad \text{(C)}\ 132 \qquad \text{(D)}\ 133 \qquad \text{(E)}\ 134$

Solution

Problem 4

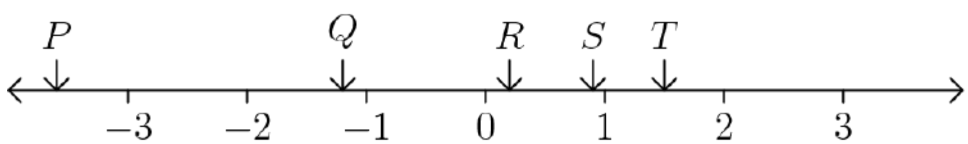
$$\frac{2+4+6+\cdots + 34}{3+6+9+\cdots+51}=$$

$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{2}{3} \qquad \text{(C)}\ \frac{3}{2} \qquad \text{(D)}\ \frac{17}{3} \qquad \text{(E)}\ \frac{34}{3}$

Solution

Problem 5

The letters P, Q, R, S, and T represent numbers located on the number line as shown.



Which of the following expressions represents a negative number?

$\text{(A)}\ P-Q \qquad \text{(B)}\ P\cdot Q \qquad \text{(C)}\ \dfrac{S}{Q}\cdot P \qquad \text{(D)}\ \dfrac{R}{P\cdot Q} \qquad \text{(E)}\ \dfrac{S+T}{R}$

Solution

Problem 6

What is the smallest result that can be obtained from the following process?

- Choose three different numbers from the set $\{3,5,7,11,13,17\}$.
- Add two of these numbers.
- Multiply their sum by the third number.

$\text{(A)}\ 15 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 50 \qquad \text{(E)}\ 56$

Solution

Problem 7

Brent has goldfish that quadruple (become four times as many) every month, and Gretel has goldfish that double every month. If Brent has 4 goldfish at the same time that Gretel has 128 goldfish, then in how many months from that time will they have the same number of goldfish?

$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 8$

Solution

Problem 8

Points A and B are 10 units apart. Points B and C are 4 units apart. Points C and D are 3 units apart. If A and D are as close as possible, then the number of units between them is

$\text{(A)}\ 0 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 11 \qquad \text{(E)}\ 17$

Solution

Problem 9

If 5 times a number is 2, then 100 times the reciprocal of the number is

$\text{(A)}\ 2.5 \qquad \text{(B)}\ 40 \qquad \text{(C)}\ 50 \qquad \text{(D)}\ 250 \qquad \text{(E)}\ 500$

Solution

Problem 10

When Walter drove up to the gasoline pump, he noticed that his gasoline tank was 1/8 full. He purchased 7.5 gallons of gasoline for $\$10$. With this additional gasoline, his gasoline tank was then 5/8 full. The number of gallons of gasoline his tank holds when it is full is

$\text{(A)}\ 8.75 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 11.5 \qquad \text{(D)}\ 15 \qquad \text{(E)}\ 22.5$

Solution

Problem 11

Let x be the number

$$0.\underbrace{0000...0000}_{1996\text{ zeros}}1,$$

where there are 1996 zeros after the decimal point. Which of the following expressions represents the largest number?

$\text{(A)}\ 3+x \qquad \text{(B)}\ 3-x \qquad \text{(C)}\ 3\cdot x \qquad \text{(D)}\ 3/x \qquad \text{(E)}\ x/3$

Solution

Problem 12

What number should be removed from the list

$$1,2,3,4,5,6,7,8,9,10,11$$

so that the average of the remaining numbers is 6.1?

$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 8$

Solution

Problem 13

In the fall of 1996, a total of 800 students participated in an annual school clean-up day. The organizers of the event expect that in each of the years 1997, 1998, and 1999, participation will increase by 50% over the previous year. The number of participants the organizers will expect in the fall of 1999 is

$\text{(A)}\ 1200 \qquad \text{(B)}\ 1500 \qquad \text{(C)}\ 2000 \qquad \text{(D)}\ 2400 \qquad \text{(E)}\ 2700$

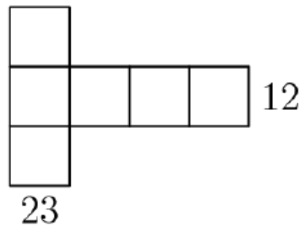
Solution

Problem 14

Six different digits from the set

$$\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

are placed in the squares in the figure shown so that the sum of the entries in the vertical column is 23 and the sum of the entries in the horizontal row is 12. The sum of the six digits used is



$\text{(A)}\ 27 \qquad \text{(B)}\ 29 \qquad \text{(C)}\ 31 \qquad \text{(D)}\ 33 \qquad \text{(E)}\ 35$

Solution

Problem 15

The remainder when the product $1492 \cdot 1776 \cdot 1812 \cdot 1996$ is divided by 5 is

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ 4$

Solution

Problem 16

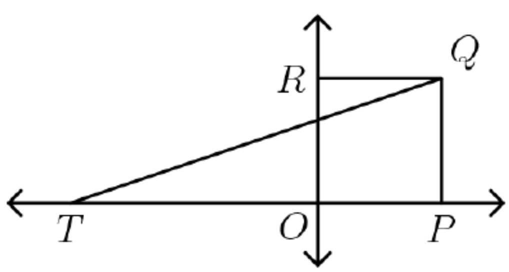
$1 - 2 - 3 + 4 + 5 - 6 - 7 + 8 + 9 - 10 - 11 + \cdots + 1992 + 1993 - 1994 - 1995 + 1996 =$

$\text{(A)}\ -998 \qquad \text{(B)}\ -1 \qquad \text{(C)}\ 0 \qquad \text{(D)}\ 1 \qquad \text{(E)}\ 998$

Solution

Problem 17

Figure $OPQR$ is a square. Point O is the origin, and point Q has coordinates (2,2). What are the coordinates for T so that the area of triangle PQT equals the area of square $OPQR$?



NOT TO SCALE

$\text{(A)}\ (-6,0) \qquad \text{(B)}\ (-4,0) \qquad \text{(C)}\ (-2,0) \qquad \text{(D)}\ (2,0) \qquad \text{(E)}\ (4,0)$

Solution

Problem 18

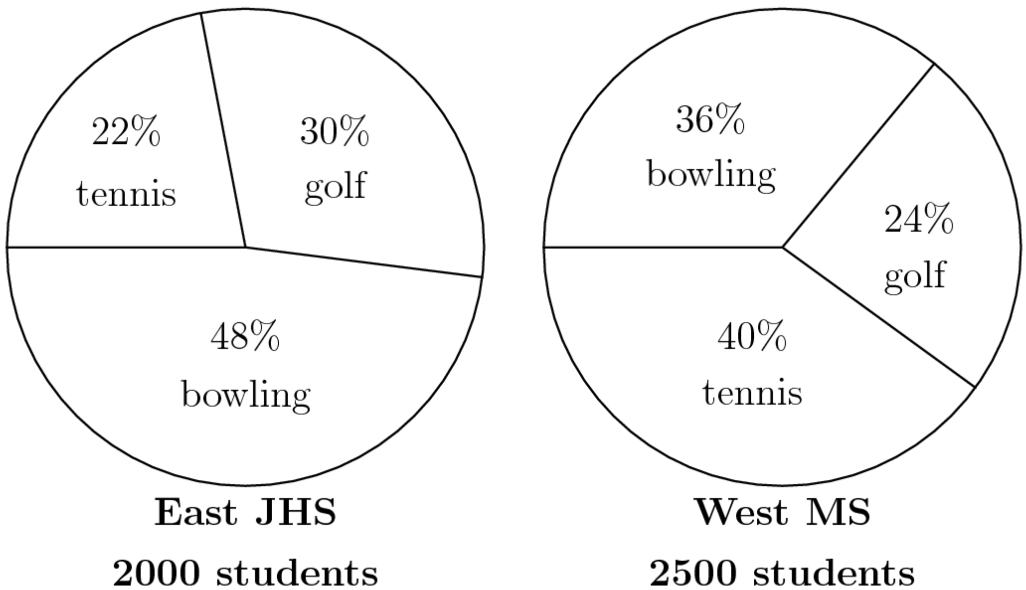
Ana's monthly salary was \$2000 in May. In June she received a 20% raise. In July she received a 20% pay cut. After the two changes in June and July, Ana's monthly salary was

$\text{(A)}\ 1920\text{ dollars} \qquad \text{(B)}\ 1980\text{ dollars} \qquad \text{(C)}\ 2000\text{ dollars} \qquad \text{(D)}\ 2020\text{ dollars} \qquad \text{(E)}\ 2040\text{ dollars}$

Solution

Problem 19

The pie charts below indicate the percent of students who prefer golf, bowling, or tennis at East Junior High School and West Middle School. The total number of students at East is 2000 and at West, 2500. In the two schools combined, the percent of students who prefer tennis is



$\text{(A)}\ 30\% \qquad \text{(B)}\ 31\% \qquad \text{(C)}\ 32\% \qquad \text{(D)}\ 33\% \qquad \text{(E)}\ 34\%$

Solution

Problem 20

Suppose there is a special key on a calculator that replaces the number x currently displayed with the number given by the formula $1/(1-x)$. For example, if the calculator is displaying 2 and the special key is pressed, then the calculator will display -1 since $1/(1-2)=-1$. Now suppose that the calculator is displaying 5. After the special key is pressed 100 times in a row, the calculator will display

$\text{(A)}\ -0.25 \qquad \text{(B)}\ 0 \qquad \text{(C)}\ 0.8 \qquad \text{(D)}\ 1.25 \qquad \text{(E)}\ 5$

Solution

Problem 21

How many subsets containing three different numbers can be selected from the set

$$\{89, 95, 99, 132, 166, 173\}$$

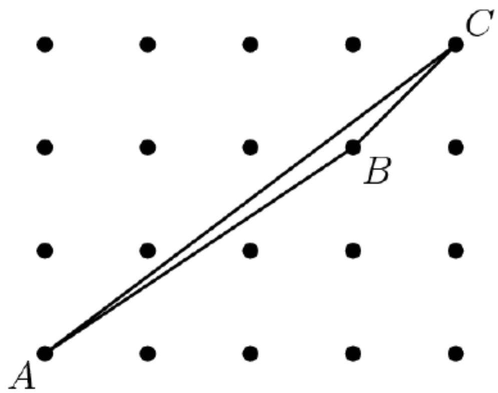
so that the sum of the three numbers is even?

$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 10 \qquad \text{(D)}\ 12 \qquad \text{(E)}\ 24$

Solution

Problem 22

The horizontal and vertical distances between adjacent points equal 1 unit. The area of triangle ABC is



$\text{(A)}\ 1/4 \qquad \text{(B)}\ 1/2 \qquad \text{(C)}\ 3/4 \qquad \text{(D)}\ 1 \qquad \text{(E)}\ 5/4$

Solution

Problem 23

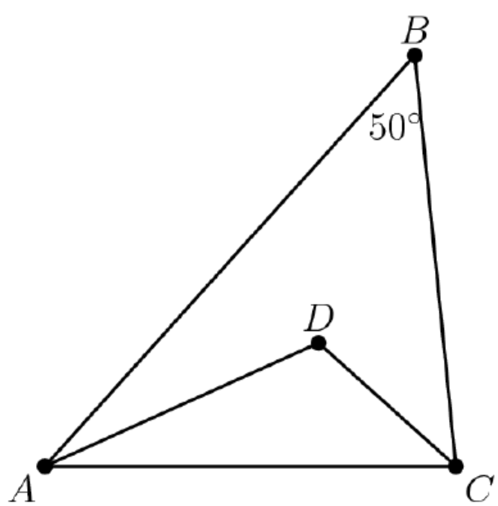
The manager of a company planned to distribute a $\$50$ bonus to each employee from the company fund, but the fund contained $\$5$ less than what was needed. Instead the manager gave each employee a $\$45$ bonus and kept the remaining $\$95$ in the company fund. The amount of money in the company fund before any bonuses were paid was

$\text{(A)}\ 945\text{ dollars} \qquad \text{(B)}\ 950\text{ dollars} \qquad \text{(C)}\ 955\text{ dollars} \qquad \text{(D)}\ 990\text{ dollars} \qquad \text{(E)}\ 995\text{ dollars}$

Solution

Problem 24

The measure of angle ABC is 50°, $\overline{AD}$ bisects angle BAC, and $\overline{DC}$ bisects angle BCA. The measure of angle ADC is



$\text{(A)}\ 90^\circ \qquad \text{(B)}\ 100^\circ \qquad \text{(C)}\ 115^\circ \qquad \text{(D)}\ 122.5^\circ \qquad \text{(E)}\ 125^\circ$

Solution

Problem 25

A point is chosen at random from within a circular region. What is the probability that the point is closer to the center of the region than it is to the boundary of the region?

$\text{(A)}\ 1/4 \qquad \text{(B)}\ 1/3 \qquad \text{(C)}\ 1/2 \qquad \text{(D)}\ 2/3 \qquad \text{(E)}\ 3/4$

Solution

See also

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1997 AJHSME Problems

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Contents

Problem 1

$$\frac{1}{10} + \frac{9}{100} + \frac{9}{1000} + \frac{7}{10000} =$$

$\text{(A)}\ 0.0026 \qquad \text{(B)}\ 0.0197 \qquad \text{(C)}\ 0.1997 \qquad \text{(D)}\ 0.26 \qquad \text{(E)}\ 1.997$

Solution

Problem 2

Ahn chooses a two-digit integer, subtracts it from 200, and doubles the result. What is the largest number Ahn can get?

$\text{(A)}\ 200 \qquad \text{(B)}\ 202 \qquad \text{(C)}\ 220 \qquad \text{(D)}\ 380 \qquad \text{(E)}\ 398$

Solution

Problem 3

Which of the following numbers is the largest?

$\text{(A)}\ 0.97 \qquad \text{(B)}\ 0.979 \qquad \text{(C)}\ 0.9709 \qquad \text{(D)}\ 0.907 \qquad \text{(E)}\ 0.9089$

Solution

Problem 4

Julie is preparing a speech for her class. Her speech must last between one-half hour and three-quarters of an hour. The ideal rate of speech is 150 words per minute. If Julie speaks at the ideal rate, which of the following number of words would be an appropriate length for her speech?

$\text{(A)}\ 2250 \qquad \text{(B)}\ 3000 \qquad \text{(C)}\ 4200 \qquad \text{(D)}\ 4350 \qquad \text{(E)}\ 5650$

Solution

Problem 5

There are many two-digit multiples of 7, but only two of the multiples have a digit sum of 10. The sum of these two multiples of 7 is

$\text{(A)}\ 119 \qquad \text{(B)}\ 126 \qquad \text{(C)}\ 140 \qquad \text{(D)}\ 175 \qquad \text{(E)}\ 189$

Solution

Problem 6

In the number 74982.1035 the value of the *place* occupied by the digit 9 is how many times as great as the value of the *place* occupied by the digit 3?

$\text{(A)}\ 1,000 \qquad \text{(B)}\ 10,000 \qquad \text{(C)}\ 100,000 \qquad \text{(D)}\ 1,000,000 \qquad \text{(E)}\ 10,000,000$

Solution

Problem 7

The area of the smallest square that will contain a circle of radius 4 is

$\text{(A)}\ 8 \qquad \text{(B)}\ 16 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 64 \qquad \text{(E)}\ 128$

Solution

Problem 8

Walter gets up at 6:30 a.m., catches the school bus at 7:30 a.m., has 6 classes that last 50 minutes each, has 30 minutes for lunch, and has 2 hours additional time at school. He takes the bus home and arrives at 4:00 p.m. How many minutes has he spent on the bus?

$\text{(A)}\ 30 \qquad \text{(B)}\ 60 \qquad \text{(C)}\ 75 \qquad \text{(D)}\ 90 \qquad \text{(E)}\ 120$

Solution

Problem 9

Three students, with different names, line up in single file. What is the probability that they are in alphabetical order from front-to-back?

$\text{(A)}\ \frac{1}{12} \qquad \text{(B)}\ \frac{1}{9} \qquad \text{(C)}\ \frac{1}{6} \qquad \text{(D)}\ \frac{1}{3} \qquad \text{(E)}\ \frac{2}{3}$

Solution

Problem 10

What fraction of this square region is shaded? Stripes are equal in width, and the figure is drawn to scale.

$\text{(A)}\ \frac{5}{12} \qquad \text{(B)}\ \frac{1}{2} \qquad \text{(C)}\ \frac{7}{12} \qquad \text{(D)}\ \frac{2}{3} \qquad \text{(E)}\ \frac{5}{6}$

Solution

Problem 11

Let $\boxed{N}$ mean the number of whole number divisors of N. For example, $\boxed{3}=2$ because 3 has two divisors, 1 and 3. Find the value of

$$\boxed{\boxed{11}\times\boxed{20}}.$$

$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 16 \qquad \text{(E)}\ 24$

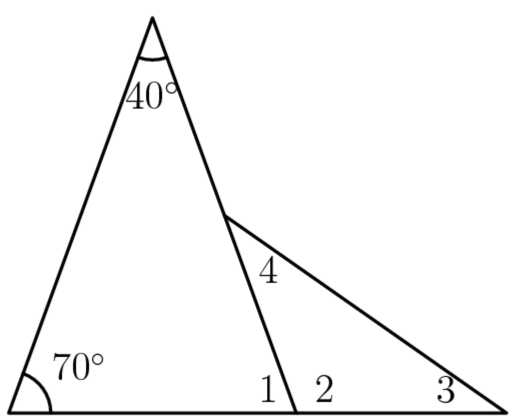
Solution

Problem 12

$\angle 1 + \angle 2 = 180^\circ$

$\angle 3 = \angle 4$

Find $\angle 4.$



$\text{(A)}\ 20^\circ \qquad \text{(B)}\ 25^\circ \qquad \text{(C)}\ 30^\circ \qquad \text{(D)}\ 35^\circ \qquad \text{(E)}\ 40^\circ$

Solution

Problem 13

Three bags of jelly beans contain 26, 28, and 30 beans. The ratios of yellow beans to all beans in each of these bags are 50%, 25%, and 20%, respectively. All three bags of candy are dumped into one bowl. Which of the following is closest to the ratio of yellow jelly beans to all beans in the bowl?

$\text{(A)}\ 31\% \qquad \text{(B)}\ 32\% \qquad \text{(C)}\ 33\% \qquad \text{(D)}\ 35\% \qquad \text{(E)}\ 95\%$

Solution

Problem 14

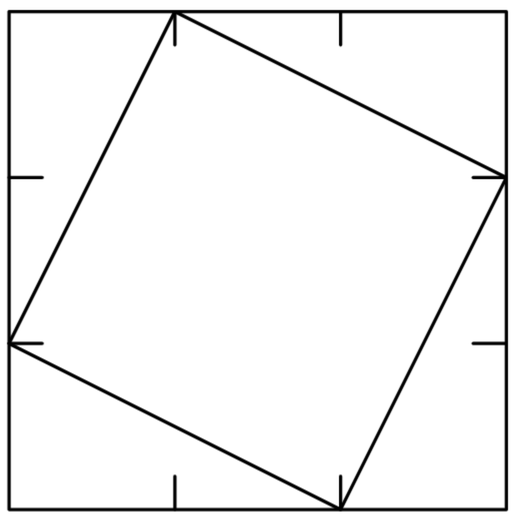
There is a set of five positive integers whose average (mean) is 5, whose median is 5, and whose only mode is 8. What is the difference between the largest and smallest integers in the set?

$\text{(A)}\ 3 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 8$

Solution

Problem 15

Each side of the large square in the figure is trisected (divided into three equal parts). The corners of an inscribed square are at these trisection points, as shown. The ratio of the area of the inscribed square to the area of the large square is



$\text{(A)}\ \dfrac{\sqrt{3}}{3} \qquad \text{(B)}\ \dfrac{5}{9} \qquad \text{(C)}\ \dfrac{2}{3} \qquad \text{(D)}\ \dfrac{\sqrt{5}}{3} \qquad \text{(E)}\ \dfrac{7}{9}$

Solution

Problem 16

Penni Precisely buys $100 worth of stock in each of three companies: Alabama Almonds, Boston Beans, and California Cauliflower. After one year, AA was up 20%, BB was down 25%, and CC was unchanged. For the second year, AA was down 20% from the previous year, BB was up 25% from the previous year, and CC was unchanged. If A, B, and C are the final values of the stock, then

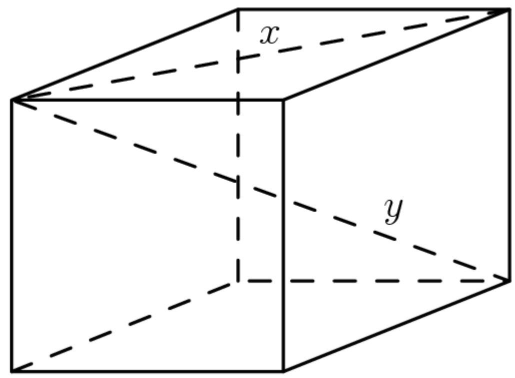
$\text{(A)}\ A = B = C \qquad \text{(B)}\ A = B < C \qquad \text{(C)}\ C < B = A$

$\text{(D)}\ A < B < C \qquad \text{(E)}\ B < A < C$

Solution

Problem 17

A cube has eight vertices (corners) and twelve edges. A segment, such as x, which joins two vertices not joined by an edge is called a diagonal. Segment y is also a diagonal. How many diagonals does a cube have?



$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 16$

Solution

Problem 18

At the grocery store last week, small boxes of facial tissue were priced at 4 boxes for $5. This week they are on sale at 5 boxes for $4. The percent decrease in the price per box during the sale was closest to

$\text{(A)}\ 30\% \qquad \text{(B)}\ 35\% \qquad \text{(C)}\ 40\% \qquad \text{(D)}\ 45\% \qquad \text{(E)}\ 65\%$

Solution

Problem 19

If the product $\dfrac{3}{2}\cdot \dfrac{4}{3}\cdot \dfrac{5}{4}\cdot \dfrac{6}{5}\cdot \ldots\cdot \dfrac{a}{b} = 9$, what is the sum of a and b?

$\text{(A)}\ 11 \qquad \text{(B)}\ 13 \qquad \text{(C)}\ 17 \qquad \text{(D)}\ 35 \qquad \text{(E)}\ 37$

Solution

Problem 20

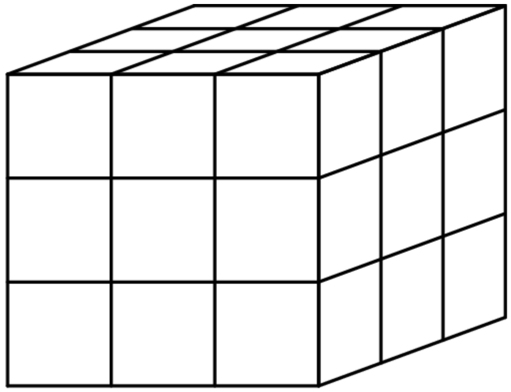
A pair of 8-sided dice have sides numbered 1 through 8. Each side has the same probability (chance) of landing face up. The probability that the product of the two numbers that land face-up exceeds 36 is

$\text{(A)}\ \dfrac{5}{32} \qquad \text{(B)}\ \dfrac{11}{64} \qquad \text{(C)}\ \dfrac{3}{16} \qquad \text{(D)}\ \dfrac{1}{4} \qquad \text{(E)}\ \dfrac{1}{2}$

Solution

Problem 21

Each corner cube is removed from this $3\text{ cm}\times 3\text{ cm}\times 3\text{ cm}$ cube. The surface area of the remaining figure is



$\text{(A)}\ 19\text{ sq.cm} \qquad \text{(B)}\ 24\text{ sq.cm} \qquad \text{(C)}\ 30\text{ sq.cm} \qquad \text{(D)}\ 54\text{ sq.cm} \qquad \text{(E)}\ 72\text{ sq.cm}$

Solution

Problem 22

A two-inch cube $(2\times 2\times 2)$ of silver weighs 3 pounds and is worth \$200. How much is a three-inch cube of silver worth?

$\text{(A)}\ 300\text{ dollars} \qquad \text{(B)}\ 375\text{ dollars} \qquad \text{(C)}\ 450\text{ dollars} \qquad \text{(D)}\ 560\text{ dollars} \qquad \text{(E)}\ 675\text{ dollars}$

Solution

Problem 23

There are positive integers that have these properties:

- the sum of the squares of their digits is 50, and
- each digit is larger than the one to its left.

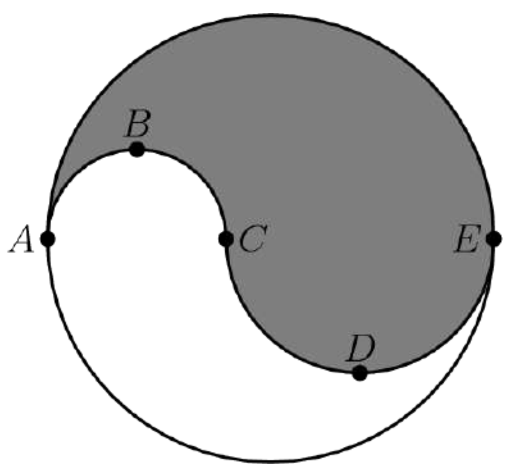
The product of the digits of the largest integer with both properties is

$\text{(A)}\ 7 \qquad \text{(B)}\ 25 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 48 \qquad \text{(E)}\ 60$

Solution

Problem 24

Diameter ACE is divided at C in the ratio $2:3$. The two semicircles, ABC and CDE, divide the circular region into an upper (shaded) region and a lower region. The ratio of the area of the upper region to that of the lower region is



$\text{(A)}\ 2:3 \qquad \text{(B)}\ 1:1 \qquad \text{(C)}\ 3:2 \qquad \text{(D)}\ 9:4 \qquad \text{(E)}\ 5:2$

Solution

Problem 25

All of the even numbers from 2 to 98 inclusive, excluding those ending in 0, are multiplied together. What is the rightmost digit (the units digit) of the product?

$\text{(A)}\ 0 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 8$

Solution

See also

1997 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1997))	
Preceded by **1996 AJHSME**	Followed by **1998 AJHSME**
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All AJHSME/AMC 8 Problems and Solutions	

- AJHSME
- AJHSME Problems and Solutions
- Mathematics competition resources

1998 AJHSME Problems

1998 AJHSME (**Answer Key**)
Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=1998) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_10-1998-43)

Instructions

1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
2. You will receive ? points for each correct answer, ? points for each problem left unanswered, and ? points for each incorrect answer.
3. No aids are permitted other than scratch paper, graph paper, ruler, compass, protractor and erasers.
4. Figures are not necessarily drawn to scale.
5. You will have **? minutes** working time to complete the test.

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Contents

Problem 1

For $x = 7$, which of the following is the smallest?

$(\mathrm{A})\ \frac{6}{x} \qquad (\mathrm{B})\ \frac{6}{x+1} \qquad (\mathrm{C})\ \frac{6}{x-1} \qquad (\mathrm{D})\ \frac{x}{6} \qquad (\mathrm{E})\ \frac{x+1}{6}$

Solution

Problem 2

If $\frac{\mathrm{a}}{\mathrm{c}}\Big|\frac{\mathrm{b}}{\mathrm{d}} = \mathrm{a}\cdot\mathrm{d} - \mathrm{b}\cdot\mathrm{c}$, what is the value of $\frac{3}{1}\Big|\frac{4}{2}$?

$(\mathrm{A})\ -2 \qquad (\mathrm{B})\ -1 \qquad (\mathrm{C})\ 0 \qquad (\mathrm{D})\ 1 \qquad (\mathrm{E})\ 2$

Solution

Problem 3

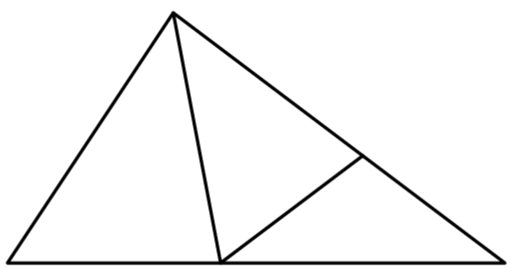
$$\frac{\frac{3}{8}+\frac{7}{8}}{\frac{4}{5}} =$$

$(\mathrm{A})\ 1 \qquad (\mathrm{B})\frac{25}{16} \qquad (\mathrm{C})\ 2 \qquad (\mathrm{D})\ \frac{43}{20} \qquad (\mathrm{E})\ \frac{47}{16}$

Solution

Problem 4

How many triangles are in this figure? (Some triangles may overlap other triangles.)



$(\mathrm{A})\ 9 \qquad (\mathrm{B})\ 8 \qquad (\mathrm{C})\ 7 \qquad (\mathrm{D})\ 6 \qquad (\mathrm{E})\ 5$

Solution

Problem 5

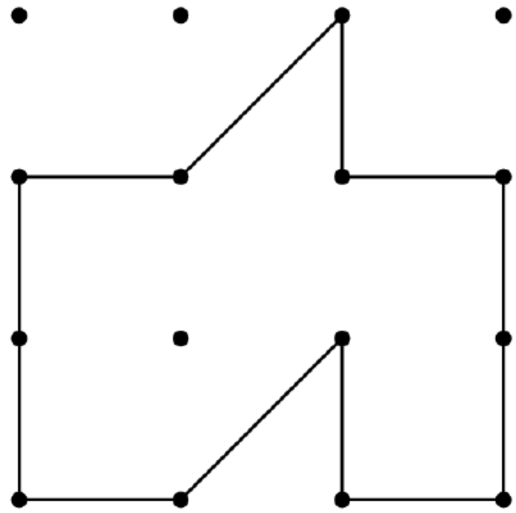
Which of the following numbers is largest?

$(\mathrm{A})\ 9.12344 \qquad (\mathrm{B})\ 9.123\overline{4} \qquad (\mathrm{C})\ 9.12\overline{34} \qquad (\mathrm{D})\ 9.1\overline{234} \qquad (\mathrm{E})\ 9.\overline{1234}$

Solution

Problem 6

Dots are spaced one unit apart, horizontally and vertically. The number of square units enclosed by the polygon is



$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 9$

Solution

Problem 7

$100 \times 19.98 \times 1.998 \times 1000 =$

$\text{(A)}\ (1.998)^2 \qquad \text{(B)}\ (19.98)^2 \qquad \text{(C)}\ (199.8)^2 \qquad \text{(D)}\ (1998)^2 \qquad \text{(E)}\ (19980)^2$

Solution

Problem 8

A child's wading pool contains 200 gallons of water. If water evaporates at the rate of 0.5 gallons per day and no other water is added or removed, how many gallons of water will be in the pool after 30 days?

$\text{(A)}\ 140 \qquad \text{(B)}\ 170 \qquad \text{(C)}\ 185 \qquad \text{(D)}\ 198.5 \qquad \text{(E)}\ 199.85$

Solution

Problem 9

For a sale, a store owner reduces the price of a $\$$10 scarf by 20%. Later the price is lowered again, this time by one-half the reduced price. The price is now

$\text{(A)}\ 2.00\text{ dollars} \qquad \text{(B)}\ 3.75\text{ dollars} \qquad \text{(C)}\ 4.00\text{ dollars} \qquad \text{(D)}\ 4.90\text{ dollars} \qquad \text{(E)}\ 6.40\text{ dollars}$

Solution

Problem 10

Each of the letters W, X, Y, and Z represents a different integer in the set $\{ 1,2,3,4\}$, but not necessarily in that order. If $\dfrac{\text{W}}{\text{X}} - \dfrac{\text{Y}}{\text{Z}}=1$, then the sum of W and Y is

$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 7$

Solution

Problem 11

Harry has 3 sisters and 5 brothers. His sister Harriet has S sisters and B brothers. What is the product of S and B?

$\text{(A)}\ 8 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 12 \qquad \text{(D)}\ 15 \qquad \text{(E)}\ 18$

Solution

Problem 12

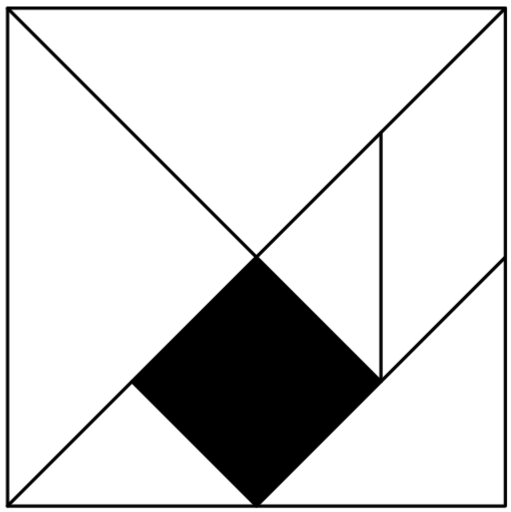
$$2\left(1-\frac{1}{2}\right)+3\left(1-\frac{1}{3}\right)+4\left(1-\frac{1}{4}\right)+\cdots+10\left(1-\frac{1}{10}\right)=$$

$\text{(A)}\ 45 \qquad \text{(B)}\ 49 \qquad \text{(C)}\ 50 \qquad \text{(D)}\ 54 \qquad \text{(E)}\ 55$

Solution

Problem 13

What is the ratio of the area of the shaded square to the area of the large square? (The figure is drawn to scale)



$\text{(A)}\ \frac{1}{6} \qquad \text{(B)}\ \frac{1}{7} \qquad \text{(C)}\ \frac{1}{8} \qquad \text{(D)}\ \frac{1}{12} \qquad \text{(E)}\ \frac{1}{16}$

Solution

Problem 14

At Annville Junior High School, 30% of the students in the Math Club are in the Science Club, and 80% of the students in the Science Club are in the Math Club. There are 15 students in the Science Club. How many students are in the Math Club?

$\text{(A)}\ 12 \qquad \text{(B)}\ 15 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 36 \qquad \text{(E)}\ 40$

Solution

Don't Crowd the Isles

Problems 15, 16, and 17 all refer to the following:

In the very center of the Irenic Sea lie the beautiful Nisos Isles. In 1998 the number of people on these islands is only 200, but the population triples every 25 years. Queen Irene has decreed that there must be at least 1.5 square miles for every person living in the Isles. The total area of the Nisos Isles is 24,900 square miles.

Problem 15

Estimate the population of Nisos in the year 2050.

$\text{(A)}\ 600 \qquad \text{(B)}\ 800 \qquad \text{(C)}\ 1000 \qquad \text{(D)}\ 2000 \qquad \text{(E)}\ 3000$

Solution

Problem 16

Estimate the year in which the population of Nisos will be approximately 6,000.

$\mathrm{(A)}\ 2050 \qquad \mathrm{(B)}\ 2075 \qquad \mathrm{(C)}\ 2100 \qquad \mathrm{(D)}\ 2125 \qquad \mathrm{(E)}\ 2150$

Solution

Problem 17

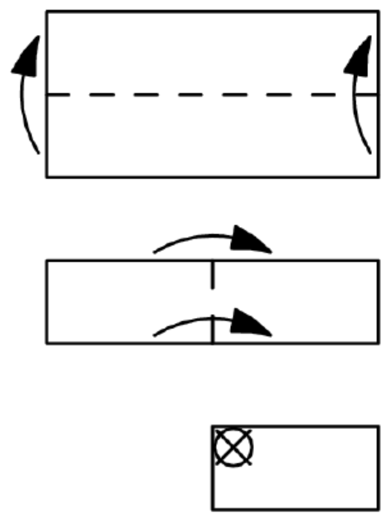
In how many years, approximately, from 1998 will the population of Nisos be as much as Queen Irene has proclaimed that the islands can support?

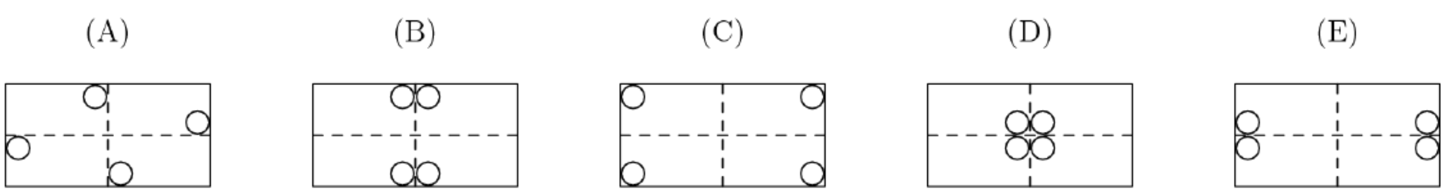
$\mathrm{(A)}\ 50\text{ yrs.} \qquad \mathrm{(B)}\ 75\text{ yrs.} \qquad \mathrm{(C)}\ 100\text{ yrs.} \qquad \mathrm{(D)}\ 125\text{ yrs.} \qquad \mathrm{(E)}\ 150\text{ yrs.}$

Solution

Problem 18

As indicated by the diagram below, a rectangular piece of paper is folded bottom to top, then left to right, and finally, a hole is punched at X. What does the paper look like when unfolded?





Solution

Problem 19

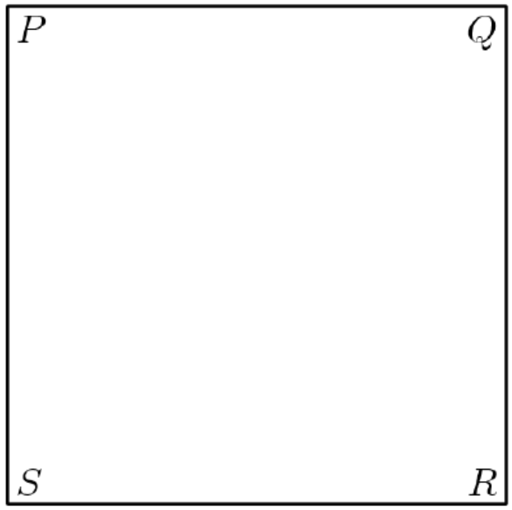
Tamika selects two different numbers at random from the set $\{8,9,10\}$ and adds them. Carlos takes two different numbers at random from the set $\{3,5,6\}$ and multiplies them. What is the probability that Tamika's result is greater than Carlos' result?

$\mathrm{(A)}\ \frac{4}{9} \qquad \mathrm{(B)}\ \frac{5}{9} \qquad \mathrm{(C)}\ \frac{1}{2} \qquad \mathrm{(D)}\ \frac{1}{3} \qquad \mathrm{(E)}\ \frac{2}{3}$

Solution

Problem 20

Let $PQRS$ be a square piece of paper. P is folded onto R and then Q is folded onto S. The area of the resulting figure is 9 square inches. Find the perimeter of square $PQRS$.



$\text{(A)}\ 9 \qquad \text{(B)}\ 16 \qquad \text{(C)}\ 18 \qquad \text{(D)}\ 24 \qquad \text{(E)}\ 36$

Solution

Problem 21

A $4 \times 4 \times 4$ cubical box contains 64 identical small cubes that exactly fill the box. How many of these small cubes touch a side or the bottom of the box?

$\text{(A)}\ 48 \qquad \text{(B)}\ 52 \qquad \text{(C)}\ 60 \qquad \text{(D)}\ 64 \qquad \text{(E)}\ 80$

Solution

Problem 22

Terri produces a sequence of positive integers by following three rules. She starts with a positive integer, then applies the appropriate rule to the result, and continues in this fashion.

Rule 1: If the integer is less than 10, multiply it by 9.

Rule 2: If the integer is even and greater than 9, divide it by 2.

Rule 3: If the integer is odd and greater than 9, subtract 5 from it.

A sample sequence: $23, 18, 9, 81, 76, \ldots .$

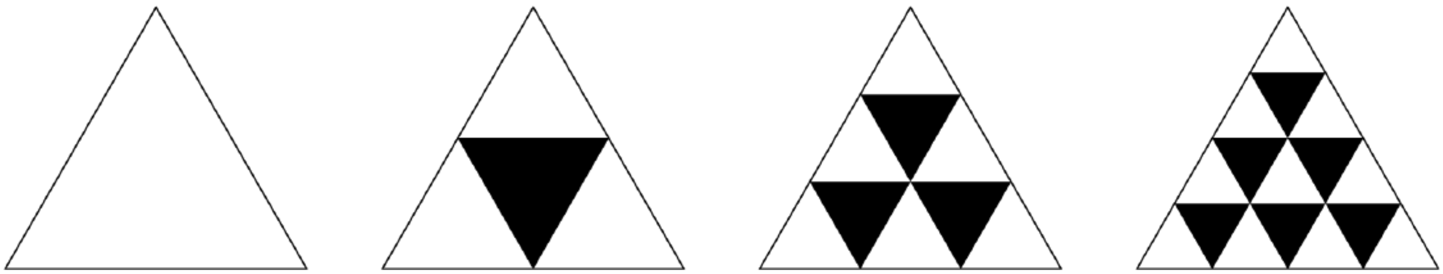
Find the 98^th term of the sequence that begins $98, 49, \ldots .$

$\text{(A)}\ 6 \qquad \text{(B)}\ 11 \qquad \text{(C)}\ 22 \qquad \text{(D)}\ 27 \qquad \text{(E)}\ 54$

Solution

Problem 23

If the pattern in the diagram continues, what fraction of the interior would be shaded in the eighth triangle?

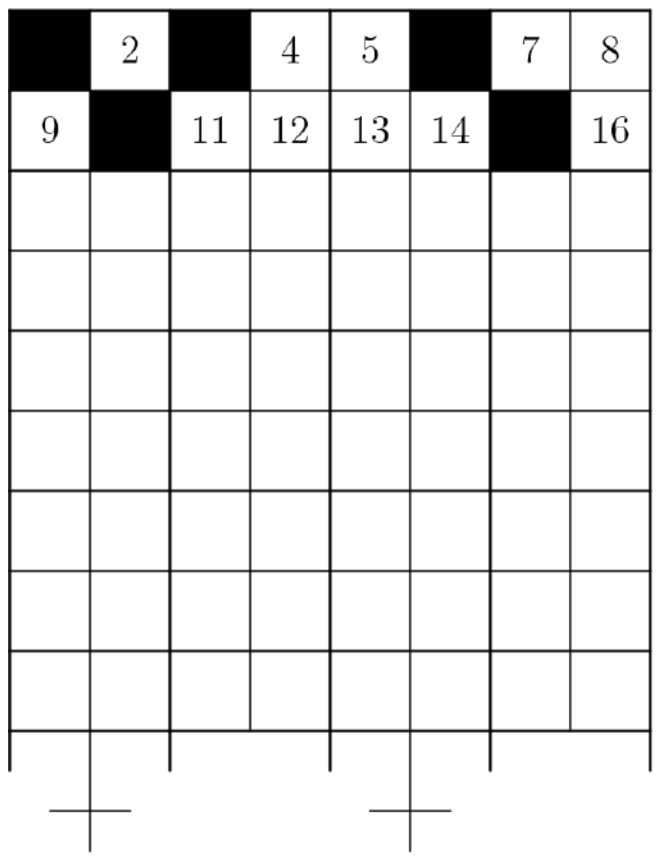


$\text{(A)}\ \dfrac{3}{8} \qquad \text{(B)}\ \dfrac{5}{27} \qquad \text{(C)}\ \dfrac{7}{16} \qquad \text{(D)}\ \dfrac{9}{16} \qquad \text{(E)}\ \dfrac{11}{45}$

Solution

Problem 24

A rectangular board of 8 columns has squares numbered beginning in the upper left corner and moving left to right so row one is numbered 1 through 8, row two is 9 through 16, and so on. A student shades square 1, then skips one square and shades square 3, skips two squares and shades square 6, skips 3 squares and shades square 10, and continues in this way until there is at least one shaded square in each column. What is the number of the shaded square that first achieves this result?



$\text{(A)}\ 36 \qquad \text{(B)}\ 64 \qquad \text{(C)}\ 78 \qquad \text{(D)}\ 91 \qquad \text{(E)}\ 120$

Solution

Problem 25

Three generous friends, each with some cash, redistribute their money as follows: Amy gives enough money to Jan and Toy to double the amount that each has. Jan then gives enough to Amy and Toy to double their amounts. Finally, Toy gives Amy and Jan enough to double their amounts. If Toy has \$36 when they begin and \$36 when they end, what is the total amount that all three friends have?

$\text{(A)}\ 108\text{ dollars} \qquad \text{(B)}\ 180\text{ dollars} \qquad \text{(C)}\ 216\text{ dollars} \qquad \text{(D)}\ 252\text{ dollars} \qquad \text{(E)}\ 288\text{ dollars}$

Solution

See also

1998 AJHSME (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1998))	
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1999 AMC 8 Problems

Contents

Problem 1

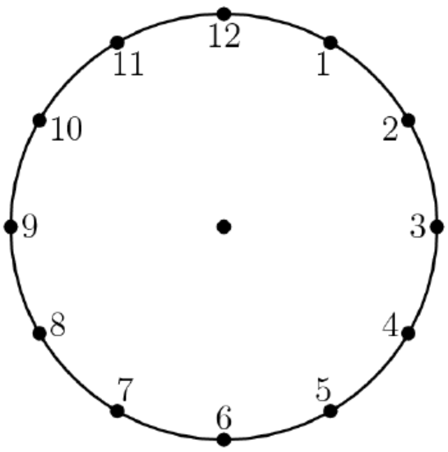
$(6?3) + 4 - (2 - 1) = 5$ To make this statement true, the question mark between the 6 and the 3 should be replaced by

$\text{(A)} \div \qquad \text{(B)}\ \times \qquad \text{(C)} + \qquad \text{(D)}\ - \qquad \text{(E)}\ \text{None of these}$

Solution

Problem 2

What is the degree measure of the smaller angle formed by the hands of a clock at 10 o clock?



$\text{(A)}\ 30 \qquad \text{(B)}\ 45 \qquad \text{(C)}\ 60 \qquad \text{(D)}\ 75 \qquad \text{(E)}\ 90$

Solution

Problem 3

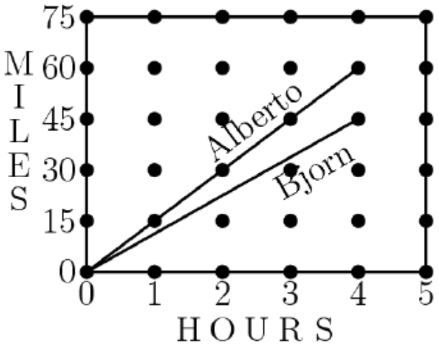
Which triplet of numbers has a sum NOT equal to 1?

$\text{(A)}\ (1/2, 1/3, 1/6) \qquad \text{(B)}\ (2, -2, 1) \qquad \text{(C)}\ (0.1, 0.3, 0.6) \qquad \text{(D)}\ (1.1, -2.1, 1.0) \qquad \text{(E)}\ (-3/2, -5/2, 5)$

Solution

Problem 4

The diagram shows the miles traveled by bikers Alberto and Bjorn. After four hours, about how many more miles has Alberto biked than Bjorn?



$\text{(A)}\ 15 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 25 \qquad \text{(D)}\ 30 \qquad \text{(E)}\ 35$

Solution

Problem 5

A rectangular garden 60 feet long and 20 feet wide is enclosed by a fence. To make the garden larger, while using the same fence, its shape is changed to a square. By how many square feet does this enlarge the garden?

$\text{(A)}\ 100 \qquad \text{(B)}\ 200 \qquad \text{(C)}\ 300 \qquad \text{(D)}\ 400 \qquad \text{(E)}\ 500$

Solution

Problem 6

Bo, Coe, Flo, Joe, and Moe have different amounts of money. Neither Joe nor Bo has as much money as Flo. Both Bo and Coe have more than Moe. Joe has more than Moe, but less than Bo. Who has the least amount of money?

$\text{(A)}\ \text{Bo} \qquad \text{(B)}\ \text{Coe} \qquad \text{(C)}\ \text{Flo} \qquad \text{(D)}\ \text{Joe} \qquad \text{(E)}\ \text{Moe}$

Solution

Problem 7

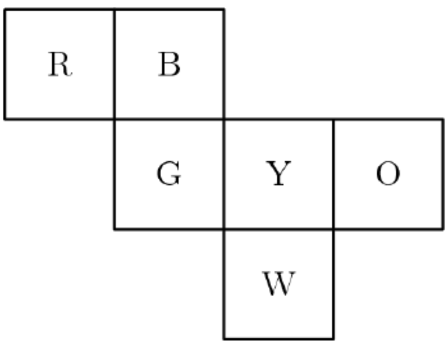
The third exit on a highway is located at milepost 40 and the tenth exit is at milepost 160. There is a service center on the highway located three-fourths of the way from the third exit to the tenth exit. At what milepost would you expect to find this service center?

$\text{(A)}\ 90 \qquad \text{(B)}\ 100 \qquad \text{(C)}\ 110 \qquad \text{(D)}\ 120 \qquad \text{(E)}\ 130$

Solution

Problem 8

Six squares are colored, front and back, (R = red, B = blue, O = orange, Y = yellow, G = green, and W = white). They are hinged together as shown, then folded to form a cube. The face opposite the white face is

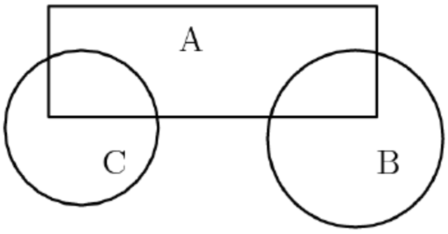


$\text{(A)}\ \text{B} \qquad \text{(B)}\ \text{G} \qquad \text{(C)}\ \text{O} \qquad \text{(D)}\ \text{R} \qquad \text{(E)}\ \text{Y}$

Solution

Problem 9

Three flower beds overlap as shown. Bed A has 500 plants, bed B has 450 plants, and bed C has 350 plants. Beds A and B share 50 plants, while beds A and C share 100. The total number of plants is



$\text{(A)}\ 850 \qquad \text{(B)}\ 1000 \qquad \text{(C)}\ 1150 \qquad \text{(D)}\ 1300 \qquad \text{(E)}\ 1450$

Solution

Problem 10

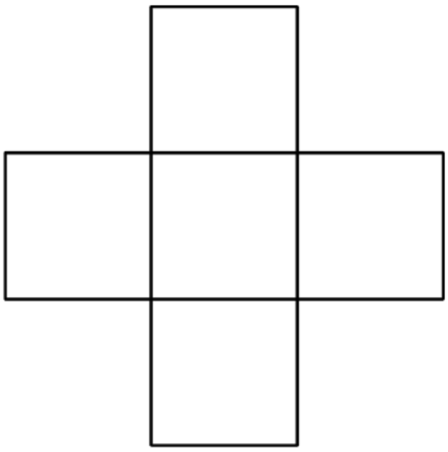
A complete cycle of a traffic light takes 60 seconds. During each cycle the light is green for 25 seconds, yellow for 5 seconds, and red for 30 seconds. At a randomly chosen time, what is the probability that the light will NOT be green?

$\text{(A)}\ \frac{1}{4} \qquad \text{(B)}\ \frac{1}{3} \qquad \text{(C)}\ \frac{5}{12} \qquad \text{(D)}\ \frac{1}{2} \qquad \text{(E)}\ \frac{7}{12}$

Solution

Problem 11

Each of the five numbers 1, 4, 7, 10, and 13 is placed in one of the five squares so that the sum of the three numbers in the horizontal row equals the sum of the three numbers in the vertical column. The largest possible value for the horizontal or vertical sum is



$\text{(A)}\ 20 \qquad \text{(B)}\ 21 \qquad \text{(C)}\ 22 \qquad \text{(D)}\ 24 \qquad \text{(E)}\ 30$

Solution

Problem 12

The ratio of the number of games won to the number of games lost (no ties) by the Middle School Middies is $11/4$. To the nearest whole percent, what percent of its games did the team lose?

$\text{(A)}\ 24 \qquad \text{(B)}\ 27 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 45 \qquad \text{(E)}\ 73$

Solution

Problem 13

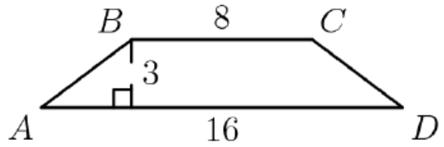
The average age of the 40 members of a computer science camp is 17 years. There are 20 girls, 15 boys, and 5 adults. If the average age of the girls is 15 and the average age of the boys is 16, what is the average age of the adults?

$\text{(A)}\ 26 \qquad \text{(B)}\ 27 \qquad \text{(C)}\ 28 \qquad \text{(D)}\ 29 \qquad \text{(E)}\ 30$

Solution

Problem 14

In trapezoid $ABCD$, the sides AB and CD are equal. The perimeter of $ABCD$ is



$\text{(A)}\ 27 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 34 \qquad \text{(E)}\ 48$

Solution

Problem 15

Bicycle license plates in Flatville each contain three letters. The first is chosen from the set {C,H,L,P,R}, the second from {A,I,O}, and the third from {D,M,N,T}.

When Flatville needed more license plates, they added two new letters. The new letters may both be added to one set or one letter may be added to one set and one to another set. What is the largest possible number of ADDITIONAL license plates that can be made by adding two letters?

$\text{(A)}\ 24 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 36 \qquad \text{(D)}\ 40 \qquad \text{(E)}\ 60$

Solution

Problem 16

Tori's mathematics test had 75 problems: 10 arithmetic, 30 algebra, and 35 geometry problems. Although she answered 70% of the arithmetic, 40% of the algebra, and 60% of the geometry problems correctly, she did not pass the test because she got less than 60% of the problems right. How many more problems would she have needed to answer correctly to earn a 60% passing grade?

$\text{(A)}\ 1 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ 11$

Solution

Problem 17

Problems 17, 18, and 19 refer to the following:

At Central Middle School the 108 students who take the AMC 8 meet in the evening to talk about problems and eat an average of two cookies apiece. Hansel and Gretel are baking Bonnie's Best Bar Cookies this year. Their recipe, which makes a pan of 15 cookies, lists these items: $1\frac{1}{2}$ cups flour, 2 eggs, 3 tablespoons butter, $\frac{3}{4}$ cups sugar, and 1 package of chocolate drops. They will make only full recipes, not partial recipes.

Hansel can buy eggs by the half-dozen. How many half-dozens should he buy to make enough cookies? (Some eggs and some cookies may be left over.)

$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 15$

Solution

Problem 18

Problems 17, 18, and 19 refer to the following:

At Central Middle School the 108 students who take the AMC 8 meet in the evening to talk about problems and eat an average of two cookies apiece. Hansel and Gretel are baking Bonnie's Best Bar Cookies this year. Their recipe, which makes a pan of 15 cookies, lists these items: $1\frac{1}{2}$ cups flour, 2 eggs, 3 tablespoons butter, $\frac{3}{4}$ cups sugar, and 1 package of chocolate drops. They will make only full recipes, not partial recipes.

They learn that a big concert is scheduled for the same night and attendance will be down 25%. How many recipes of cookies should they make for their smaller party?

$\text{(A)}\ 6 \qquad \text{(B)}\ 8 \qquad \text{(C)}\ 9 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 11$

Solution

Problem 19

Problems 17, 18, and 19 refer to the following:

At Central Middle School the 108 students who take the AMC 8 meet in the evening to talk about problems and eat an average of two cookies apiece. Hansel and Gretel are baking Bonnie's Best Bar Cookies this year. Their recipe, which makes a pan of 15 cookies, lists these items: $1\frac{1}{2}$ cups flour, 2 eggs, 3 tablespoons butter, $\frac{3}{4}$ cups sugar, and 1 package of chocolate drops. They will make only full recipes, not partial recipes.

The drummer gets sick. The concert is cancelled. Hansel and Gretel must make enough pans of cookies to supply 216 cookies. There are 8 tablespoons in a stick of butter. How many sticks of butter will be needed? (Some butter may be left over, of course.)

$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 9$

Solution

Problem 20

Figure 1 is called a "stack map." The numbers tell how many cubes are stacked in each position. Fig. 2 shows these cubes, and Fig. 3 shows the view of the stacked cubes as seen from the front.

Which of the following is the front view for the stack map in Fig. 4?

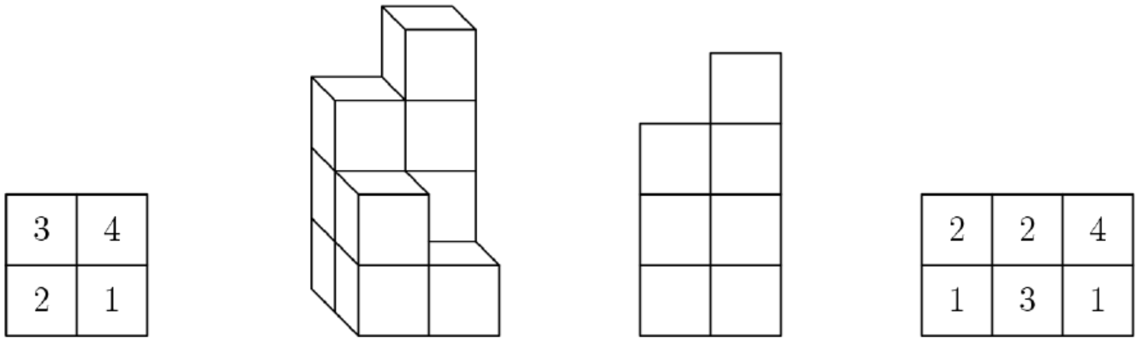
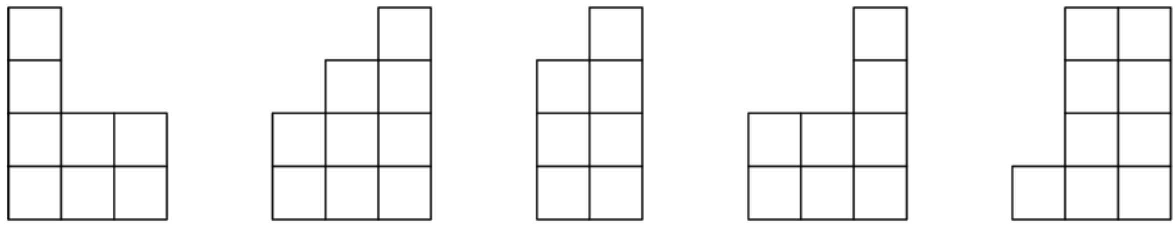


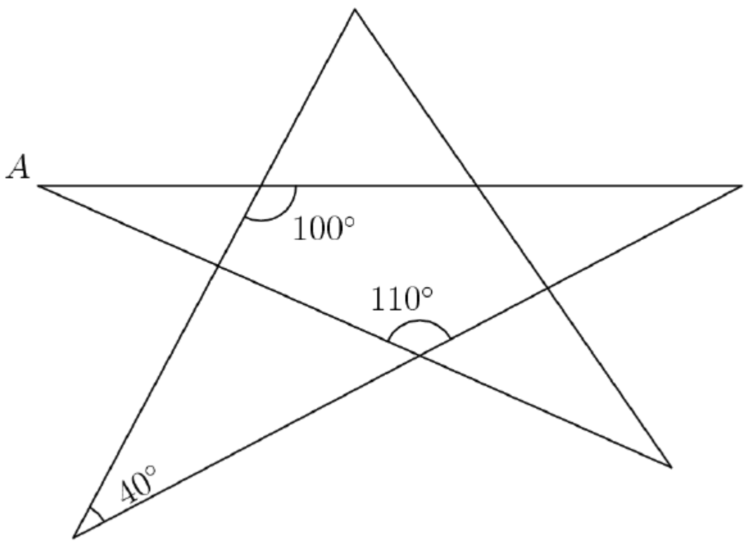
Figure 1 Figure 2 Figure 3 Figure 4


(A) (B) (C) (D) (E)

Solution

Problem 21

The degree measure of angle A is



$\text{(A)}\ 20 \qquad \text{(B)}\ 30 \qquad \text{(C)}\ 35 \qquad \text{(D)}\ 40 \qquad \text{(E)}\ 45$

Solution

Problem 22

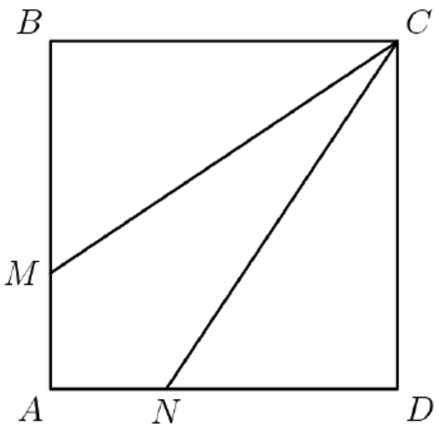
In a far-off land three fish can be traded for two loaves of bread and a loaf of bread can be traded for four bags of rice. How many bags of rice is one fish worth?

$\text{(A)}\ \frac{3}{8} \qquad \text{(B)}\ \frac{1}{2} \qquad \text{(C)}\ \frac{3}{4} \qquad \text{(D)}\ 2\frac{2}{3} \qquad \text{(E)}\ 3\frac{1}{3}$

Solution

Problem 23

Square $ABCD$ has sides of length 3. Segments CM and CN divide the square's area into three equal parts. How long is segment CM?



$\text{(A)}\ \sqrt{10} \qquad \text{(B)}\ \sqrt{12} \qquad \text{(C)}\ \sqrt{13} \qquad \text{(D)}\ \sqrt{14} \qquad \text{(E)}\ \sqrt{15}$

Solution

Problem 24

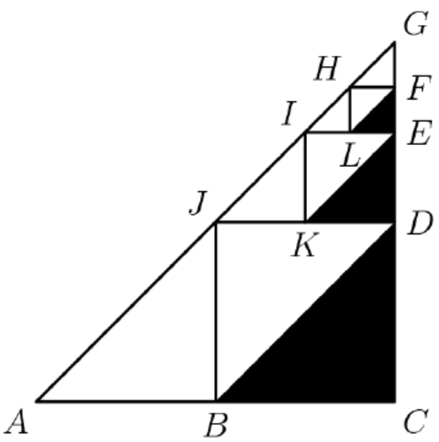
When 1999^{2000} is divided by 5, the remainder is

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 3 \qquad \text{(E)}\ 4$

Solution

Problem 25

Points B, D, and J are midpoints of the sides of right triangle ACG. Points K, E, I are midpoints of the sides of triangle JDG, etc. If the dividing and shading process is done 100 times (the first three are shown) and $AC = CG = 6$, then the total area of the shaded triangles is nearest



$\text{(A)}\ 6 \qquad \text{(B)}\ 7 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 9 \qquad \text{(E)}\ 10$

Solution

See also

1999 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=1999))	
Preceded by **1998 AJHSME**	Followed by **2000 AMC 8**
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2000 AMC 8 Problems

Contents

Problem 1

Aunt Anna is 42 years old. Caitlin is 5 years younger than Brianna, and Brianna is half as old as Aunt Anna. How old is Caitlin?

$\text{(A)}\ 15 \qquad \text{(B)}\ 16 \qquad \text{(C)}\ 17 \qquad \text{(D)}\ 21 \qquad \text{(E)}\ 37$

Problem 2

Which of these numbers is less than its reciprocal?

$\text{(A)}\ -2 \qquad \text{(B)}\ -1 \qquad \text{(C)}\ 0 \qquad \text{(D)}\ 1 \qquad \text{(E)}\ 2$

Problem 3

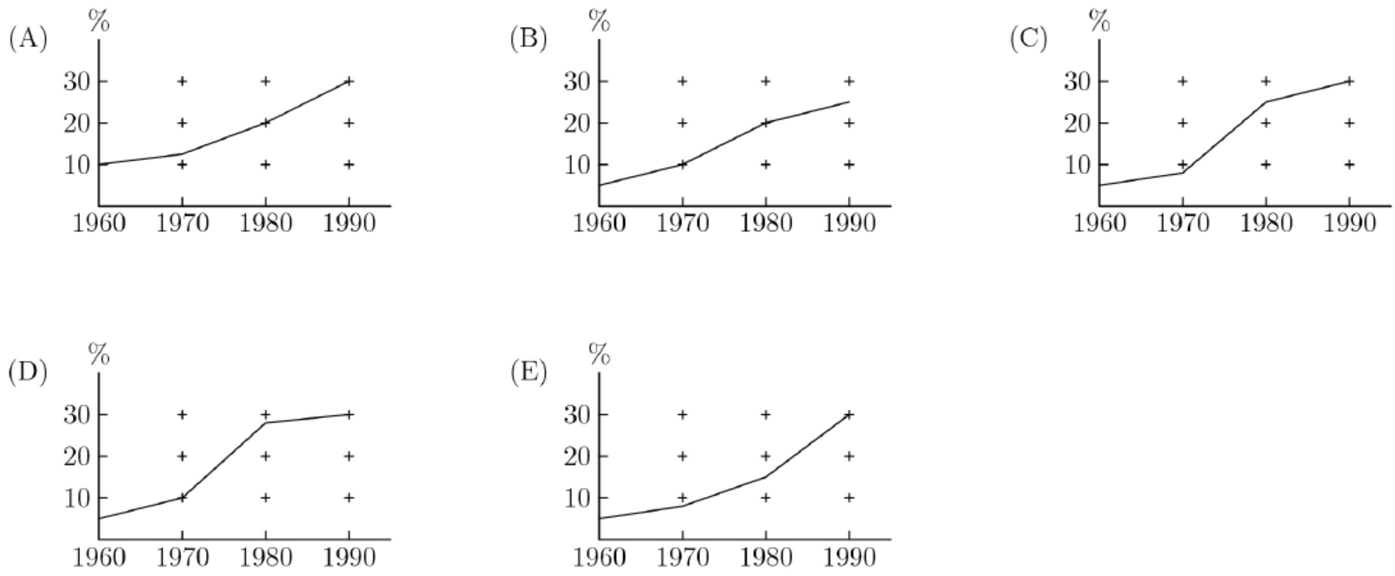
How many whole numbers lie in the interval between $\frac{5}{3}$ and $2\pi ?$

$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ \text{infinitely many}$

D.5

Problem 4

In 1960 only 5% of the working adults in Carlin City worked at home. By 1970 the "at-home" work force increased to 8%. In 1980 there were approximately 15% working at home, and in 1990 there were 30%. The graph that best illustrates this is



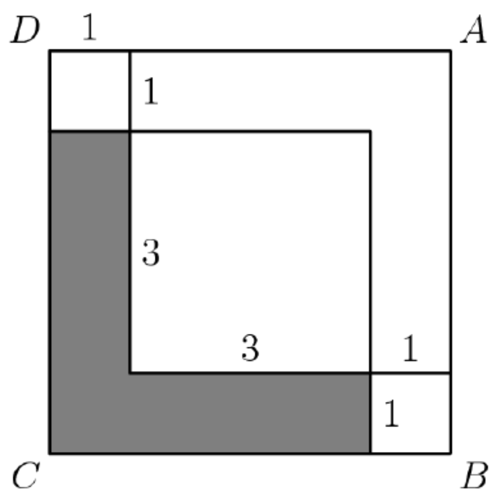
Problem 5

Each principal of Lincoln High School serves exactly one 3-year term. What is the maximum number of principals this school could have during an 8-year period?

$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 8$

Problem 6

Figure $ABCD$ is a square. Inside this square three smaller squares are drawn with the side lengths as labeled. The area of the shaded L-shaped region is



$\text{(A)}\ 7 \qquad \text{(B)}\ 10 \qquad \text{(C)}\ 12.5 \qquad \text{(D)}\ 14 \qquad \text{(E)}\ 15$

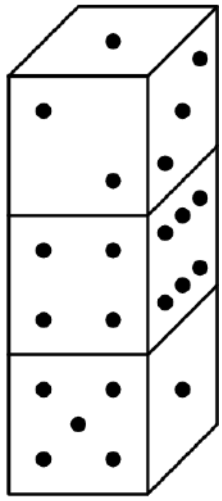
Problem 7

What is the minimum possible product of three different numbers of the set $\{-8,-6,-4,0,3,5,7\}$?

$\text{(A)}\ -336 \qquad \text{(B)}\ -280 \qquad \text{(C)}\ -210 \qquad \text{(D)}\ -192 \qquad \text{(E)}\ 0$

Problem 8

Three dice with faces numbered 1 through 6 are stacked as shown. Seven of the eighteen faces are visible, leaving eleven faces hidden (back, bottom, between). The total number of dots NOT visible in this view is

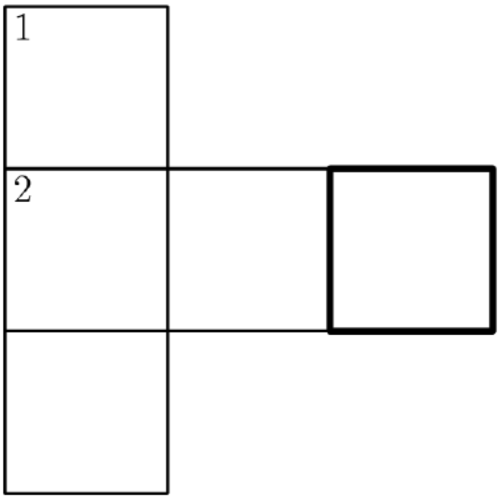


$\text{(A)}\ 21 \qquad \text{(B)}\ 22 \qquad \text{(C)}\ 31 \qquad \text{(D)}\ 41 \qquad \text{(E)}\ 53$

Problem 9

Three-digit powers of 2 and 5 are used in this *cross-number* puzzle. What is the only possible digit for the outlined square?

$$\begin{array}{lcl} \textbf{ACROSS} & & \textbf{DOWN} \\ \textbf{2}.2^m & & \textbf{1}.5^n \end{array}$$



$\text{(A)}\ 0 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 8$

Problem 10

Ara and Shea were once the same height. Since then Shea has grown 20% while Ara has grown half as many inches as Shea. Shea is now 60 inches tall. How tall, in inches, is Ara now?

$\text{(A)}\ 48 \qquad \text{(B)}\ 51 \qquad \text{(C)}\ 52 \qquad \text{(D)}\ 54 \qquad \text{(E)}\ 55$

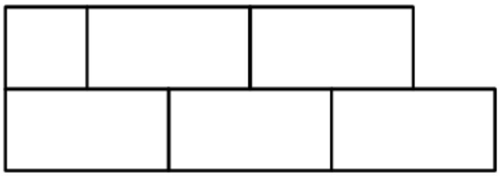
Problem 11

The number 64 has the property that it is divisible by its units digit. How many whole numbers between 10 and 50 have this property?

$\text{(A)}\ 15 \qquad \text{(B)}\ 16 \qquad \text{(C)}\ 17 \qquad \text{(D)}\ 18 \qquad \text{(E)}\ 20$

Problem 12

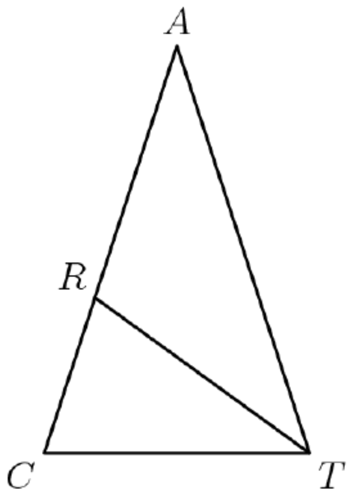
A block wall 100 feet long and 7 feet high will be constructed using blocks that are 1 foot high and either 2 feet long or 1 foot long (no blocks may be cut). The vertical joins in the blocks must be staggered as shown, and the wall must be even on the ends. What is the smallest number of blocks needed to build this wall?



$\text{(A)}\ 344 \qquad \text{(B)}\ 347 \qquad \text{(C)}\ 350 \qquad \text{(D)}\ 353 \qquad \text{(E)}\ 356$

Problem 13

In triangle CAT, we have $\angle ACT = \angle ATC$ and $\angle CAT = 36^\circ$. If $\overline{TR}$ bisects $\angle ATC$, then $\angle CRT =$



$\text{(A)}\ 36^\circ \qquad \text{(B)}\ 54^\circ \qquad \text{(C)}\ 72^\circ \qquad \text{(D)}\ 90^\circ \qquad \text{(E)}\ 108^\circ$

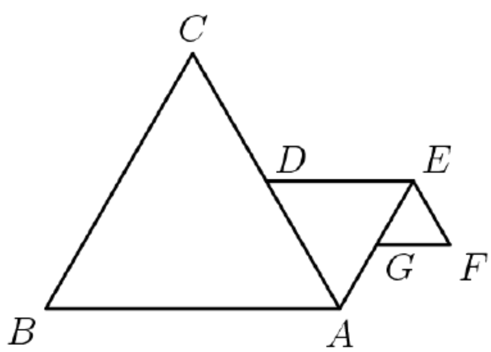
Problem 14

What is the units digit of $19^{19} + 99^{99}$?

$\text{(A)}\ 0 \qquad \text{(B)}\ 1 \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 9$

Problem 15

Triangles ABC, ADE, and EFG are all equilateral. Points D and G are midpoints of $\overline{AC}$ and $\overline{AE}$, respectively. If $AB = 4$, what is the perimeter of figure $ABCDEFG$?



$\text{(A)}\ 12 \qquad \text{(B)}\ 13 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 18 \qquad \text{(E)}\ 21$

Problem 16

In order for Mateen to walk a kilometer (1000m) in his rectangular backyard, he must walk the length 25 times or walk its perimeter 10 times. What is the area of Mateen's backyard in square meters?

$\text{(A)}\ 40 \qquad \text{(B)}\ 200 \qquad \text{(C)}\ 400 \qquad \text{(D)}\ 500 \qquad \text{(E)}\ 1000$

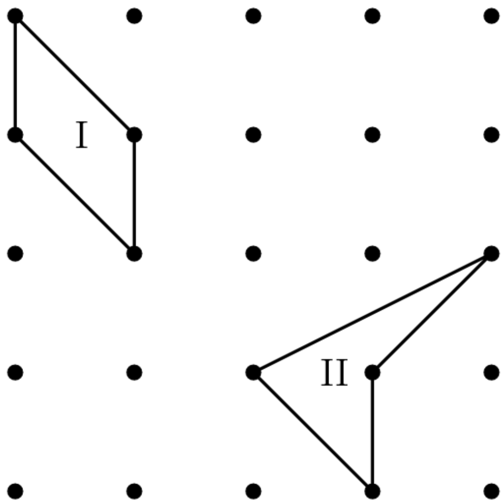
Problem 17

The operation $\otimes$ is defined for all nonzero numbers by $a \otimes b = \frac{a^2}{b}$. Determine $[(1 \otimes 2) \otimes 3] - [1 \otimes (2 \otimes 3)]$.

$\text{(A)}\ -\frac{2}{3}\qquad\text{(B)}\ -\frac{1}{4}\qquad\text{(C)}\ 0\qquad\text{(D)}\ \frac{1}{4}\qquad\text{(E)}\ \frac{2}{3}$

Problem 18

Consider these two geoboard quadrilaterals. Which of the following statements is true?



(A) The area of quadrilateral I is more than the area of quadrilateral II.

(B) The area of quadrilateral I is less than the area of quadrilateral II.

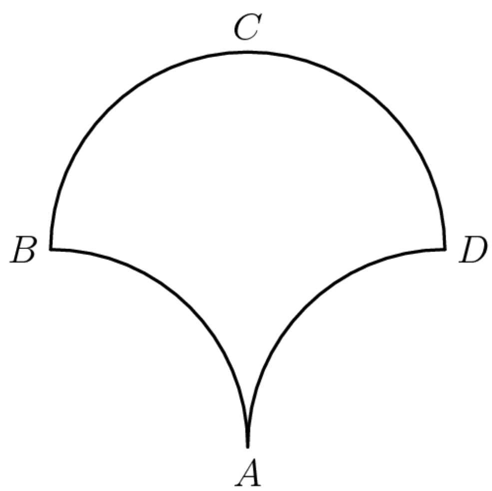
(C) The quadrilaterals have the same area and the same perimeter.

(D) The quadrilaterals have the same area, but the perimeter of I is more than the perimeter of II.

(E) The quadrilaterals have the same area, but the perimeter of I is less than the perimeter of II.

Problem 19

Three circular arcs of radius 5 units bound the region shown. Arcs AB and AD are quarter-circles, and arc BCD is a semicircle. What is the area, in square units, of the region?



$\text{(A)}\ 25\qquad\text{(B)}\ 10+5\pi\qquad\text{(C)}\ 50\qquad\text{(D)}\ 50+5\pi\qquad\text{(E)}\ 25\pi$

Problem 20

You have nine coins: a collection of pennies, nickels, dimes, and quarters having a total value of $\$1.02$, with at least one coin of each type. How many dimes must you have?

$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 5$

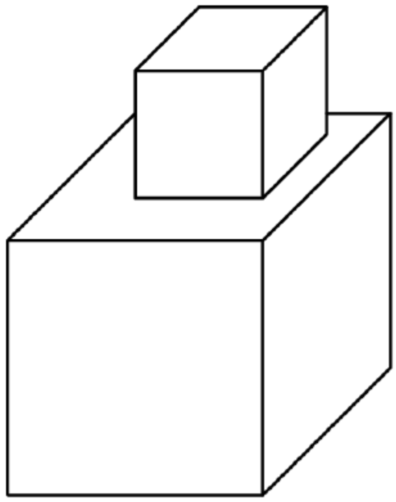
Problem 21

Keiko tosses one penny and Ephraim tosses two pennies. The probability that Ephraim gets the same number of heads that Keiko gets is:

$\text{(A)}\ \frac{1}{4} \qquad \text{(B)}\ \frac{3}{8} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{2}{3} \qquad \text{(E)}\ \frac{3}{4}$

Problem 22

A cube has edge length 2. Suppose that we glue a cube of edge length 1 on top of the big cube so that one of its faces rests entirely on the top face of the larger cube. The percent increase in the surface area (sides, top, and bottom) from the original cube to the new solid formed is closest to



$\text{(A)}\ 10 \qquad \text{(B)}\ 15 \qquad \text{(C)}\ 17 \qquad \text{(D)}\ 21 \qquad \text{(E)}\ 25$

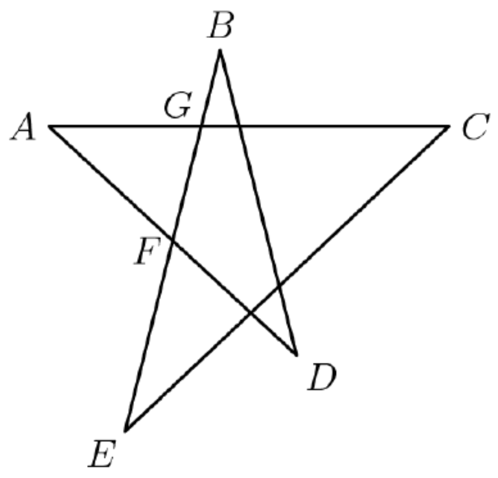
Problem 23

There is a list of seven numbers. The average of the first four numbers is 5, and the average of the last four numbers is 8. If the average of all seven numbers is $6\frac{4}{7}$, then the number common to both sets of four numbers is

$\text{(A)}\ 5\frac{3}{7} \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 6\frac{4}{7} \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 7\frac{3}{7}$

Problem 24

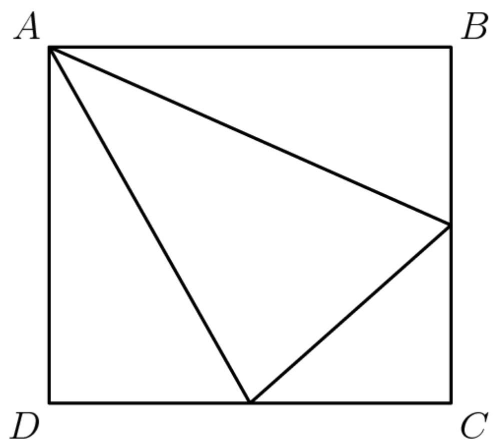
If $\angle A = 20^\circ$ and $\angle AFG = \angle AGF$, then $\angle B + \angle D =$



$\text{(A)}\ 48^\circ \qquad \text{(B)}\ 60^\circ \qquad \text{(C)}\ 72^\circ \qquad \text{(D)}\ 80^\circ \qquad \text{(E)}\ 90^\circ$

Problem 25

The area of rectangle $ABCD$ is 72. If point A and the midpoints of $\overline{BC}$ and $\overline{CD}$ are joined to form a triangle, the area of that triangle is



$\text{(A)}\ 21 \qquad \text{(B)}\ 27 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 36 \qquad \text{(E)}\ 40$

See Also

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2001 AMC 8 Problems

Contents

Problem 1

Casey's shop class is making a golf trophy. He has to paint 300 dimples on a golf ball. If it takes him 2 seconds to paint one dimple, how many minutes will he need to do his job?

$\text{(A)}\ 4 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 8 \qquad \text{(D)}\ 10 \qquad \text{(E)}\ 12$

Solution

Problem 2

I'm thinking of two whole numbers. Their product is 24 and their sum is 11. What is the larger number?

$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 12$

Solution

Problem 3

Granny Smith has $63. Elberta has $2 more than Anjou and Anjou has one-third as much as Granny Smith. How many dollars does Elberta have?

$\text{(A)}\ 17 \qquad \text{(B)}\ 18 \qquad \text{(C)}\ 19 \qquad \text{(D)}\ 21 \qquad \text{(E)}\ 23$

Solution

Problem 4

The digits 1, 2, 3, 4 and 9 are each used once to form the smallest possible **even** five-digit number. The digit in the tens place is

$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 9$

Solution

Problem 5

On a dark and stormy night Snoopy suddenly saw a flash of lightning. Ten seconds later he heard the sound of thunder. The speed of sound is 1088 feet per second and one mile is 5280 feet. Estimated, to the nearest half-mile, how far Snoopy was from the flash of lightning?

$\text{(A)}\ 1 \qquad \text{(B)}\ 1\frac{1}{2} \qquad \text{(C)}\ 2 \qquad \text{(D)}\ 2\frac{1}{2} \qquad \text{(E)}\ 3$

Solution

Problem 6

Six trees are equally spaced along one side of a straight road. The distance from the first tree to the fourth is 60 feet. What is the distance in feet between the first and last trees?

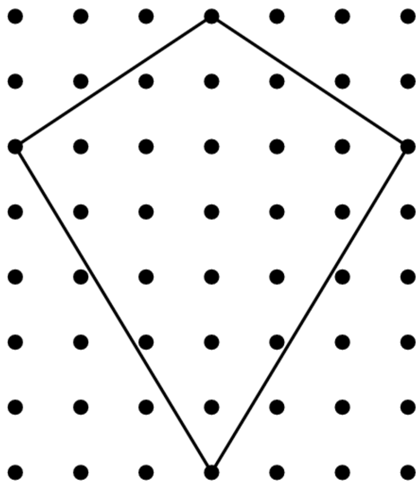
$\text{(A)}\ 90 \qquad \text{(B)}\ 100 \qquad \text{(C)}\ 105 \qquad \text{(D)}\ 120 \qquad \text{(E)}\ 140$

Solution

Kites on Parade

Problems 7, 8 and 9 are about these kites.

To promote her school's annual Kite Olympics, Genevieve makes a small kite and a large kite for a bulletin board display. The kites look like the one in the diagram below. For her small kite Genevieve draws the kite on a one-inch grid. For the large kite she triples both the height and width of the entire grid.



Problem 7

What is the number of square inches in the area of the small kite?

$\text{(A)}\ 21 \qquad \text{(B)}\ 22 \qquad \text{(C)}\ 23 \qquad \text{(D)}\ 24 \qquad \text{(E)}\ 25$

Solution

Problem 8

Genevieve puts bracing on her large kite in the form of a cross connecting opposite corners of the kite. How many inches of bracing material does she need?

$\text{(A)}\ 30 \qquad \text{(B)}\ 32 \qquad \text{(C)}\ 35 \qquad \text{(D)}\ 38 \qquad \text{(E)}\ 39$

Solution

Problem 9

The large kite is covered with gold foil. The foil is cut from a rectangular piece that just covers the entire grid. How many square inches of waste material are cut off from the four corners?

$\text{(A)}\ 63 \qquad \text{(B)}\ 72 \qquad \text{(C)}\ 180 \qquad \text{(D)}\ 189 \qquad \text{(E)}\ 264$

Solution

Problem 10

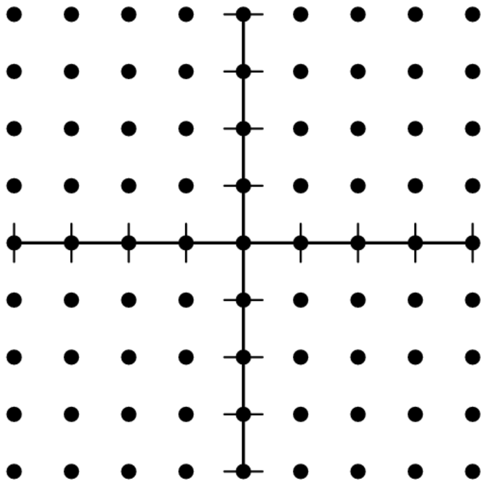
A collector offers to buy state quarters for 2000% of their face value. At that rate how much will Bryden get for his four state quarters?

$\text{(A)}\ 20\text{ dollars} \qquad \text{(B)}\ 50\text{ dollars} \qquad \text{(C)}\ 200\text{ dollars} \qquad \text{(D)}\ 500\text{ dollars} \qquad \text{(E)}\ 2000\text{ dollars}$

Solution

Problem 11

Points A, B, C and D have these coordinates: $A(3,2)$, $B(3,-2)$, $C(-3,-2)$ and $D(-3,0)$. The area of quadrilateral $ABCD$ is



$\text{(A)}\ 12 \qquad \text{(B)}\ 15 \qquad \text{(C)}\ 18 \qquad \text{(D)}\ 21 \qquad \text{(E)}\ 24$

Solution

Problem 12

If $a \otimes b = \dfrac{a + b}{a - b}$, then $(6\otimes 4)\otimes 3 =$

$\text{(A)}\ 4 \qquad \text{(B)}\ 13 \qquad \text{(C)}\ 15 \qquad \text{(D)}\ 30 \qquad \text{(E)}\ 72$

Solution

Problem 13

Of the 36 students in Richelle's class, 12 prefer chocolate pie, 8 prefer apple, and 6 prefer blueberry. Half of the remaining students prefer cherry pie and half prefer lemon. For Richelle's pie graph showing this data, how many degrees should she use for cherry pie?

$\text{(A)}\ 10 \qquad \text{(B)}\ 20 \qquad \text{(C)}\ 30 \qquad \text{(D)}\ 50 \qquad \text{(E)}\ 72$

Solution

Problem 14

Tyler has entered a buffet line in which he chooses one kind of meat, two different vegetables and one dessert. If the order of food items is not important, how many different meals might he choose?

- Meat: beef, chicken, pork
- Vegetables: baked beans, corn, potatoes, tomatoes
- Dessert: brownies, chocolate cake, chocolate pudding, ice cream

$\text{(A)}\ 4 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 72 \qquad \text{(D)}\ 80 \qquad \text{(E)}\ 144$

Solution

Problem 15

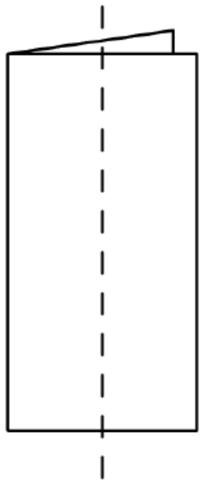
Homer began peeling a pile of 44 potatoes at the rate of 3 potatoes per minute. Four minutes later Christen joined him and peeled at the rate of 5 potatoes per minute. When they finished, how many potatoes had Christen peeled?

$\text{(A)}\ 20 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 33 \qquad \text{(E)}\ 40$

Solution

Problem 16

A square piece of paper, 4 inches on a side, is folded in half vertically. Both layers are then cut in half parallel to the fold. Three new rectangles are formed, a large one and two small ones. What is the ratio of the perimeter of one of the small rectangles to the perimeter of the large rectangle?



$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{1}{2} \qquad \text{(C)}\ \frac{3}{4} \qquad \text{(D)}\ \frac{4}{5} \qquad \text{(E)}\ \frac{5}{6}$

Solution

Problem 17

For the game show *Who Wants To Be A Millionaire?*, the dollar values of each question are shown in the following table (where K = 1000).

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Value	100	200	300	500	1K	2K	4K	8K	16K	32K	64K	125K	250K	500K	1000K

Between which two questions is the percent increase of the value the smallest?

$\text{(A)}\ \text{From 1 to 2} \qquad \text{(B)}\ \text{From 2 to 3} \qquad \text{(C)}\ \text{From 3 to 4} \qquad \text{(D)}\ \text{From 11 to 12} \qquad \text{(E)}\ \text{From 14 to 15}$

Solution

Problem 18

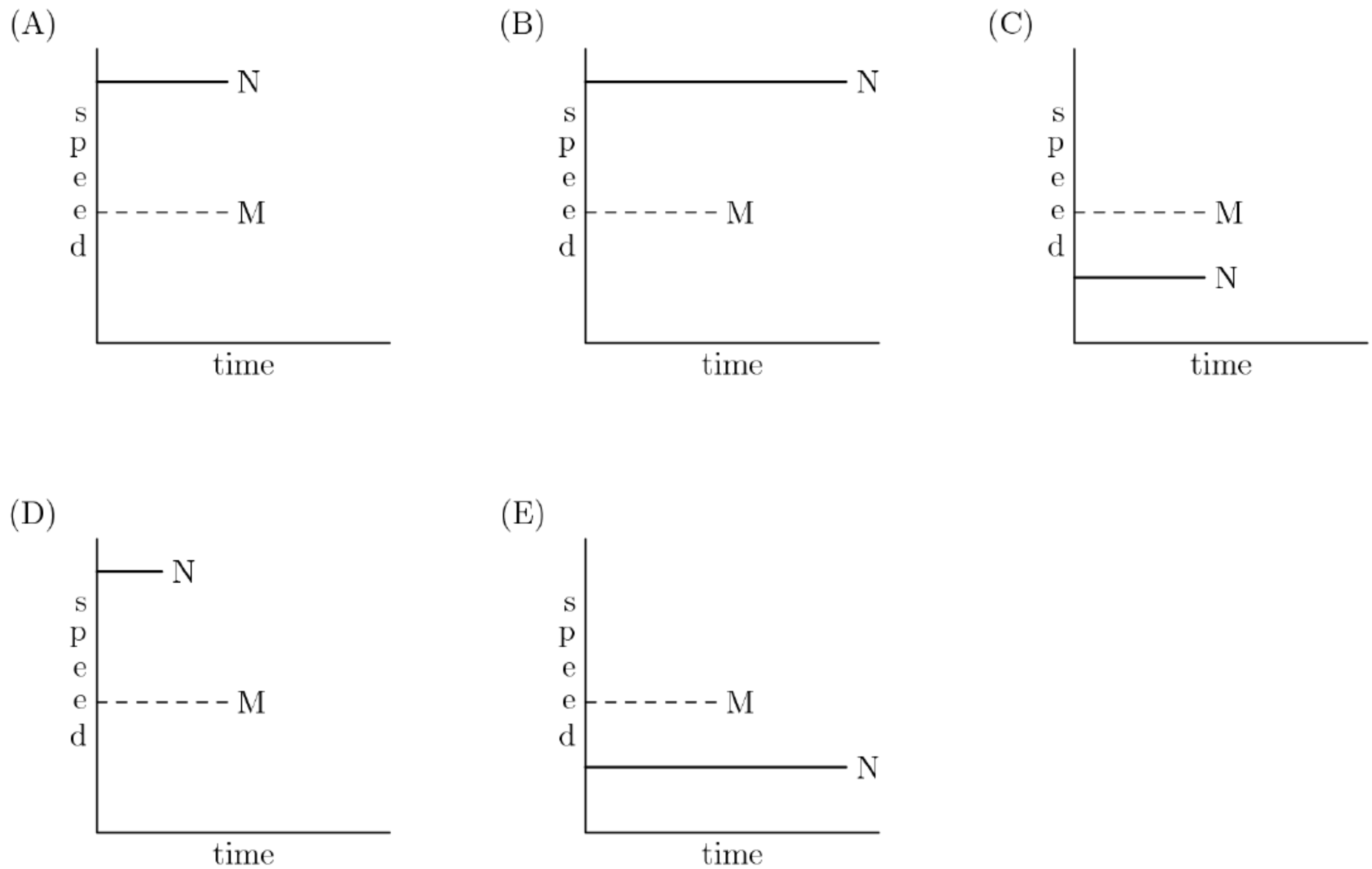
Two dice are thrown. What is the probability that the product of the two numbers is a multiple of 5?

$\text{(A)}\ \frac{1}{36} \qquad \text{(B)}\ \frac{1}{18} \qquad \text{(C)}\ \frac{1}{6} \qquad \text{(D)}\ \frac{11}{36} \qquad \text{(E)}\ \frac{1}{3}$

Solution

Problem 19

Car M traveled at a constant speed for a given time. This is shown by the dashed line. Car N traveled at twice the speed for the same distance. If Car N's speed and time are shown as solid line, which graph illustrates this?



Solution

Problem 20

Kaleana shows her test score to Quay, Marty and Shana, but the others keep theirs hidden. Quay thinks, "At least two of us have the same score." Marty thinks, "I didn't get the lowest score." Shana thinks, "I didn't get the highest score." List the scores from lowest to highest for Marty (M), Quay (Q) and Shana (S).

$\text{(A)}\ \text{S,Q,M} \qquad \text{(B)}\ \text{Q,M,S} \qquad \text{(C)}\ \text{Q,S,M} \qquad \text{(D)}\ \text{M,S,Q} \qquad \text{(E)}\ \text{S,M,Q}$

Solution

Problem 21

The mean of a set of five different positive integers is 15. The median is 18. The maximum possible value of the largest of these five integers is

$\text{(A)}\ 19 \qquad \text{(B)}\ 24 \qquad \text{(C)}\ 32 \qquad \text{(D)}\ 35 \qquad \text{(E)}\ 40$

Solution

Problem 22

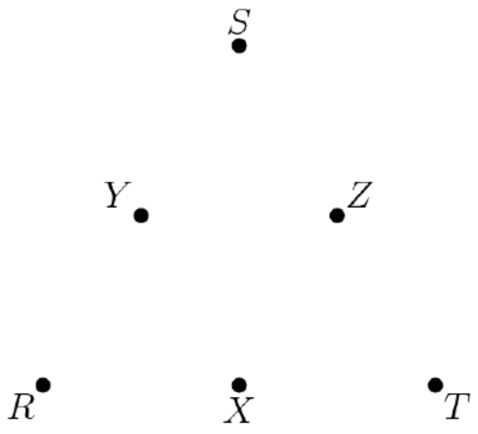
On a twenty-question test, each correct answer is worth 5 points, each unanswered question is worth 1 point and each incorrect answer is worth 0 points. Which of the following scores is **NOT** possible?

$\text{(A)}\ 90 \qquad \text{(B)}\ 91 \qquad \text{(C)}\ 92 \qquad \text{(D)}\ 95 \qquad \text{(E)}\ 97$

Solution

Problem 23

Points R, S and T are vertices of an equilateral triangle, and points X, Y and Z are midpoints of its sides. How many noncongruent triangles can be drawn using any three of these six points as vertices?

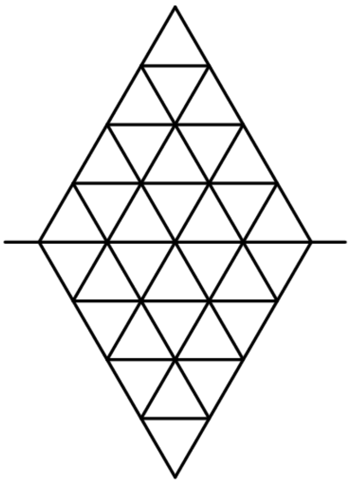


$\text{(A)}\ 1 \qquad \text{(B)}\ 2 \qquad \text{(C)}\ 3 \qquad \text{(D)}\ 4 \qquad \text{(E)}\ 20$

Solution

Problem 24

Each half of this figure is composed of 3 red triangles, 5 blue triangles and 8 white triangles. When the upper half is folded down over the centerline, 2 pairs of red triangles coincide, as do 3 pairs of blue triangles. There are 2 red-white pairs. How many white pairs coincide?



$\text{(A)}\ 4 \qquad \text{(B)}\ 5 \qquad \text{(C)}\ 6 \qquad \text{(D)}\ 7 \qquad \text{(E)}\ 9$

Solution

Problem 25

There are 24 four-digit whole numbers that use each of the four digits 2, 4, 5 and 7 exactly once. Only one of these four-digit numbers is a multiple of another one. Which of the following is it?

$\text{(A)}\ 5724 \qquad \text{(B)}\ 7245 \qquad \text{(C)}\ 7254 \qquad \text{(D)}\ 7425 \qquad \text{(E)}\ 7542$

Solution

See Also

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2002 AMC 8 Problems

Contents

Problem 1

A circle and two distinct lines are drawn on a sheet of paper. What is the largest possible number of points of intersection of these figures?

$$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad (C)\ 4 \qquad (D)\ 5 \qquad (E)\ 6$$

Solution

Problem 2

How many different combinations of $5 bills and $2 bills can be used to make a total of $17? Order does not matter in this problem.

$$\text{(A)}\ 2 \qquad \text{(B)}\ 3 \qquad \text{(C)}\ 4 \qquad \text{(D)}\ 5 \qquad \text{(E)}\ 6$$

Solution

Problem 3

What is the smallest possible average of four distinct positive even integers?

$$\text{(A)}\ 3 \qquad \text{(B)}\ 4 \qquad \text{(C)}\ 5 \qquad \text{(D)}\ 6 \qquad \text{(E)}\ 7$$

Solution

Problem 4

The year 2002 is a palindrome (a number that reads the same from left to right as it does from right to left). What is the product of the digits of the next year after 2002 that is a palindrome?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 16 \qquad \textbf{(E)}\ 25$

Solution

Problem 5

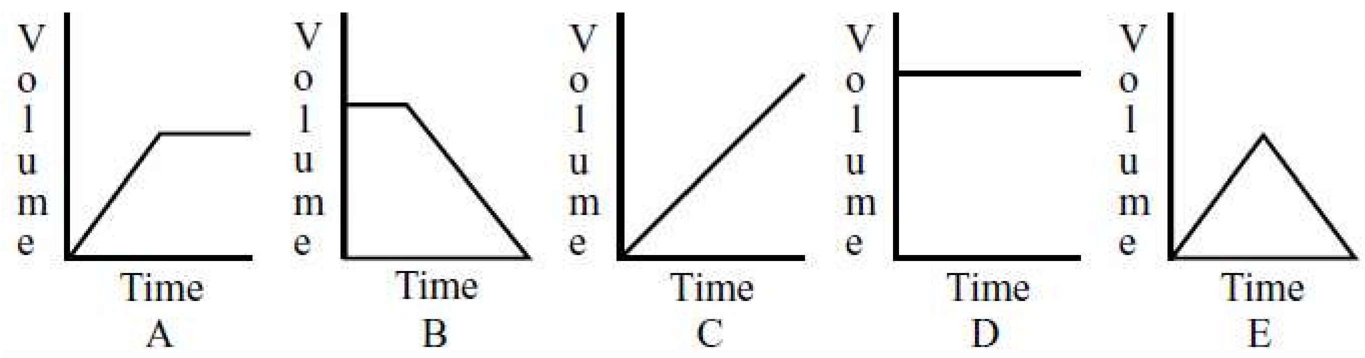
Carlos Montado was born on Saturday, November 9, 2002. On what day of the week will Carlos be 706 days old?

$\textbf{(A)}\ \text{Monday} \qquad \textbf{(B)}\ \text{Wednesday} \qquad \textbf{(C)}\ \text{Friday} \qquad \textbf{(D)}\ \text{Saturday} \qquad \textbf{(E)}\ \text{Sunday}$

Solution

Problem 6

A birdbath is designed to overflow so that it will be self-cleaning. Water flows in at the rate of 20 milliliters per minute and drains at the rate of 18 milliliters per minute. One of these graphs shows the volume of water in the birdbath during the filling time and continuing into the overflow time. Which one is it?

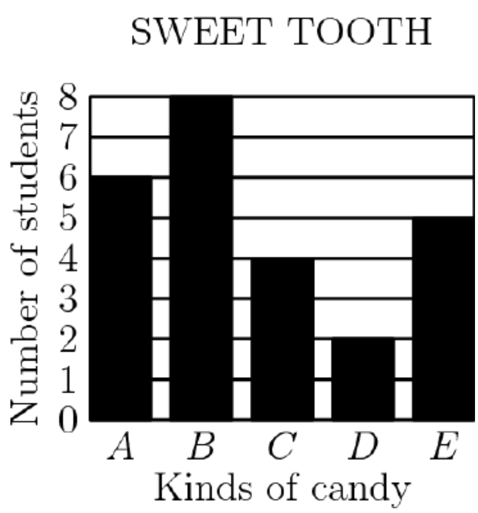


$\textbf{(A)}\ A \qquad \textbf{(B)}\ B \qquad \textbf{(C)}\ C \qquad \textbf{(D)}\ D \qquad \textbf{(E)}\ E$

Solution

Problem 7

The students in Mrs. Sawyer's class were asked to do a taste test of five kinds of candy. Each student chose one kind of candy. A bar graph of their preferences is shown. What percent of her class chose candy E?



$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 12 \qquad \textbf{(C)}\ 15 \qquad \textbf{(D)}\ 16 \qquad \textbf{(E)}\ 20$

Solution

Juan's Old Stamping Grounds

Problems 8,9 and 10 use the data found in the accompanying paragraph and table:

Juan organizes the stamps in his collection by country and by the decade in which they were issued. The prices he paid for them at a stamp shop were: Brazil and France, 6 cents each, Peru 4 cents each, and Spain 5 cents each. (Brazil and Peru are South American countries and France and Spain are in Europe.)

Number of Stamps by Decade

Country	50s	60s	70s	80s
Brazil	4	7	12	8
France	8	4	12	15
Peru	6	4	6	10
Spain	3	9	13	9

Juan's Stamp Collection

Problem 8

How many of his European stamps were issued in the '80s?

$\textbf{(A)}\ 9 \qquad \textbf{(B)}\ 15 \qquad \textbf{(C)}\ 18 \qquad \textbf{(D)}\ 24 \qquad \textbf{(E)}\ 42$

Solution

Problem 9

His South American stamps issued before the '70s cost him?

$\textbf{(A)}\ \$0.40 \qquad \textbf{(B)}\ \$1.06 \qquad \textbf{(C)}\ \$1.80 \qquad \textbf{(D)}\ \$2.38 \qquad \textbf{(E)}\ \$2.64$

Solution

Problem 10

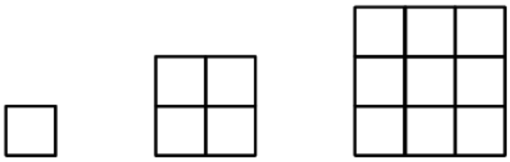
The average price of his '70s stamps is closest to

$\textbf{(A)}\ 3.5\text{ cents} \qquad \textbf{(B)}\ 4\text{ cents} \qquad \textbf{(C)}\ 4.5\text{ cents} \qquad \textbf{(D)}\ 5\text{ cents} \qquad \textbf{(E)}\ 5.4\text{ cents}$

Solution

Problem 11

A sequence of squares is made of identical square tiles. The edge of each square is one tile length longer than the edge of the previous square. The first three squares are shown. How many more tiles does the seventh square require than the sixth?



$\textbf{(A)}\ 11 \qquad \textbf{(B)}\ 12 \qquad \textbf{(C)}\ 13 \qquad \textbf{(D)}\ 14 \qquad \textbf{(E)}\ 15$

Solution

Problem 12

A board game spinner is divided into three regions labeled A, B and C. The probability of the arrow stopping on region A is $\frac{1}{3}$ and on region B is $\frac{1}{2}$. The probability of the arrow stopping on region C is

$\textbf{(A)}\ \frac{1}{12} \qquad \textbf{(B)}\ \frac{1}{6} \qquad \textbf{(C)}\ \frac{1}{5} \qquad \textbf{(D)}\ \frac{1}{3} \qquad \textbf{(E)}\ \frac{2}{5}$

Solution

Problem 13

For his birthday, Bert gets a box that holds 125 jellybeans when filled to capacity. A few weeks later, Carrie gets a larger box full of jellybeans. Her box is twice as high, twice as wide and twice as long as Bert's. Approximately, how many jellybeans did Carrie get?

$\text{(A)}\ 250 \qquad \text{(B)}\ 500 \qquad \text{(C)}\ 625 \qquad \text{(D)}\ 750 \qquad \text{(E)}\ 1000$

Solution

Problem 14

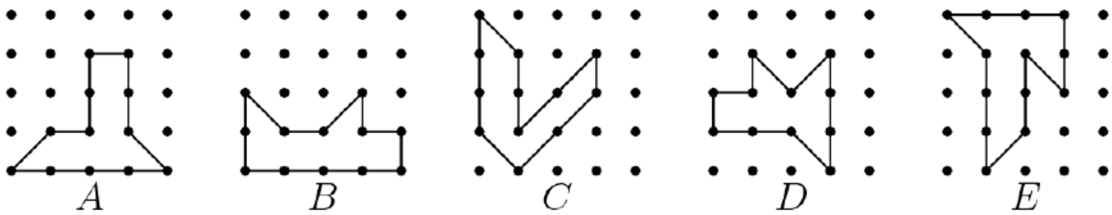
A merchant offers a large group of items at 30% off. Later, the merchant takes 20% off these sale prices and claims that the final price of these items is 50% off the original price. The total discount is

$\text{(A)}\ 35\% \qquad \text{(B)}\ 44\% \qquad \text{(C)}\ 50\% \qquad \text{(D)}\ 56\% \qquad \text{(E)}\ 60\%$

Solution

Problem 15

Which of the following polygons has the largest area?

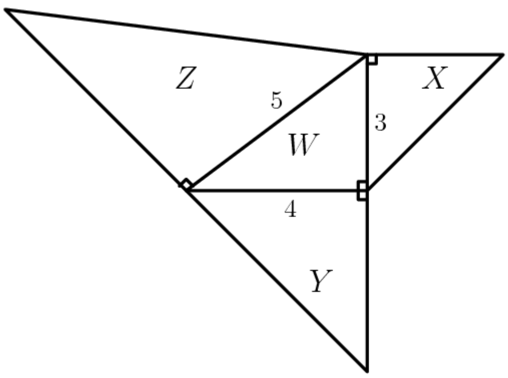


$\text{(A)} \text{A} \qquad \text{(B)}\ \text{B} \qquad \text{(C)}\ \text{C} \qquad \text{(D)}\ \text{D} \qquad \text{(E)}\ \text{E}$

Solution

Problem 16

Right isosceles triangles are constructed on the sides of a 3-4-5 right triangle, as shown. A capital letter represents the area of each triangle. Which one of the following is true?



$\text{(A)}\ X+Z=W+Y \qquad \text{(B)}\ W+X=Z \qquad \text{(C)}\ 3X+4Y=5Z$

$\text{(D)}\ X+W=\frac{1}{2}(Y+Z) \qquad \text{(E)}\ X+Y=Z$

Solution

Problem 17

In a mathematics contest with ten problems, a student gains 5 points for a correct answer and loses 2 points for an incorrect answer. If Olivia answered every problem and her score was 29, how many correct answers did she have?

$\text{(A)}\ 5 \qquad \text{(B)}\ 6 \qquad \text{(C)}\ 7 \qquad \text{(D)}\ 8 \qquad \text{(E)}\ 9$

Solution

Problem 18

Gage skated 1 hr 15 min each day for 5 days and 1 hr 30 min each day for 3 days. How long would he have to skate the ninth day in order to average 85 minutes of skating each day for the entire time?

$(\mathrm{A})\ 1\ \mathrm{hr} \qquad (\mathrm{B})\ 1\ \mathrm{hr}\ 10\ \mathrm{min} \qquad (\mathrm{C})\ 1\ \mathrm{hr}\ 20\ \mathrm{min} \qquad (\mathrm{D})\ 1\ \mathrm{hr}\ 40\ \mathrm{min} \qquad (\mathrm{E})\ 2\ \mathrm{hr}$

Solution

Problem 19

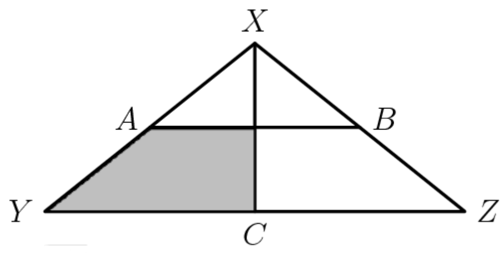
How many whole numbers between 99 and 999 contain exactly one 0?

$(\mathrm{A})\ 72 \qquad (\mathrm{B})\ 90 \qquad (\mathrm{C})\ 144 \qquad (\mathrm{D})\ 162 \qquad (\mathrm{E})\ 180$

Solution

Problem 20

The area of triangle XYZ is 8 square inches. Points A and B are midpoints of congruent segments $\overline{XY}$ and $\overline{XZ}$. Altitude $\overline{XC}$ bisects $\overline{YZ}$. The area (in square inches) of the shaded region is



$(\mathrm{A})\ 1\frac{1}{2} \qquad (\mathrm{B})\ 2 \qquad (\mathrm{C})\ 2\frac{1}{2} \qquad (\mathrm{D})\ 3 \qquad (\mathrm{E})\ 3\frac{1}{2}$

Solution

Problem 21

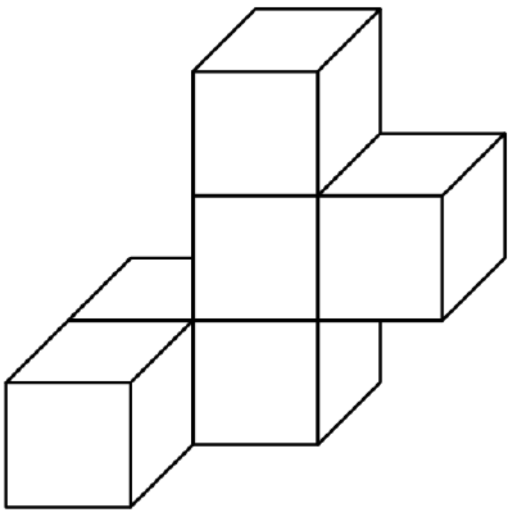
Harold tosses a nickel four times. The probability that he gets at least as many heads as tails is

$(\mathrm{A})\ \frac{5}{16} \qquad (\mathrm{B})\ \frac{3}{8} \qquad (\mathrm{C})\ \frac{1}{2} \qquad (\mathrm{D})\ \frac{5}{8} \qquad (\mathrm{E})\ \frac{11}{16}$

Solution

Problem 22

Six cubes, each an inch on an edge, are fastened together, as shown. Find the total surface area in square inches. Include the top, bottom and sides.

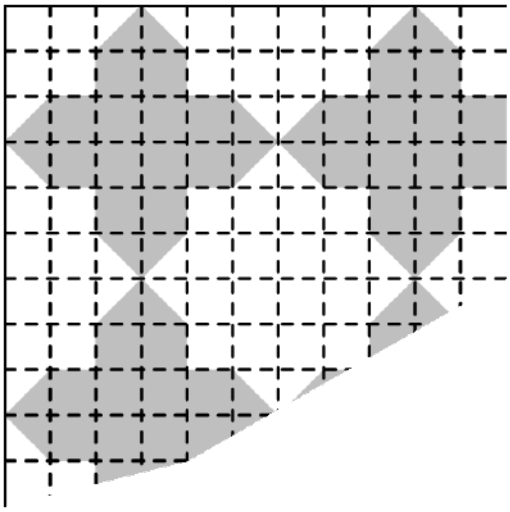


$(\mathrm{A})\ 18 \qquad (\mathrm{B})\ 24 \qquad (\mathrm{C})\ 26 \qquad (\mathrm{D})\ 30 \qquad (\mathrm{E})\ 36$

Solution

Problem 23

A corner of a tiled floor is shown. If the entire floor is tiled in this way and each of the four corners looks like this one, then what fraction of the tiled floor is made of darker tiles?



$\text{(A)}\ \frac{1}{3} \qquad \text{(B)}\ \frac{4}{9} \qquad \text{(C)}\ \frac{1}{2} \qquad \text{(D)}\ \frac{5}{9} \qquad \text{(E)}\ \frac{5}{8}$

Solution

Problem 24

Miki has a dozen oranges of the same size and a dozen pears of the same size. Miki uses her juicer to extract 8 ounces of pear juice from 3 pears and 8 ounces of orange juice from 2 oranges. She makes a pear-orange juice blend from an equal number of pears and oranges. What percent of the blend is pear juice?

$\text{(A)}\ 30 \qquad \text{(B)}\ 40 \qquad \text{(C)}\ 50 \qquad \text{(D)}\ 60 \qquad \text{(E)}\ 70$

Solution

Problem 25

Loki, Moe, Nick and Ott are good friends. Ott had no money, but the others did. Moe gave Ott one-fifth of his money, Loki gave Ott one-fourth of his money and Nick gave Ott one-third of his money. Each gave Ott the same amount of money. What fractional part of the group's money does Ott now have?

$\text{(A)}\ \frac{1}{10} \qquad \text{(B)}\ \frac{1}{4} \qquad \text{(C)}\ \frac{1}{3} \qquad \text{(D)}\ \frac{2}{5} \qquad \text{(E)}\ \frac{1}{2}$

Solution

See Also

2002 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2002))	
Preceded by **2001 AMC 8**	Followed by **2003 AMC 8**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AJHSME/AMC 8 Problems and Solutions	

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- AMC 8 Problems and Solutions
- Mathematics competition resources

2003 AMC 8 Problems

Contents

Problem 1

Jamie counted the number of edges of a cube, Jimmy counted the numbers of corners, and Judy counted the number of faces. They then added the three numbers. What was the resulting sum?

$\mathrm{(A)}\ 12 \qquad \mathrm{(B)}\ 16 \qquad \mathrm{(C)}\ 20 \qquad \mathrm{(D)}\ 22 \qquad \mathrm{(E)}\ 26$

Solution

Problem 2

Which of the following numbers has the smallest prime factor?

$\mathrm{(A)}\ 55 \qquad \mathrm{(B)}\ 57 \qquad \mathrm{(C)}\ 58 \qquad \mathrm{(D)}\ 59 \qquad \mathrm{(E)}\ 61$

Solution

Problem 3

A burger at Ricky C's weighs 120 grams, of which 30 grams are filler. What percent of the burger is not filler?

$\mathrm{(A)}\ 60\% \qquad \mathrm{(B)}\ 65\% \qquad \mathrm{(C)}\ 70\% \qquad \mathrm{(D)}\ 75\% \qquad \mathrm{(E)}\ 90\%$

Solution

Problem 4

A group of children riding on bicycles and tricycles rode past Billy Bob's house. Billy Bob counted 7 children and 19 wheels. How many tricycles were there?

$\mathrm{(A)}\ 2 \qquad \mathrm{(B)}\ 4 \qquad \mathrm{(C)}\ 5 \qquad \mathrm{(D)}\ 6 \qquad \mathrm{(E)}\ 7$

Solution

Problem 5

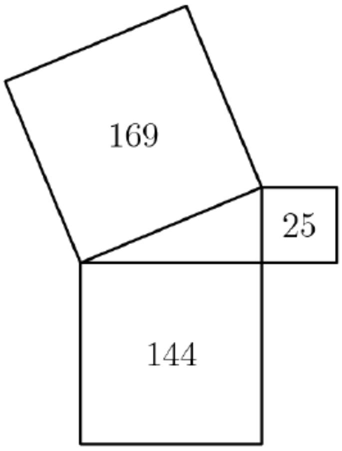
If 20% of a number is 12, what is 30% of the same number?

$\mathrm{(A)}\ 15 \qquad \mathrm{(B)}\ 18 \qquad \mathrm{(C)}\ 20 \qquad \mathrm{(D)}\ 24 \qquad \mathrm{(E)}\ 30$

Solution

Problem 6

Given the areas of the three squares in the figure, what is the area of the interior triangle?



$\textbf{(A)}\ 13 \qquad\textbf{(B)}\ 30 \qquad\textbf{(C)}\ 60 \qquad\textbf{(D)}\ 300 \qquad\textbf{(E)}\ 1800$

Solution

Problem 7

Blake and Jenny each took four 100-point tests. Blake averaged 78 on the four tests. Jenny scored 10 points higher than Blake on the first test, 10 points lower than him on the second test, and 20 points higher on both the third and fourth tests. What is the difference between Jenny's average and Blake's average on these four tests?

$\textbf{(A)}\ 10 \qquad\textbf{(B)}\ 15 \qquad\textbf{(C)}\ 20 \qquad\textbf{(D)}\ 25 \qquad\textbf{(E)}\ 40$

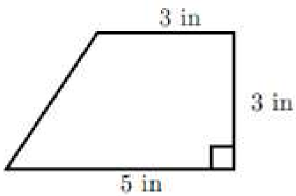
Solution

Bake Sale

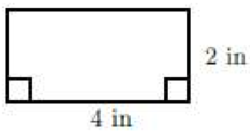
Problems 8, 9, and 10 use the data found in the accompanying paragraph and figures.

Four friends, Art, Roger, Paul and Trisha, bake cookies, and all cookies have the same thickness. The shapes of the cookies differ, as shown.

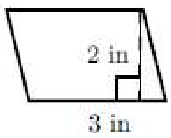
- Art's cookies are trapezoids:



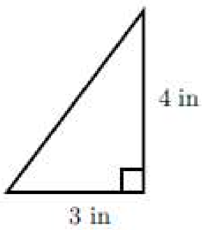
- Roger's cookies are rectangles:



- Paul's cookies are parallelograms:



- Trisha's cookies are triangles:



Each friend uses the same amount of dough, and Art makes exactly 12 cookies.

Problem 8

Who gets the fewest cookies from one batch of cookie dough?

$\textbf{(A)}\ \text{Art} \qquad \textbf{(B)}\ \text{Paul} \qquad \textbf{(C)}\ \text{Roger} \qquad \textbf{(D)}\ \text{Trisha} \qquad \textbf{(E)}\ \text{There is a tie for fewest.}$

Solution

Problem 9

Art's cookies sell for 60 cents each. To earn the same amount from a single batch, how much should one of Roger's cookies cost in cents?

$\textbf{(A)}\ 18 \qquad \textbf{(B)}\ 25 \qquad \textbf{(C)}\ 40 \qquad \textbf{(D)}\ 75 \qquad \textbf{(E)}\ 90$

Solution

Problem 10

How many cookies will be in one batch of Trisha's cookies?

$\textbf{(A)}\ 10 \qquad \textbf{(B)}\ 12 \qquad \textbf{(C)}\ 16 \qquad \textbf{(D)}\ 18 \qquad \textbf{(E)}\ 24$

Solution

Problem 11

Business is a little slow at Lou's Fine Shoes, so Lou decides to have a sale. On Friday, Lou increases all of Thursday's prices by 10%. Over the weekend, Lou advertises the sale: "Ten percent off the listed price. Sale starts Monday." How much does a pair of shoes cost on Monday that cost 40 dollars on Thursday?

$\textbf{(A)}\ 36 \qquad \textbf{(B)}\ 39.60 \qquad \textbf{(C)}\ 40 \qquad \textbf{(D)}\ 40.40 \qquad \textbf{(E)}\ 44$

Solution

Problem 12

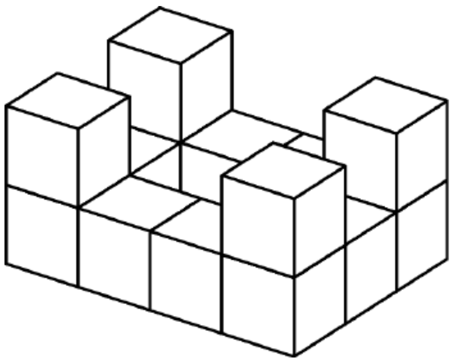
When a fair six-sided die is tossed on a table top, the bottom face cannot be seen. What is the probability that the product of the numbers on the five faces that can be seen is divisible by 6?

$\textbf{(A)}\ \frac{1}{3} \qquad \textbf{(B)}\ \frac{1}{2} \qquad \textbf{(C)}\ \frac{2}{3} \qquad \textbf{(D)}\ \frac{5}{6} \qquad \textbf{(E)}\ 1$

Solution

Problem 13

Fourteen white cubes are put together to form the figure on the right. The complete surface of the figure, including the bottom, is painted red. The figure is then separated into individual cubes. How many of the individual cubes have exactly four red faces?



$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 12$

Solution

Problem 14

In this addition problem, each letter stands for a different digit.

$$\begin{array}{cccc} & T & W & O \\ + & T & W & O \\ \hline F & O & U & R \end{array}$$

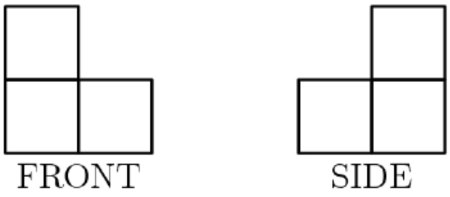
If $T = 7$ and the letter O represents an even number, what is the only possible value for W?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 2 \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

Solution

Problem 15

A figure is constructed from unit cubes. Each cube shares at least one face with another cube. What is the minimum number of cubes needed to build a figure with the front and side views shown?



$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 7$

Solution

Problem 16

Ali, Bonnie, Carlo, and Dianna are going to drive together to a nearby theme park. The car they are using has 4 seats: 1 driver's seat, 1 front passenger seat, and 2 back passenger seats. Bonnie and Carlo are the only ones who know how to drive the car. How many possible seating arrangements are there?

$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 12 \qquad \textbf{(E)}\ 24$

Solution

Problem 17

The six children listed below are from two families of three siblings each. Each child has blue or brown eyes and black or blond hair. Children from the same family have at least one of these characteristics in common. Which two children are Jim's siblings?

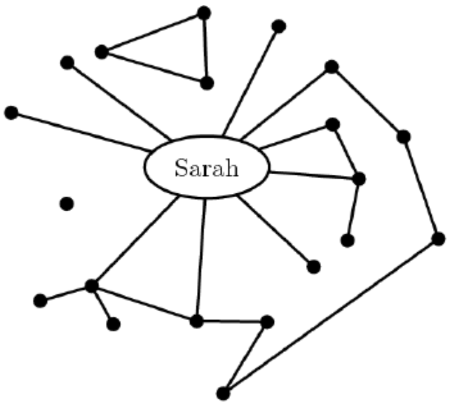
Child	Eye Color	Hair Color
Benjamin	Blue	Black
Jim	Brown	Blonde
Nadeen	Brown	Black
Austin	Blue	Blonde
Tevyn	Blue	Black
Sue	Blue	Blonde

$\textbf{(A)}\ \text{Nadeen and Austin} \qquad \textbf{(B)}\ \text{Benjamin and Sue} \qquad \textbf{(C)}\ \text{Benjamin and Austin} \qquad \textbf{(D)}\ \text{Nadeen and Tevyn}$
$\textbf{(E)}\ \text{Austin and Sue}$

Solution

Problem 18

Each of the twenty dots on the graph below represents one of Sarah's classmates. Classmates who are friends are connected with a line segment. For her birthday party, Sarah is inviting only the following: all of her friends and all of those classmates who are friends with at least one of her friends. How many classmates will not be invited to Sarah's party?



$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 7$

Solution

Problem 19

How many integers between 1000 and 2000 have all three of the numbers 15, 20, and 25 as factors?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 20

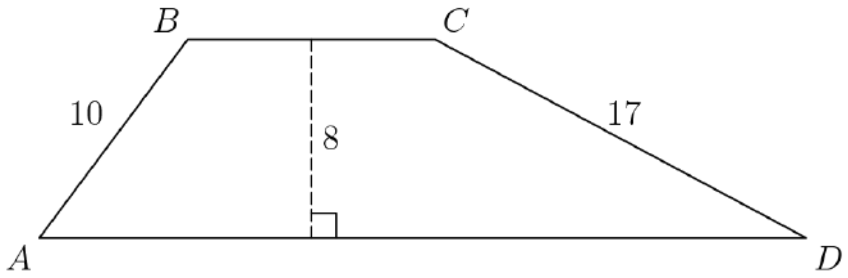
What is the measure of the acute angle formed by the hands of the clock at 4:20 PM?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 12$

Solution

Problem 21

The area of trapezoid $ABCD$ is 164 cm^2. The altitude is 8 cm, AB is 10 cm, and CD is 17 cm. What is BC, in centimeters?

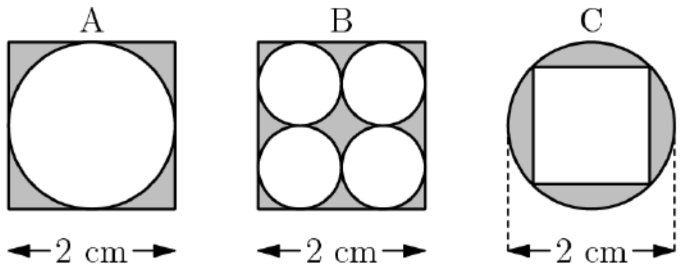


$\textbf{(A)}\ 9 \qquad \textbf{(B)}\ 10 \qquad \textbf{(C)}\ 12 \qquad \textbf{(D)}\ 15 \qquad \textbf{(E)}\ 20$

Solution

Problem 22

The following figures are composed of squares and circles. Which figure has a shaded region with largest area?

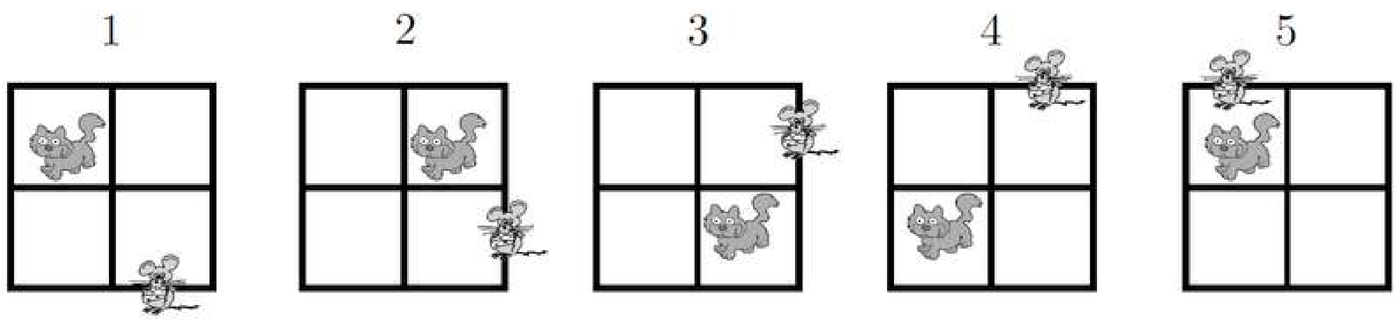


$\textbf{(A)}\ \text{A only} \qquad \textbf{(B)}\ \text{B only} \qquad \textbf{(C)}\ \text{C only} \qquad \textbf{(D)}\ \text{both A and B} \qquad \textbf{(E)}\ \text{all are equal}$

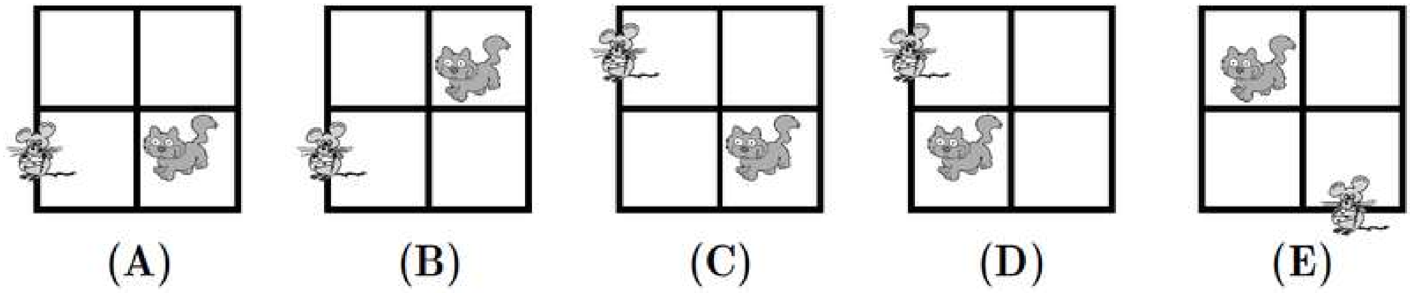
Solution

Problem 23

In the pattern below, the cat moves clockwise through the four squares and the mouse moves counterclockwise through the eight exterior segments of the four squares.



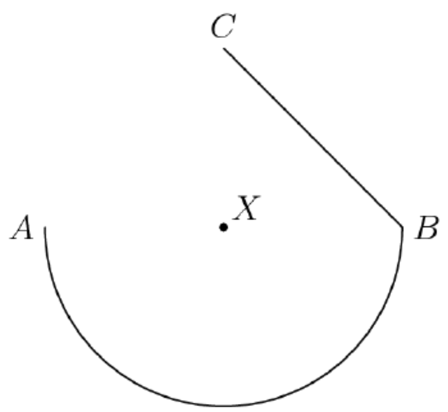
If the pattern is continued, where would the cat and mouse be after the 247th move?

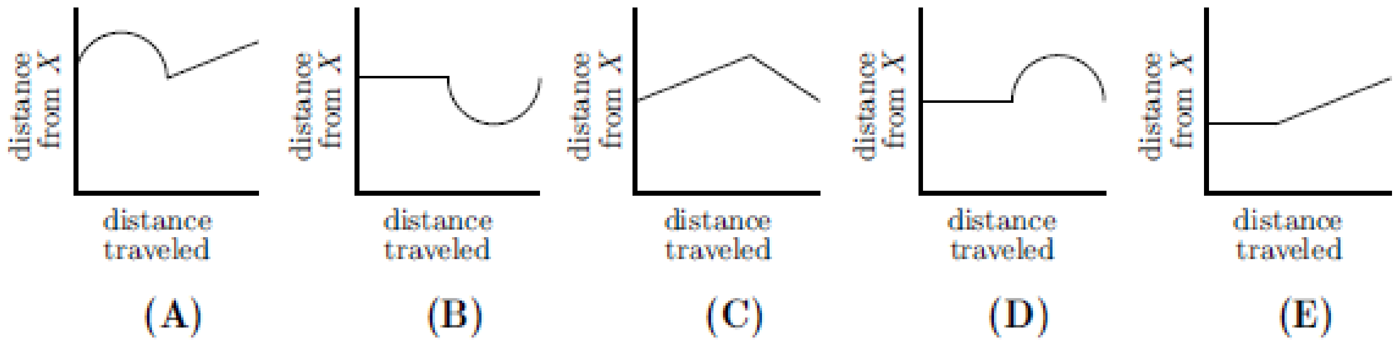


Solution

Problem 24

A ship travels from point A to point B along a semicircular path, centered at Island X. Then it travels along a straight path from B to C. Which of these graphs best shows the ship's distance from Island X as it moves along its course?

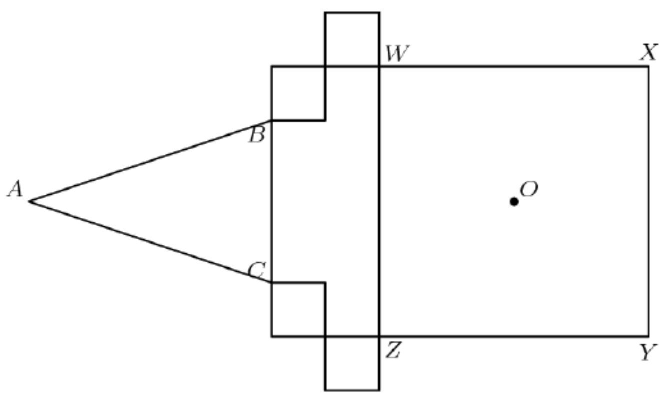




Solution

Problem 25

In the figure, the area of square $WXYZ$ is 25 cm^2. The four smaller squares have sides 1 cm long, either parallel to or coinciding with the sides of the large square. In $\triangle ABC$, $AB = AC$, and when $\triangle ABC$ is folded over side $\overline{BC}$, point A coincides with O, the center of square $WXYZ$. What is the area of $\triangle ABC$, in square centimeters?



$\textbf{(A)}\ \frac{15}{4} \qquad \textbf{(B)}\ \frac{21}{4} \qquad \textbf{(C)}\ \frac{27}{4} \qquad \textbf{(D)}\ \frac{21}{2} \qquad \textbf{(E)}\ \frac{27}{2}$

Solution

See Also

2003 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2003))	
Preceded by **2002 AMC 8**	Followed by **2004 AMC 8**
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All AJHSME/AMC 8 Problems and Solutions	

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- AMC 8 Problems and Solutions
- Mathematics competition resources

2004 AMC 8 Problems

Contents

Problem 1

On a map, a 12-centimeter length represents 72 kilometers. How many kilometers does a 17-centimeter length represent?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 102 \qquad \textbf{(C)}\ 204 \qquad \textbf{(D)}\ 864 \qquad \textbf{(E)}\ 1224$

Solution

Problem 2

How many different four-digit numbers can be formed by rearranging the four digits in 2004?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 16 \qquad \textbf{(D)}\ 24 \qquad \textbf{(E)}\ 81$

Solution

Problem 3

Twelve friends met for dinner at Oscar's Overstuffed Oyster House, and each ordered one meal. The portions were so large, there was enough food for 18 people. If they shared, how many meals should they have ordered to have just enough food for the 12 of them?

$\textbf{(A)}\ 8 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 15 \qquad \textbf{(E)}\ 18$

Solution

Problem 4

Ms. Hamilton’s eighth-grade class wants to participate in the annual three-person-team basketball tournament. Lance, Sally, Joy, and Fred are chosen for the team. In how many ways can the three starters be chosen?

$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 10$

Solution

Problem 5

Ms. Hamilton's eighth-grade class wants to participate in the annual three-person-team basketball tournament. The losing team of each game is eliminated from the tournament. If sixteen teams compete, how many games will be played to determine the winner?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 15 \qquad \textbf{(E)}\ 16$

Solution

Problem 6

After Sally takes 20 shots, she has made 55% of her shots. After she takes 5 more shots, she raises her percentage to 56%. How many of the last 5 shots did she make?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 7

An athlete's target heart rate, in beats per minute, is 80% of the theoretical maximum heart rate. The maximum heart rate is found by subtracting the athlete's age, in years, from 220. To the nearest whole number, what is the target heart rate of an athlete who is 26 years old?

$\textbf{(A)}\ 134 \qquad \textbf{(B)}\ 155 \qquad \textbf{(C)}\ 176 \qquad \textbf{(D)}\ 194 \qquad \textbf{(E)}\ 243$

Solution

Problem 8

Find the number of two-digit positive integers whose digits total 7.

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 10$

Solution

Problem 9

The average of the five numbers in a list is 54. The average of the first two numbers is 48. What is the average of the last three numbers?

$\textbf{(A)}\ 55 \qquad \textbf{(B)}\ 56 \qquad \textbf{(C)}\ 57 \qquad \textbf{(D)}\ 58 \qquad \textbf{(E)}\ 59$

Solution

Problem 10

Handy Aaron helped a neighbor $1\frac{1}{4}$ hours on Monday, 50 minutes on Tuesday, from 8:20 to 10:45 on Wednesday morning, and a half-hour on Friday. He is paid $\$3$ per hour. How much did he earn for the week?

$\textbf{(A)}\ \$8 \qquad \textbf{(B)}\ \$9 \qquad \textbf{(C)}\ \$10 \qquad \textbf{(D)}\ \$12 \qquad \textbf{(E)}\ \$15$

Solution

Problem 11

The numbers $-2, 4, 6, 9$ and 12 are rearranged according to these rules:

$$\begin{array}{l} \text{The largest isn't first, but it is in one of the first three places.} \\ \text{The smallest isn't last, but it is in one of the last three places.} \\ \text{The median isn't first or last.} \end{array}$$

What is the average of the first and last numbers?

$\textbf{(A)}\ 3.5 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 6.5 \qquad \textbf{(D)}\ 7.5 \qquad \textbf{(E)}\ 8$

Solution

Problem 12

Niki usually leaves her cell phone on. If her cell phone is on but she is not actually using it, the battery will last for 24 hours. If she is using it constantly, the battery will last for only 3 hours. Since the last recharge, her phone has been on 9 hours, and during that time she has used it for 60 minutes. If she doesn't talk any more but leaves the phone on, how many more hours will the battery last?

$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 11 \qquad \textbf{(D)}\ 14 \qquad \textbf{(E)}\ 15$

Solution

Problem 13

Amy, Bill and Celine are friends with different ages. Exactly one of the following statements is true.

```
I. Bill is the oldest.
II. Amy is not the oldest.
III. Celine is not the youngest.
```

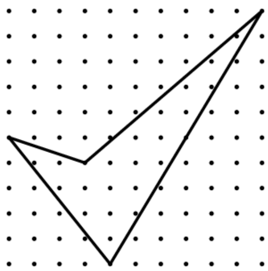
Rank the friends from the oldest to the youngest.

$\textbf{(A)}\ \text{Bill, Amy, Celine} \qquad \textbf{(B)}\ \text{Amy, Bill, Celine} \qquad \textbf{(C)}\ \text{Celine, Amy, Bill}$
$\textbf{(D)}\ \text{Celine, Bill, Amy} \qquad \textbf{(E)}\ \text{Amy, Celine, Bill}$

Solution

Problem 14

What is the area enclosed by the geoboard quadrilateral below?

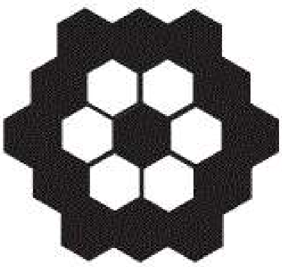


$\textbf{(A)}\ 15 \qquad \textbf{(B)}\ 18\frac{1}{2} \qquad \textbf{(C)}\ 22\frac{1}{2} \qquad \textbf{(D)}\ 27 \qquad \textbf{(E)}\ 41$

Solution

Problem 15

Thirteen black and six white hexagonal tiles were used to create the figure below. If a new figure is created by attaching a border of white tiles with the same size and shape as the others, what will be the difference between the total number of white tiles and the total number of black tiles in the new figure?



$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 11 \qquad \textbf{(D)}\ 12 \qquad \textbf{(E)}\ 18$

Solution

Problem 16

Two 600 mL pitchers contain orange juice. One pitcher is $1/3$ full and the other pitcher is $2/5$ full. Water is added to fill each pitcher completely, then both pitchers are poured into one large container. What fraction of the mixture in the large container is orange juice?

$\textbf{(A)}\ \frac{1}{8} \qquad \textbf{(B)}\ \frac{3}{16} \qquad \textbf{(C)}\ \frac{11}{30} \qquad \textbf{(D)}\ \frac{11}{19} \qquad \textbf{(E)}\ \frac{11}{15}$

Solution

Problem 17

Three friends have a total of 6 identical pencils, and each one has at least one pencil. In how many ways can this happen?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 12$

Solution

Problem 18

Five friends compete in a dart-throwing contest. Each one has two darts to throw at the same circular target, and each individual's score is the sum of the scores in the target regions that are hit. The scores for the target regions are the whole numbers 1 through 10. Each throw hits the target in a region with a different value. The scores are: Alice 16 points, Ben 4 points, Cindy 7 points, Dave 11 points, and Ellen 17 points. Who hits the region worth 6 points?

$\textbf{(A)}\ \text{Alice}\qquad\textbf{(B)}\ \text{Ben}\qquad\textbf{(C)}\ \text{Cindy}\qquad\textbf{(D)}\ \text{Dave}\qquad\textbf{(E)}\ \text{Ellen}$

Solution

Problem 19

A whole number larger than 2 leaves a remainder of 2 when divided by each of the numbers $3, 4, 5,$ and 6. The smallest such number lies between which two numbers?

$\textbf{(A)}\ 40\text{ and }49\qquad\textbf{(B)}\ 60\text{ and }79\qquad\textbf{(C)}\ 100\text{ and }129\qquad\textbf{(D)}\ 210\text{ and }249\qquad\textbf{(E)}\ 320\text{ and }369$

Solution

Problem 20

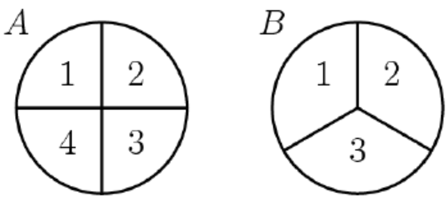
Two-thirds of the people in a room are seated in three-fourths of the chairs. The rest of the people are standing. If there are 6 empty chairs, how many people are in the room?

$\textbf{(A)}\ 12\qquad\textbf{(B)}\ 18\qquad\textbf{(C)}\ 24\qquad\textbf{(D)}\ 27\qquad\textbf{(E)}\ 36$

Solution

Problem 21

Spinners A and B are spun. On each spinner, the arrow is equally likely to land on each number. What is the probability that the product of the two spinners' numbers is even?



$\textbf{(A)}\ \frac{1}{4}\qquad\textbf{(B)}\ \frac{1}{3}\qquad\textbf{(C)}\ \frac{1}{2}\qquad\textbf{(D)}\ \frac{2}{3}\qquad\textbf{(E)}\ \frac{3}{4}$

Solution

Problem 22

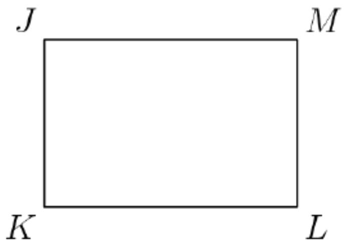
At a party there are only single women and married men with their wives. The probability that a randomly selected woman is single is $\frac{2}{5}$. What fraction of the people in the room are married men?

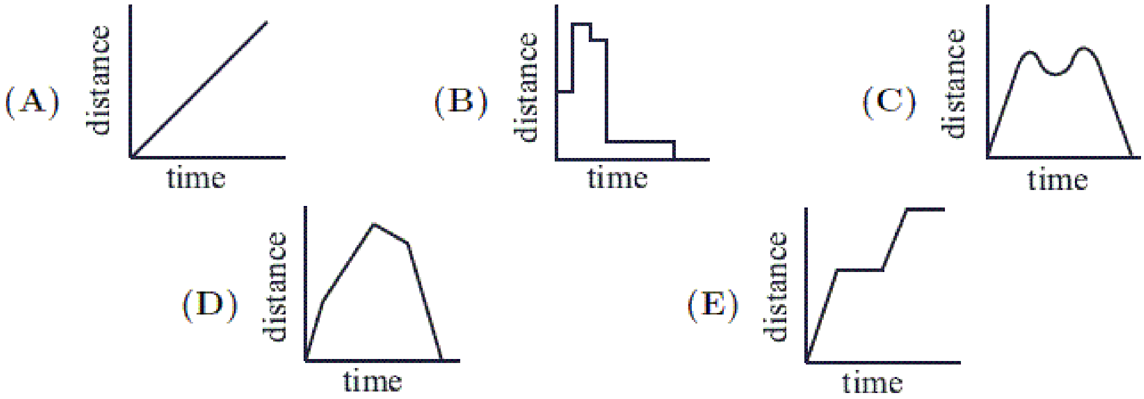
$\textbf{(A)}\ \frac{1}{3}\qquad\textbf{(B)}\ \frac{3}{8}\qquad\textbf{(C)}\ \frac{2}{5}\qquad\textbf{(D)}\ \frac{5}{12}\qquad\textbf{(E)}\ \frac{3}{5}$

Solution

Problem 23

Tess runs counterclockwise around rectangular block $JKLM$. She lives at corner J. Which graph could represent her straight-line distance from home?

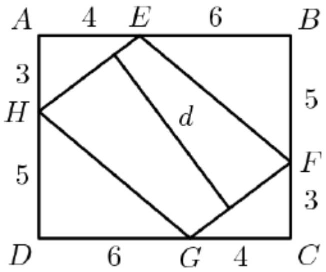




Solution

Problem 24

In the figure, $ABCD$ is a rectangle and $EFGH$ is a parallelogram. Using the measurements given in the figure, what is the length d of the segment that is perpendicular to $\overline{HE}$ and $\overline{FG}$?

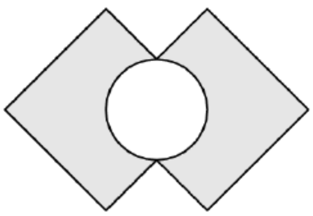


$\textbf{(A)}\ 6.8 \qquad \textbf{(B)}\ 7.1 \qquad \textbf{(C)}\ 7.6 \qquad \textbf{(D)}\ 7.8 \qquad \textbf{(E)}\ 8.1$

Solution

Problem 25

Two 4×4 squares intersect at right angles, bisecting their intersecting sides, as shown. The circle's diameter is the segment between the two points of intersection. What is the area of the shaded region created by removing the circle from the squares?



$\textbf{(A)}\ 16-4\pi \qquad \textbf{(B)}\ 16-2\pi \qquad \textbf{(C)}\ 28-4\pi \qquad \textbf{(D)}\ 28-2\pi \qquad \textbf{(E)}\ 32-2\pi$

Solution

See Also

2004 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2004))	
Preceded by **2003 AMC 8**	Followed by **2005 AMC 8**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AJHSME/AMC 8 Problems and Solutions	

- AMC 8
- AMC 8 Problems and Solutions
- Mathematics competition resources

2005 AMC 8 Problems

Contents

Problem 1

Connie multiplies a number by 2 and gets 60 as her answer. However, she should have divided the number by 2 to get the correct answer. What is the correct answer?

$\textbf{(A)}\ 7.5\qquad\textbf{(B)}\ 15\qquad\textbf{(C)}\ 30\qquad\textbf{(D)}\ 120\qquad\textbf{(E)}\ 240$

Solution

Problem 2

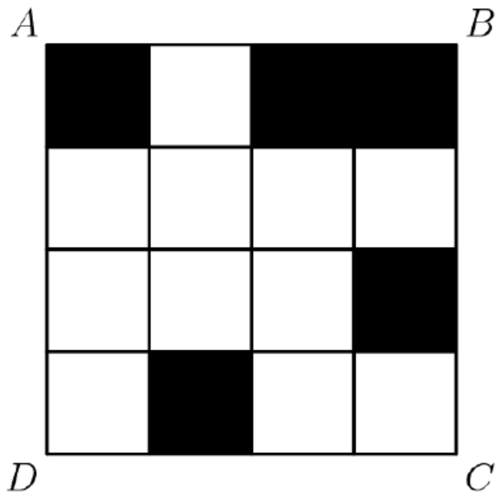
Karl bought five folders from Pay-A-Lot at a cost of $\$2.50$ each. Pay-A-Lot had a 20%-off sale the following day. How much could Karl have saved on the purchase by waiting a day?

$\textbf{(A)}\ \$1.00\qquad\textbf{(B)}\ \$2.00\qquad\textbf{(C)}\ \$2.50\qquad\textbf{(D)}\ \$2.75\qquad\textbf{(E)}\ \$5.00$

Solution

Problem 3

What is the minimum number of small squares that must be colored black so that a line of symmetry lies on the diagonal $\overline{BD}$ of square $ABCD$?



$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 4

A square and a triangle have equal perimeters. The lengths of the three sides of the triangle are 6.1 cm, 8.2 cm and 9.7 cm. What is the area of the square in square centimeters?

$\textbf{(A)}\ 24 \qquad \textbf{(B)}\ 25 \qquad \textbf{(C)}\ 36 \qquad \textbf{(D)}\ 48 \qquad \textbf{(E)}\ 64$

Solution

Problem 5

Soda is sold in packs of 6, 12 and 24 cans. What is the minimum number of packs needed to buy exactly 90 cans of soda?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 15$

Solution

Problem 6

Suppose d is a digit. For how many values of d is $2.00d5 > 2.005$?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 10$

Solution

Problem 7

Bill walks $\frac{1}{2}$ mile south, then $\frac{3}{4}$ mile east, and finally $\frac{1}{2}$ mile south. How many miles is he, in a direct line, from his starting point?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 1\frac{1}{4} \qquad \textbf{(C)}\ 1\frac{1}{2} \qquad \textbf{(D)}\ 1\frac{3}{4} \qquad \textbf{(E)}\ 2$

Solution

Problem 8

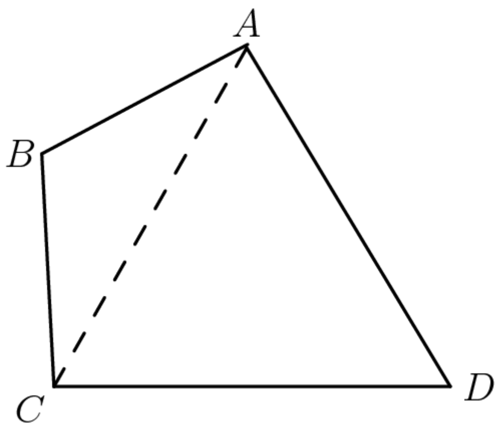
Suppose m and n are positive odd integers. Which of the following must also be an odd integer?

$\textbf{(A)}\ m+3n \qquad \textbf{(B)}\ 3m-n \qquad \textbf{(C)}\ 3m^2 + 3n^2 \qquad \textbf{(D)}\ (nm + 3)^2 \qquad \textbf{(E)}\ 3mn$

Solution

Problem 9

In quadrilateral $ABCD$, sides $\overline{AB}$ and $\overline{BC}$ both have length 10, sides $\overline{CD}$ and $\overline{DA}$ both have length 17, and the measure of angle ADC is 60°. What is the length of diagonal $\overline{AC}$?



$\textbf{(A)}\ 13.5\qquad\textbf{(B)}\ 14\qquad\textbf{(C)}\ 15.5\qquad\textbf{(D)}\ 17\qquad\textbf{(E)}\ 18.5$

Solution

Problem 10

Joe had walked half way from home to school when he realized he was late. He ran the rest of the way to school. He ran 3 times as fast as he walked. Joe took 6 minutes to walk half way to school. How many minutes did it take Joe to get from home to school?

$\textbf{(A)}\ 7\qquad\textbf{(B)}\ 7.3\qquad\textbf{(C)}\ 7.7\qquad\textbf{(D)}\ 8\qquad\textbf{(E)}\ 8.3$

Solution

Problem 11

The sales tax rate in Bergville is 6%. During a sale at the Bergville Coat Closet, the price of a coat is discounted 20% from its $90.00 price. Two clerks, Jack and Jill, calculate the bill independently. Jack brings up $90.00 and adds 6% sales tax, then subtracts 20% from this total. Jill rings up $90.00, subtracts 20% of the price, then adds 6% of the discounted price for sales tax. What is Jack's total minus Jill's total?

$\textbf{(A)}\ -\$1.06\qquad\textbf{(B)}\ -\$0.53\qquad\textbf{(C)}\ 0\qquad\textbf{(D)}\ \$0.53\qquad\textbf{(E)}\ \$1.06$

Solution

Problem 12

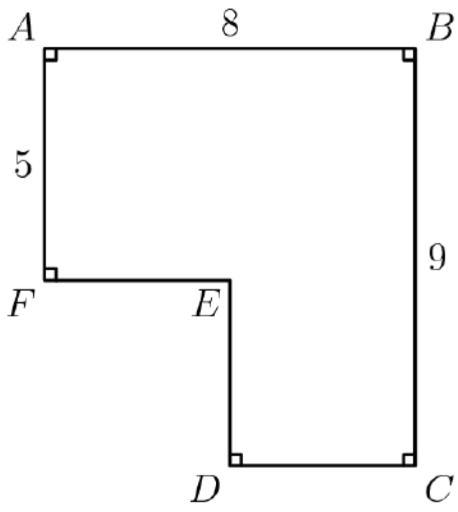
Big Al the ape ate 100 delicious yellow bananas from May 1 through May 5. Each day he ate six more bananas than on the previous day. How many delicious bananas did Big Al eat on May 5?

$\textbf{(A)}\ 20\qquad\textbf{(B)}\ 22\qquad\textbf{(C)}\ 30\qquad\textbf{(D)}\ 32\qquad\textbf{(E)}\ 34$

Solution

Problem 13

The area of polygon $ABCDEF$ is 52 with $AB=8$, $BC=9$ and $FA=5$. What is $DE+EF$?



$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 11$

Solution

Problem 14

The Little Twelve Basketball League has two divisions, with six teams in each division. Each team plays each of the other teams in its own division twice and every team in the other division once. How many games are scheduled?

$\textbf{(A)}\ 80 \qquad \textbf{(B)}\ 96 \qquad \textbf{(C)}\ 100 \qquad \textbf{(D)}\ 108 \qquad \textbf{(E)}\ 192$

Solution

Problem 15

How many different isosceles triangles have integer side lengths and perimeter 23?

$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 11$

Solution

Problem 16

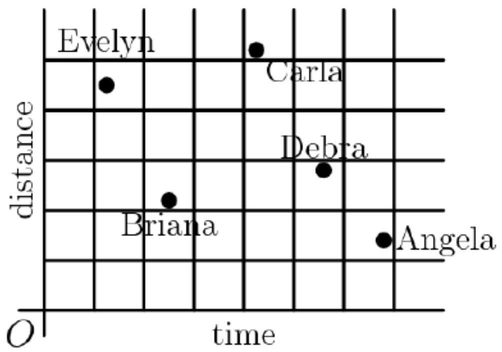
A five-legged Martian has a drawer full of socks, each of which is red, white or blue, and there are at least five socks of each color. The Martian pulls out one sock at a time without looking. How many socks must the Martian remove from the drawer to be certain there will be 5 socks of the same color?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 12 \qquad \textbf{(D)}\ 13 \qquad \textbf{(E)}\ 15$

Solution

Problem 17

The results of a cross-country team's training run are graphed below. Which student has the greatest average speed?



$\textbf{(A)}\ \text{Angela} \qquad \textbf{(B)}\ \text{Briana} \qquad \textbf{(C)}\ \text{Carla} \qquad \textbf{(D)}\ \text{Debra} \qquad \textbf{(E)}\ \text{Evelyn}$

Solution

Problem 18

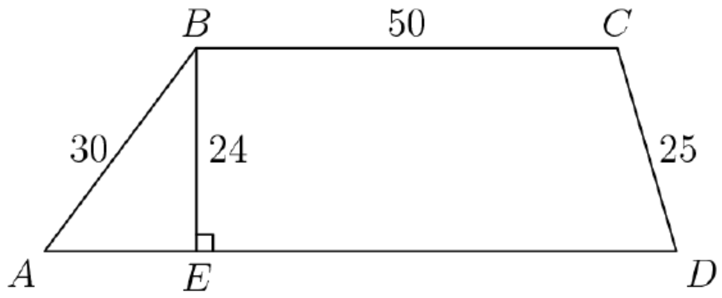
How many three-digit numbers are divisible by 13?

$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 67 \qquad \textbf{(C)}\ 69 \qquad \textbf{(D)}\ 76 \qquad \textbf{(E)}\ 77$

Solution

Problem 19

What is the perimeter of trapezoid $ABCD$?



$\textbf{(A)}\ 180 \qquad \textbf{(B)}\ 188 \qquad \textbf{(C)}\ 196 \qquad \textbf{(D)}\ 200 \qquad \textbf{(E)}\ 204$

Solution

Problem 20

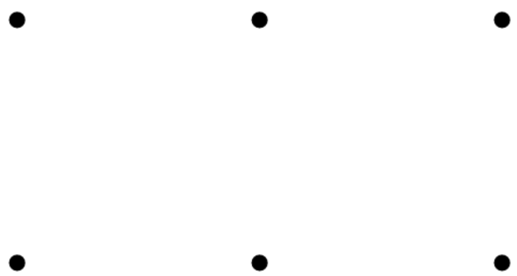
Alice and Bob play a game involving a circle whose circumference is divided by 12 equally-spaced points. The points are numbered clockwise, from 1 to 12. Both start on point 12. Alice moves clockwise and Bob, counterclockwise. In a turn of the game, Alice moves 5 points clockwise and Bob moves 9 points counterclockwise. The game ends when they stop on the same point. How many turns will this take?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 12 \qquad \textbf{(D)}\ 14 \qquad \textbf{(E)}\ 24$

Solution

Problem 21

How many distinct triangles can be drawn using three of the dots below as vertices?



$\textbf{(A)}\ 9 \qquad \textbf{(B)}\ 12 \qquad \textbf{(C)}\ 18 \qquad \textbf{(D)}\ 20 \qquad \textbf{(E)}\ 24$

Solution

Problem 22

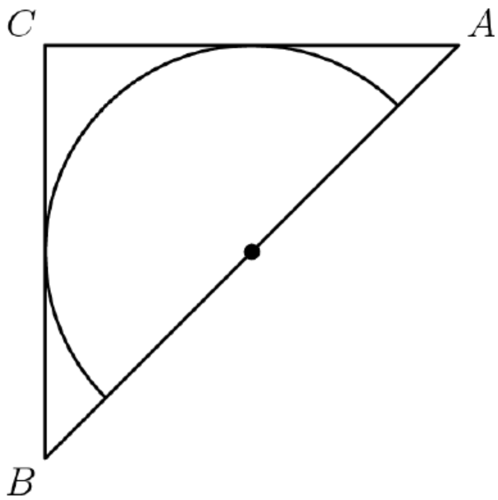
A company sells detergent in three different sized boxes: small (S), medium (M) and large (L). The medium size costs 50% more than the small size and contains 20% less detergent than the large size. The large size contains twice as much detergent as the small size and costs 30% more than the medium size. Rank the three sizes from best to worst buy.

$\textbf{(A)}\ \text{SML} \qquad \textbf{(B)}\ \text{LMS} \qquad \textbf{(C)}\ \text{MSL} \qquad \textbf{(D)}\ \text{LSM} \qquad \textbf{(E)}\ \text{MLS}$

Solution

Problem 23

Isosceles right triangle ABC encloses a semicircle of area 2π. The circle has its center O on hypotenuse $\overline{AB}$ and is tangent to sides $\overline{AC}$ and $\overline{BC}$. What is the area of triangle ABC?



$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 3\pi \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 4\pi$

Solution

Problem 24

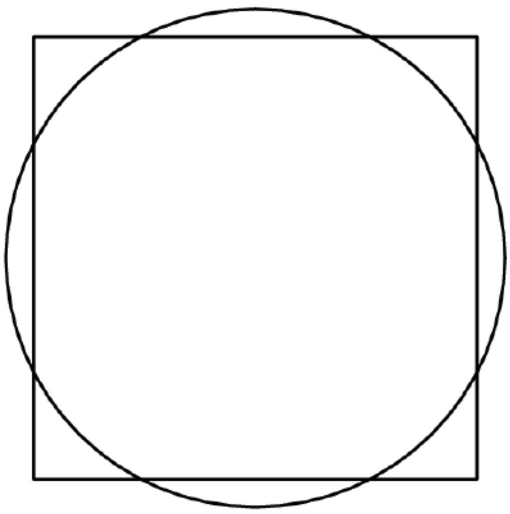
A certain calculator has only two keys [+1] and [x2]. When you press one of the keys, the calculator automatically displays the result. For instance, if the calculator originally displayed "9" and you pressed [+1], it would display "10." If you then pressed [x2], it would display "20." Starting with the display "1," what is the fewest number of keystrokes you would need to reach "200"?

$\textbf{(A)}\ 8 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 11 \qquad \textbf{(E)}\ 12$

Solution

Problem 25

A square with side length 2 and a circle share the same center. The total area of the regions that are inside the circle and outside the square is equal to the total area of the regions that are outside the circle and inside the square. What is the radius of the circle?



$\textbf{(A)}\ \frac{2}{\sqrt{\pi}} \qquad \textbf{(B)}\ \frac{1+\sqrt{2}}{2} \qquad \textbf{(C)}\ \frac{3}{2} \qquad \textbf{(D)}\ \sqrt{3} \qquad \textbf{(E)}\ \sqrt{\pi}$

Solution

See Also

2005 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2005))	
Preceded by **2004 AMC 8**	Followed by **2006 AMC 8**
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All AJHSME/AMC 8 Problems and Solutions	

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2006 AMC 8 Problems

Contents

Problem 1

Mindy made three purchases for $\$1.98$, $\$5.04$, and $\$9.89$. What was her total, to the nearest dollar?

$\textbf{(A)}\ 10 \qquad \textbf{(B)}\ 15 \qquad \textbf{(C)}\ 16 \qquad \textbf{(D)}\ 17 \qquad \textbf{(E)}\ 18$

Solution

Problem 2

On the AMC 8 contest Billy answers 13 questions correctly, answers 7 questions incorrectly and doesn't answer the last 5. What is his score? (right=+1, wrong or N/A=+0)

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 13 \qquad \textbf{(D)}\ 19 \qquad \textbf{(E)}\ 26$

Solution

Problem 3

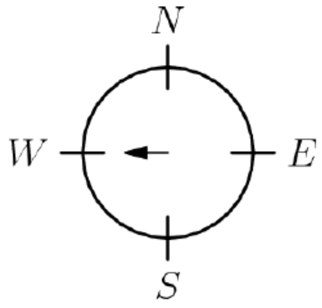
Elisa swims laps in the pool. When she first started, she completed 10 laps in 25 minutes. Now she can finish 12 laps in 24 minutes. By how many minutes has she improved her lap time?

$\textbf{(A)}\ \frac{1}{2} \qquad \textbf{(B)}\ \frac{3}{4} \qquad \textbf{(C)}\ 1 \qquad \textbf{(D)}\ 2 \qquad \textbf{(E)}\ 3$

Solution

Problem 4

Initially, a spinner points west. Chenille moves it clockwise $2\frac{1}{4}$ revolutions and then counterclockwise $3\frac{3}{4}$ revolutions. In what direction does the spinner point after the two moves?

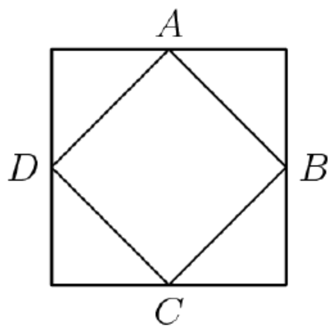


$\textbf{(A)}\ \text{north} \qquad \textbf{(B)}\ \text{east} \qquad \textbf{(C)}\ \text{south} \qquad \textbf{(D)}\ \text{west} \qquad \textbf{(E)}\ \text{northwest}$

Solution

Problem 5

Points A, B, C and D are midpoints of the sides of the larger square. If the larger square has area 60, what is the area of the smaller square?

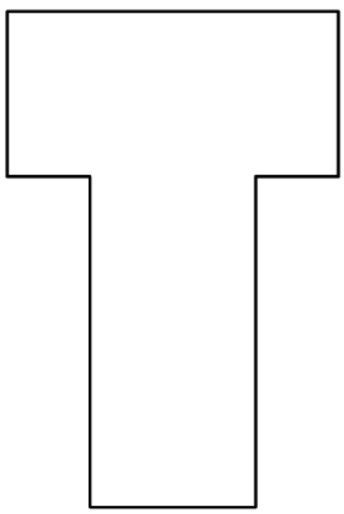


$\textbf{(A)}\ 15 \qquad \textbf{(B)}\ 20 \qquad \textbf{(C)}\ 24 \qquad \textbf{(D)}\ 30 \qquad \textbf{(E)}\ 40$

Solution

Problem 6

The letter T is formed by placing two 2×4 inch rectangles next to each other, as shown. What is the perimeter of the T, in inches?



$\textbf{(A) } 12 \qquad \textbf{(B) } 16 \qquad \textbf{(C) } 20 \qquad \textbf{(D) } 22 \qquad \textbf{(E) } 24$

Solution

Problem 7

Circle X has a radius of π. Circle Y has a circumference of 8π. Circle Z has an area of 9π. List the circles in order from smallest to largest radius.

$\textbf{(A) } X, Y, Z \qquad \textbf{(B) } Z, X, Y \qquad \textbf{(C) } Y, X, Z \qquad \textbf{(D) } Z, Y, X \qquad \textbf{(E) } X, Z, Y$

Solution

Problem 8

The table shows some of the results of a survey by radiostation KACL. What percentage of the males surveyed listen to the station?

	Listen	Don't Listen	Total
Males	?	26	?
Females	58	?	96
Total	136	64	200

$\textbf{(A) } 39 \qquad \textbf{(B) } 48 \qquad \textbf{(C) } 52 \qquad \textbf{(D) } 55 \qquad \textbf{(E) } 75$

Solution

Problem 9

What is the product of $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \cdots \times \frac{2006}{2005}$?

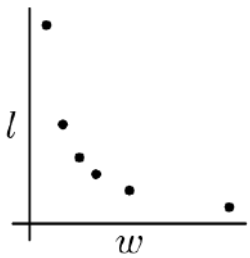
$\textbf{(A) } 1 \qquad \textbf{(B) } 1002 \qquad \textbf{(C) } 1003 \qquad \textbf{(D) } 2005 \qquad \textbf{(E) } 2006$

Solution

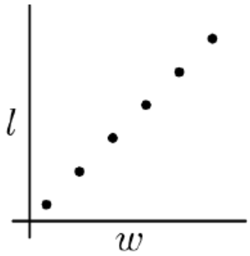
Problem 10

Jorge's teacher asks him to plot all the ordered pairs (w, l) of positive integers for which w is the width and l is the length of a rectangle with area 12. What should his graph look like?

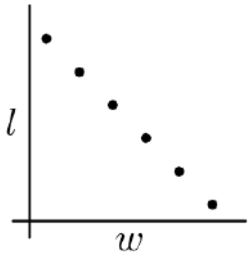
$\textbf{(A)}$



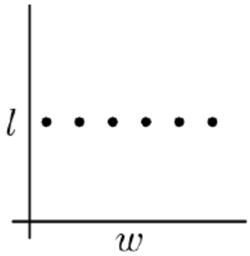
$\textbf{(B)}$



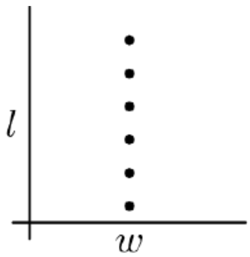
$\textbf{(C)}$



$\textbf{(D)}$



$\textbf{(E)}$



Solution

Problem 11

How many two-digit numbers have digits whose sum is a perfect square?

$\textbf{(A)}\ 13\qquad\textbf{(B)}\ 16\qquad\textbf{(C)}\ 17\qquad\textbf{(D)}\ 18\qquad\textbf{(E)}\ 19$

Solution

Problem 12

Antonette gets 70% on a 10-problem test, 80% on a 20-problem test and 90% on a 30-problem test. If the three tests are combined into one 60-problem test, which percent is closest to her overall score?

$\textbf{(A)}\ 40\qquad\textbf{(B)}\ 77\qquad\textbf{(C)}\ 80\qquad\textbf{(D)}\ 83\qquad\textbf{(E)}\ 87$

Solution

Problem 13

Cassie leaves Escanaba at 8:30 AM heading for Marquette on her bike. She bikes at a uniform rate of 12 miles per hour. Brian leaves Marquette at 9:00 AM heading for Escanaba on his bike. He bikes at a uniform rate of 16 miles per hour. They both bike on the same 62-mile route between Escanaba and Marquette. At what time in the morning do they meet?

$\textbf{(A)}\ 10:00\qquad\textbf{(B)}\ 10:15\qquad\textbf{(C)}\ 10:30\qquad\textbf{(D)}\ 11:00\qquad\textbf{(E)}\ 11:30$

Solution

Problem 14

Problems 14, 15 and 16 involve Mrs. Reed's English assignment.

A Novel Assignment

The students in Mrs. Reed's English class are reading the same 760-page novel. Three friends, Alice, Bob and Chandra, are in the class. Alice reads a page in 20 seconds, Bob reads a page in 45 seconds and Chandra reads a page in 30 seconds.

If Bob and Chandra both read the whole book, Bob will spend how many more seconds reading than Chandra?

$\textbf{(A)}\ 7,600\qquad\textbf{(B)}\ 11,400\qquad\textbf{(C)}\ 12,500\qquad\textbf{(D)}\ 15,200\qquad\textbf{(E)}\ 22,800$

Solution

Problem 15

Problems 14, 15 and 16 involve Mrs. Reed's English assignment.

A Novel Assignment

The students in Mrs. Reed's English class are reading the same 760-page novel. Three friends, Alice, Bob and Chandra, are in the class. Alice reads a page in 20 seconds, Bob reads a page in 45 seconds and Chandra reads a page in 30 seconds.

Chandra and Bob, who each have a copy of the book, decide that they can save time by "team reading" the novel. In this scheme, Chandra will read from page 1 to a certain page and Bob will read from the next page through page 760, finishing the book. When they are through they will tell each other about the part they read. What is the last page that Chandra should read so that she and Bob spend the same amount of time reading the novel?

$\textbf{(A)}\ 425\qquad\textbf{(B)}\ 444\qquad\textbf{(C)}\ 456\qquad\textbf{(D)}\ 484\qquad\textbf{(E)}\ 506$

Solution

Problem 16

Problems 14, 15 and 16 involve Mrs. Reed's English assignment.

A Novel Assignment

The students in Mrs. Reed's English class are reading the same 760-page novel. Three friends, Alice, Bob and Chandra, are in the class. Alice reads a page in 20 seconds, Bob reads a page in 45 seconds and Chandra reads a page in 30 seconds.

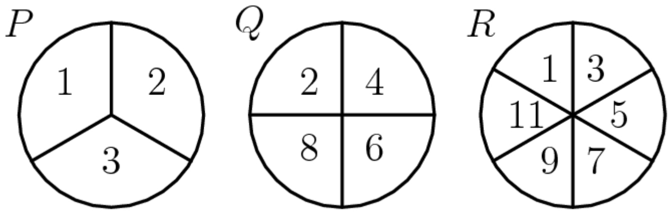
Before Chandra and Bob start reading, Alice says she would like to team read with them. If they divide the book into three sections so that each reads for the same length of time, how many seconds will each have to read?

$\textbf{(A)}\ 6400\qquad\textbf{(B)}\ 6600\qquad\textbf{(C)}\ 6800\qquad\textbf{(D)}\ 7000\qquad\textbf{(E)}\ 7200$

Solution

Problem 17

Jeff rotates spinners P, Q and R and adds the resulting numbers. What is the probability that his sum is an odd number?



$\textbf{(A)}\ \frac{1}{4} \qquad \textbf{(B)}\ \frac{1}{3} \qquad \textbf{(C)}\ \frac{1}{2} \qquad \textbf{(D)}\ \frac{2}{3} \qquad \textbf{(E)}\ \frac{3}{4}$

Solution

Problem 18

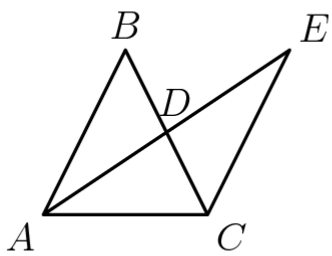
A cube with 3-inch edges is made using 27 cubes with 1-inch edges. Nineteen of the smaller cubes are white and eight are black. If the eight black cubes are placed at the corners of the larger cube, what fraction of the surface area of the larger cube is white?

$\textbf{(A)}\ \frac{1}{9} \qquad \textbf{(B)}\ \frac{1}{4} \qquad \textbf{(C)}\ \frac{4}{9} \qquad \textbf{(D)}\ \frac{5}{9} \qquad \textbf{(E)}\ \frac{19}{27}$

Solution

Problem 19

Triangle ABC is an isosceles triangle with $\overline{AB} = \overline{BC}$. Point D is the midpoint of both $\overline{BC}$ and $\overline{AE}$, and $\overline{CE}$ is 11 units long. Triangle ABD is congruent to triangle ECD. What is the length of $\overline{BD}$?



$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 4.5 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 5.5 \qquad \textbf{(E)}\ 6$

Solution

Problem 20

A singles tournament had six players. Each player played every other player only once, with no ties. If Helen won 4 games, Ines won 3 games, Janet won 2 games, Kendra won 2 games and Lara won 2 games, how many games did Monica (the sixth player) win?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 2 \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

Solution

Problem 21

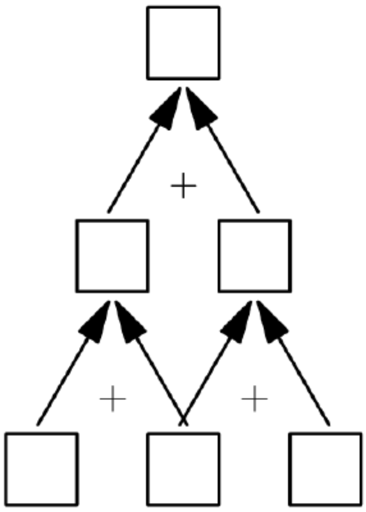
An aquarium has a rectangular base that measures 100 cm by 40 cm and has a height of 50 cm. The aquarium is filled with water to a depth of 37 cm. A rock with volume 1000 cm^3 is then placed in the aquarium and completely submerged. By how many centimeters does the water level rise?

$\textbf{(A)}\ 0.25 \qquad \textbf{(B)}\ 0.5 \qquad \textbf{(C)}\ 1 \qquad \textbf{(D)}\ 1.25 \qquad \textbf{(E)}\ 2.5$

Solution

Problem 22

Three different one-digit positive integers are placed in the bottom row of cells. Numbers in adjacent cells are added and the sum is placed in the cell above them. In the second row, continue the same process to obtain a number in the top cell. What is the difference between the largest and smallest numbers possible in the top cell?



$\textbf{(A) } 16 \qquad \textbf{(B) } 24 \qquad \textbf{(C) } 25 \qquad \textbf{(D) } 26 \qquad \textbf{(E) } 35$

Solution

Problem 23

A box contains gold coins. If the coins are equally divided among six people, four coins are left over. If the coins are equally divided among five people, three coins are left over. If the box holds the smallest number of coins that meets these two conditions, how many coins are left when equally divided among seven people?

$\textbf{(A) } 0 \qquad \textbf{(B) } 1 \qquad \textbf{(C) } 2 \qquad \textbf{(D) } 3 \qquad \textbf{(E) } 5$

Solution

Problem 24

In the multiplication problem below A, B, C, D and are different digits. What is $A+B$?

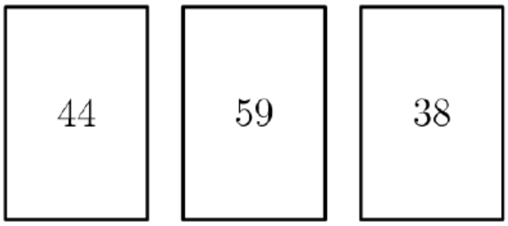
$$\begin{array}{cccc} & A & B & A \\ \times & & C & D \\ \hline C & D & C & D \end{array}$$

$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } 9$

Solution

Problem 25

Barry wrote 6 different numbers, one on each side of 3 cards, and laid the cards on a table, as shown. The sums of the two numbers on each of the three cards are equal. The three numbers on the hidden sides are prime numbers. What is the average of the hidden prime numbers?



$\textbf{(A) } 13 \qquad \textbf{(B) } 14 \qquad \textbf{(C) } 15 \qquad \textbf{(D) } 16 \qquad \textbf{(E) } 17$

Solution

See Also

2006 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2006))	
Preceded by **2005 AMC 8**	Followed by **2007 AMC 8**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AJHSME/AMC 8 Problems and Solutions	

- AMC 8
- AMC 8 Problems and Solutions
- Mathematics competition resources

2007 AMC 8 Problems

Contents

Problem 1

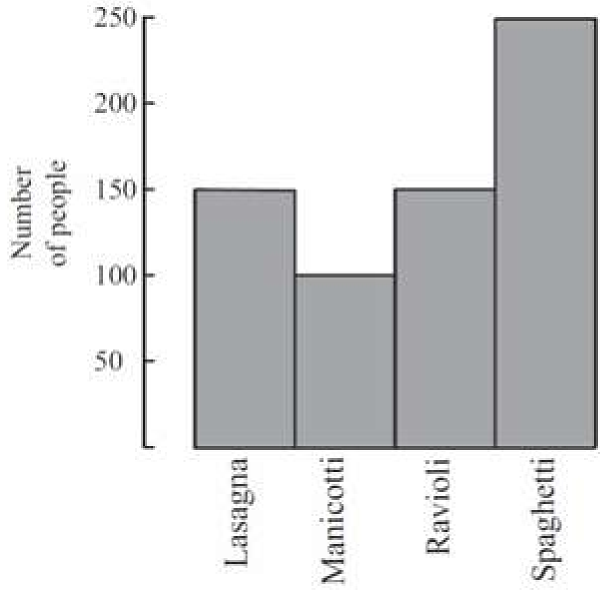
Theresa's parents have agreed to buy her tickets to see her favorite band if she spends an average of 10 hours per week helping around the house for 6 weeks. For the first 5 weeks she helps around the house for 8, 11, 7, 12 and 10 hours. How many hours must she work for the final week to earn the tickets?

$\mathrm{(A)}\ 9 \qquad\mathrm{(B)}\ 10 \qquad\mathrm{(C)}\ 11 \qquad\mathrm{(D)}\ 12 \qquad\mathrm{(E)}\ 13$

Solution

Problem 2

650 students were surveyed about their pasta preferences. The choices were lasagna, manicotti, ravioli and spaghetti. The results of the survey are displayed in the bar graph. What is the ratio of the number of students who preferred spaghetti to the number of students who preferred manicotti?



$\text{(A)}\frac{2}{5} \qquad \text{(B)}\frac{1}{2} \qquad \text{(C)}\frac{5}{4} \qquad \text{(D)}\frac{5}{3} \qquad \text{(E)}\frac{5}{2}$

Solution

Problem 3

What is the sum of the two smallest prime factors of 250?

$\mathrm{(A)}\ 2 \qquad \mathrm{(B)}\ 5 \qquad \mathrm{(C)}\ 7 \qquad \mathrm{(D)}\ 10 \qquad \mathrm{(E)}\ 12$

Solution

Problem 4

A haunted house has six windows. In how many ways can Georgie the Ghost enter the house by one window and leave by a different window?

$\mathrm{(A)}\ 12 \qquad \mathrm{(B)}\ 15 \qquad \mathrm{(C)}\ 18 \qquad \mathrm{(D)}\ 30 \qquad \mathrm{(E)}\ 36$

Solution

Problem 5

Chandler wants to buy a $\$500$ mountain bike. For his birthday, his grandparents send him $\$50$, his aunt sends him $\$35$ and his cousin gives him $\$15$. He earns $\$16$ per week for his paper route. He will use all of his birthday money and all of the money he earns from his paper route. In how many weeks will he be able to buy the mountain bike?

$\mathrm{(A)}\ 24 \qquad \mathrm{(B)}\ 25 \qquad \mathrm{(C)}\ 26 \qquad \mathrm{(D)}\ 27 \qquad \mathrm{(E)}\ 28$

Solution

Problem 6

The average cost of a long-distance call in the USA in 1985 was 41 cents per minute, and the average cost of a long-distance call in the USA in 2005 was 7 cents per minute. Find the approximate percent decrease in the cost per minute of a long- distance call.

$\mathrm{(A)}\ 7 \qquad \mathrm{(B)}\ 17 \qquad \mathrm{(C)}\ 34 \qquad \mathrm{(D)}\ 41 \qquad \mathrm{(E)}\ 80$

Solution

Problem 7

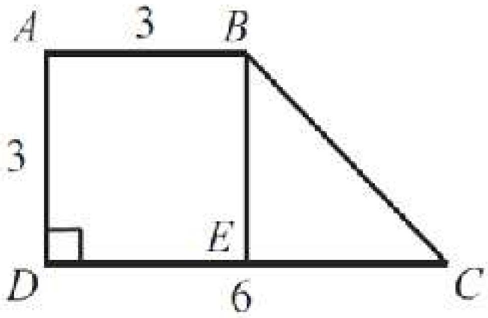
The average age of 5 people in a room is 30 years. An 18-year-old person leaves the room. What is the average age of the four remaining people?

$\mathrm{(A)}\ 25 \qquad \mathrm{(B)}\ 26 \qquad \mathrm{(C)}\ 29 \qquad \mathrm{(D)}\ 33 \qquad \mathrm{(E)}\ 36$

Solution

Problem 8

In trapezoid $ABCD$, AD is perpendicular to DC, AD = AB = 3, and DC = 6. In addition, E is on DC, and BE is parallel to AD. Find the area of $\triangle BEC$.



$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 4.5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 18$

Solution

Problem 9

To complete the grid below, each of the digits 1 through 4 must occur once in each row and once in each column. What number will occupy the lower right-hand square?

1		2	
2	3		
			4

$\mathrm{(A)}\ 1 \qquad \mathrm{(B)}\ 2 \qquad \mathrm{(C)}\ 3 \qquad \mathrm{(D)}\ 4 \qquad \mathrm{(E)}$ cannot be determined

Solution

Problem 10

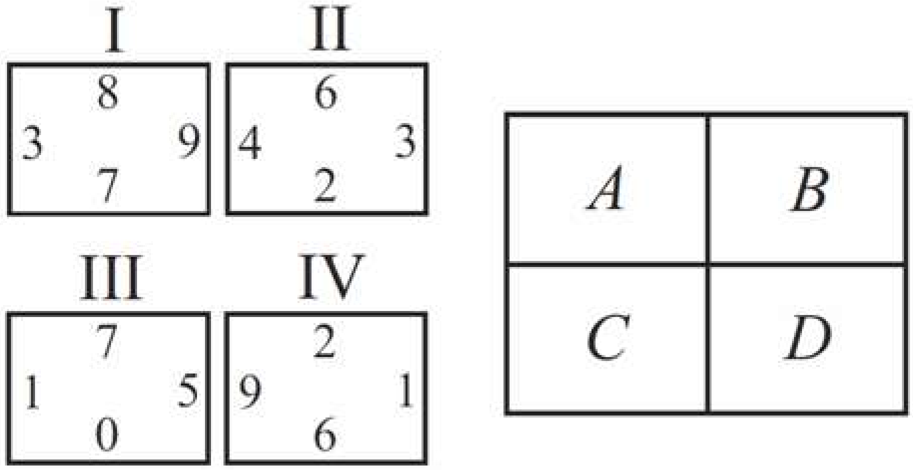
For any positive integer n, define $\boxed{n}$ to be the sum of the positive factors of n. For example, $\boxed{6} = 1 + 2 + 3 + 6 = 12$. Find $\boxed{\boxed{11}}$.

$\mathrm{(A)}\ 13 \qquad \mathrm{(B)}\ 20 \qquad \mathrm{(C)}\ 24 \qquad \mathrm{(D)}\ 28 \qquad \mathrm{(E)}\ 30$

Solution

Problem 11

Tiles I, II, III and IV are translated so one tile coincides with each of the rectangles A, B, C and D. In the final arrangement, the two numbers on any side common to two adjacent tiles must be the same. Which of the tiles is translated to Rectangle C?

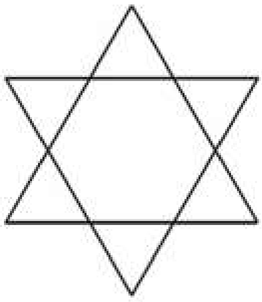


$\text{(A)}\ I \qquad \text{(B)}\ II \qquad \text{(C)}\ III \qquad \text{(D)}\ IV \qquad \text{(E)}$ cannot be determined

Solution

Problem 12

A unit hexagram is composed of a regular hexagon of side length 1 and its 6 equilateral triangular extensions, as shown in the diagram. What is the ratio of the area of the extensions to the area of the original hexagon?

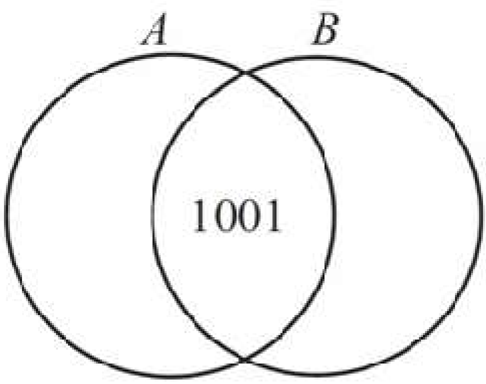


$\mathrm{(A)}\ 1:1 \qquad \mathrm{(B)}\ 6:5 \qquad \mathrm{(C)}\ 3:2 \qquad \mathrm{(D)}\ 2:1 \qquad \mathrm{(E)}\ 3:1$

Solution

Problem 13

Sets A and B, shown in the Venn diagram, have the same number of elements. Their union has 2007 elements and their intersection has 1001 elements. Find the number of elements in A.



$\mathrm{(A)}\ 503 \qquad \mathrm{(B)}\ 1006 \qquad \mathrm{(C)}\ 1504 \qquad \mathrm{(D)}\ 1507 \qquad \mathrm{(E)}\ 1510$

Solution

Problem 14

The base of isosceles $\triangle ABC$ is 24 and its area is 60. What is the length of one of the congruent sides?

$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 13 \qquad \textbf{(D)}\ 14 \qquad \textbf{(E)}\ 18$

Solution

Problem 15

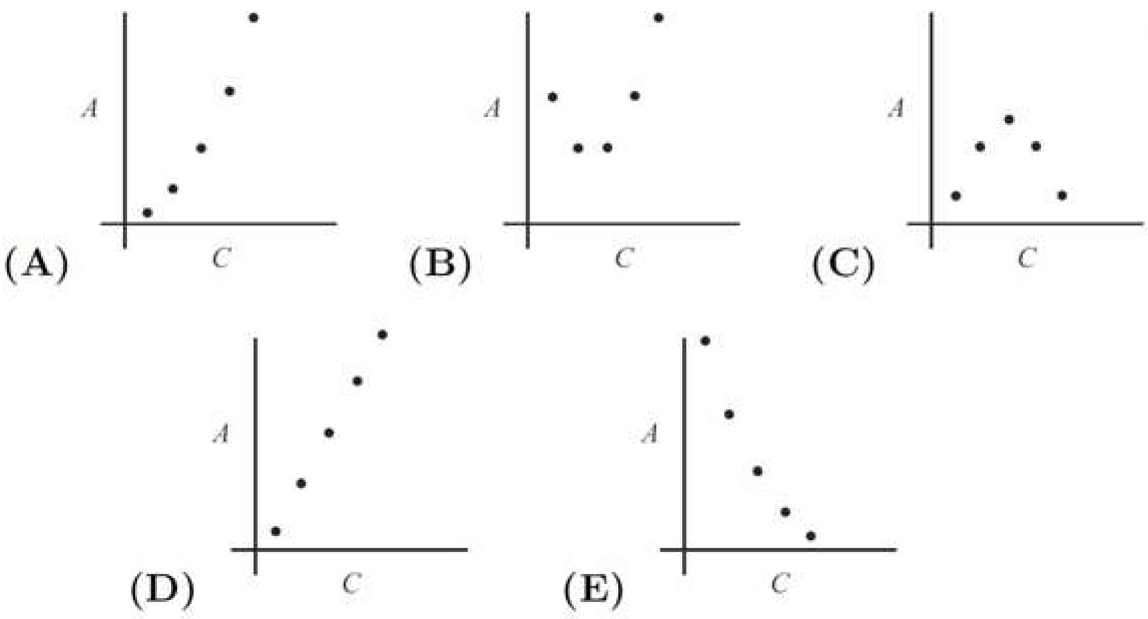
Let a, b and c be numbers with $0 < a < b < c$. Which of the following is impossible?

$\mathrm{(A)}\ a + c < b \qquad \mathrm{(B)}\ a \cdot b < c \qquad \mathrm{(C)}\ a + b < c \qquad \mathrm{(D)}\ a \cdot c < b \qquad \mathrm{(E)} \frac{b}{c} = a$

Solution

Problem 16

Amanda draws five circles with radii $1, 2, 3, 4$ and 5. Then for each circle she plots the point (C, A), where C is its circumference and A is its area. Which of the following could be her graph?



Solution

Problem 17

A mixture of 30 liters of paint is 25% red tint, 30% yellow tint and 45% water. Five liters of yellow tint are added to the original mixture. What is the percent of yellow tint in the new mixture?

$\mathrm{(A)}\ 25 \qquad \mathrm{(B)}\ 35 \qquad \mathrm{(C)}\ 40 \qquad \mathrm{(D)}\ 45 \qquad \mathrm{(E)}\ 50$

Solution

Problem 18

The product of the two 99-digit numbers

$303,030,303,...,030,303$ and $505,050,505,...,050,505$

has thousands digit A and units digit B. What is the sum of A and B?

$\mathrm{(A)}\ 3 \qquad \mathrm{(B)}\ 5 \qquad \mathrm{(C)}\ 6 \qquad \mathrm{(D)}\ 8 \qquad \mathrm{(E)}\ 10$

Solution

Problem 19

Pick two consecutive positive integers whose sum is less than 100. Square both of those integers and then find the difference of the squares. Which of the following could be the difference?

$\mathrm{(A)}\ 2 \qquad \mathrm{(B)}\ 64 \qquad \mathrm{(C)}\ 79 \qquad \mathrm{(D)}\ 96 \qquad \mathrm{(E)}\ 131$

Solution

Problem 20

Before district play, the Unicorns had won 45% of their basketball games. During district play, they won six more games and lost two, to finish the season having won half their games. How many games did the Unicorns play in all?

$\mathrm{(A)}\ 48 \qquad \mathrm{(B)}\ 50 \qquad \mathrm{(C)}\ 52 \qquad \mathrm{(D)}\ 54 \qquad \mathrm{(E)}\ 60$

Solution

Problem 21

Two cards are dealt from a deck of four red cards labeled A, B, C, D and four green cards labeled A, B, C, D. A winning pair is two of the same color or two of the same letter. What is the probability of drawing a winning pair?

$\mathrm{(A)}\frac{2}{7} \qquad \mathrm{(B)}\frac{3}{8} \qquad \mathrm{(C)}\frac{1}{2} \qquad \mathrm{(D)}\frac{4}{7} \qquad \mathrm{(E)}\frac{5}{8}$

Solution

Problem 22

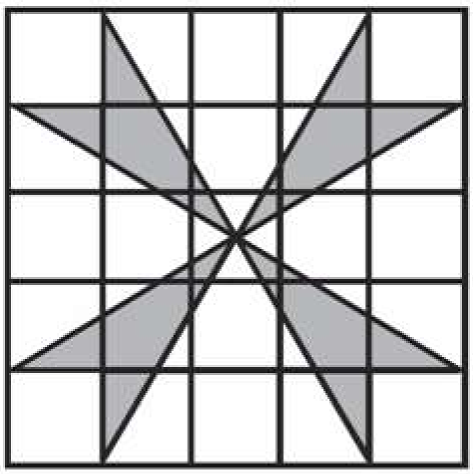
A lemming sits at a corner of a square with side length 10 meters. The lemming runs 6.2 meters along a diagonal toward the opposite corner. It stops, makes a 90 degree right turn and runs 2 more meters. A scientist measures the shortest distance between the lemming and each side of the square. What is the average of these four distances in meters?

$\mathrm{(A)}\ 2 \qquad \mathrm{(B)}\ 4.5 \qquad \mathrm{(C)}\ 5 \qquad \mathrm{(D)}\ 6.2 \qquad \mathrm{(E)}\ 7$

Solution

Problem 23

What is the area of the shaded part shown in the 5 x 5 grid?



$\mathrm{(A)}\ 4 \qquad \mathrm{(B)}\ 6 \qquad \mathrm{(C)}\ 8 \qquad \mathrm{(D)}\ 10 \qquad \mathrm{(E)}\ 12$

Solution

Problem 24

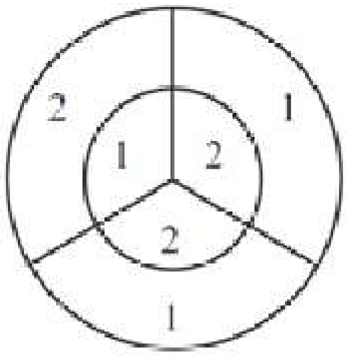
A bag contains four pieces of paper, each labeled with one of the digits "1, 2, 3" or "4", with no repeats. Three of these pieces are drawn, one at a time without replacement, to construct a three-digit number. What is the probability that the three-digit number is a multiple of 3?

$$\text{(A)}\frac{1}{4} \qquad \text{(B)}\frac{1}{3} \qquad \text{(C)}\frac{1}{2} \qquad \text{(D)}\frac{2}{3} \qquad \text{(E)}\frac{3}{4}$$

Solution

Problem 25

On the dart board shown in the Figure, the outer circle has radius 6 and the inner circle has a radius of 3. Three radii divide each circle into three congruent regions, with point values shown. The probability that a dart will hit a given region is proportional to the area of the region. When two darts hit this board, the score is the sum of the point values in the regions. What is the probability that the score is odd?



$$\text{(A)}\frac{17}{36} \qquad \text{(B)}\frac{35}{72} \qquad \text{(C)}\frac{1}{2} \qquad \text{(D)}\frac{37}{72} \qquad \text{(E)}\frac{19}{36}$$

Solution

See Also

2007 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2007))	
Preceded by **2006 AMC 8**	Followed by **2008 AMC 8**
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- Mathematics competition resources

2008 AMC 8 Problems

Contents

Problem 1

Susan had 50 dollars to spend at the carnival. She spent 12 dollars on food and twice as much on rides. How many dollars did she have left to spend?

$\textbf{(A)}\ 12 \qquad \textbf{(B)}\ 14 \qquad \textbf{(C)}\ 26 \qquad \textbf{(D)}\ 38 \qquad \textbf{(E)}\ 50$

Solution

Problem 2

The ten-letter code BEST OF LUCK represents the ten digits $0-9$, in order. What 4-digit number is represented by the code word CLUE?

$\textbf{(A)}\ 8671 \qquad \textbf{(B)}\ 8672 \qquad \textbf{(C)}\ 9781 \qquad \textbf{(D)}\ 9782 \qquad \textbf{(E)}\ 9872$

Solution

Problem 3

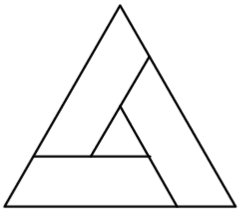
If February is a month that contains Friday the 13^{th}, what day of the week is February 1?

$\textbf{(A)}\ \text{Sunday} \qquad \textbf{(B)}\ \text{Monday} \qquad \textbf{(C)}\ \text{Wednesday} \qquad \textbf{(D)}\ \text{Thursday} \qquad \textbf{(E)}\ \text{Saturday}$

Solution

Problem 4

In the figure, the outer equilateral triangle has area 16, the inner equilateral triangle has area 1, and the three trapezoids are congruent. What is the area of one of the trapezoids?



$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 7$

Solution

Problem 5

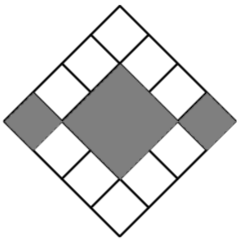
Barney Schwinn notices that the odometer on his bicycle reads 1441, a palindrome, because it reads the same forward and backward. After riding 4 more hours that day and 6 the next, he notices that the odometer shows another palindrome, 1661. What was his average speed in miles per hour?

$\textbf{(A)}\ 15 \qquad \textbf{(B)}\ 16 \qquad \textbf{(C)}\ 18 \qquad \textbf{(D)}\ 20 \qquad \textbf{(E)}\ 22$

Solution

Problem 6

In the figure, what is the ratio of the area of the gray squares to the area of the white squares?



$\textbf{(A)}\ 3:10 \qquad \textbf{(B)}\ 3:8 \qquad \textbf{(C)}\ 3:7 \qquad \textbf{(D)}\ 3:5 \qquad \textbf{(E)}\ 1:1$

Solution

Problem 7

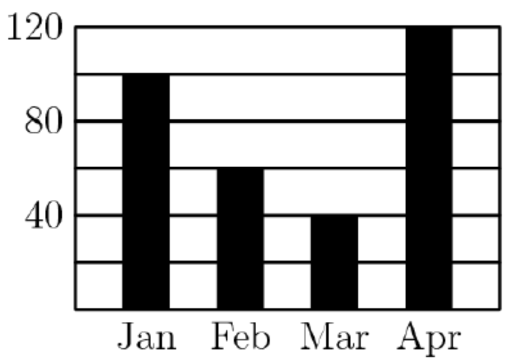
If $\frac{3}{5}=\frac{M}{45}=\frac{60}{N}$, what is $M+N$?

$\textbf{(A)}\ 27 \qquad \textbf{(B)}\ 29 \qquad \textbf{(C)}\ 45 \qquad \textbf{(D)}\ 105 \qquad \textbf{(E)}\ 127$

Solution

Problem 8

Candy sales from the Boosters Club from January through April are shown. What were the average sales per month in dollars?



$\textbf{(A)}\ 60 \qquad \textbf{(B)}\ 70 \qquad \textbf{(C)}\ 75 \qquad \textbf{(D)}\ 80 \qquad \textbf{(E)}\ 85$

Solution

Problem 9

In 2005 Tycoon Tammy invested 100 dollars for two years. During the the first year her investment suffered a 15% loss, but during the second year the remaining investment showed a 20% gain. Over the two-year period, what was the change in Tammy's investment?

$\textbf{(A)}\ 5\%\text{ loss}\qquad\textbf{(B)}\ 2\%\text{ loss}\qquad\textbf{(C)}\ 1\%\text{ gain}\qquad\textbf{(D)}\ 2\%\text{ gain}\qquad\textbf{(E)}\ 5\%\text{ gain}$

Solution

Problem 10

The average age of the 6 people in Room A is 40. The average age of the 4 people in Room B is 25. If the two groups are combined, what is the average age of all the people?

$\textbf{(A)}\ 32.5\qquad\textbf{(B)}\ 33\qquad\textbf{(C)}\ 33.5\qquad\textbf{(D)}\ 34\qquad\textbf{(E)}\ 35$

Solution

Problem 11

Each of the 39 students in the eighth grade at Lincoln Middle School has one dog or one cat or both a dog and a cat. Twenty students have a dog and 26 students have a cat. How many students have both a dog and a cat?

$\textbf{(A)}\ 7\qquad\textbf{(B)}\ 13\qquad\textbf{(C)}\ 19\qquad\textbf{(D)}\ 39\qquad\textbf{(E)}\ 46$

Solution

Problem 12

A ball is dropped from a height of 3 meters. On its first bounce it rises to a height of 2 meters. It keeps falling and bouncing to $\frac{2}{3}$ of the height it reached in the previous bounce. On which bounce will it rise to a height less than 0.5 meters?

$\textbf{(A)}\ 3\qquad\textbf{(B)}\ 4\qquad\textbf{(C)}\ 5\qquad\textbf{(D)}\ 6\qquad\textbf{(E)}\ 7$

Solution

Problem 13

Mrs. Harman needs to know the combined weight in pounds of three boxes he wants to mail. However, the only available scale is not accurate for weights less than 100 pounds or more than 150 pounds. So the boxes are weighed in pairs in every possible way. The results are 122, 125 and 127 pounds. What is the combined weight in pounds of the three boxes?

$\textbf{(A)}\ 160\qquad\textbf{(B)}\ 170\qquad\textbf{(C)}\ 187\qquad\textbf{(D)}\ 195\qquad\textbf{(E)}\ 354$

Solution

Problem 14

Three A's, three B's, and three C's are placed in the nine spaces so that each row and column contain one of each letter. If A is placed in the upper left corner, how many arrangements are possible?

A		

$\textbf{(A)}\ 2\qquad\textbf{(B)}\ 3\qquad\textbf{(C)}\ 4\qquad\textbf{(D)}\ 5\qquad\textbf{(E)}\ 6$

Solution

Problem 15

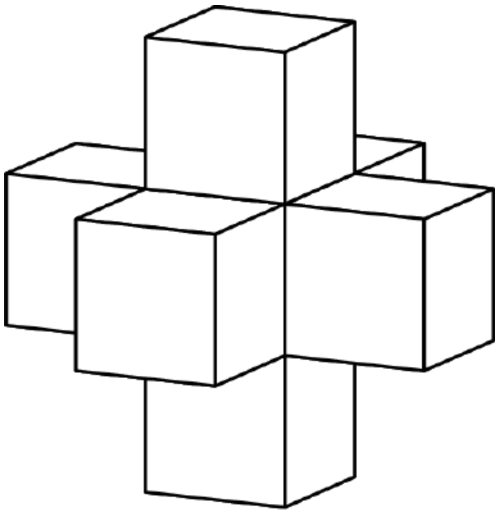
In Theresa's first 8 basketball games, she scored $7, 4, 3, 6, 8, 3, 1$ and 5 points. In her ninth game, she scored fewer than 10 points and her points-per-game average for the nine games was an integer. Similarly in her tenth game, she scored fewer than 10 points and her points-per-game average for the 10 games was also an integer. What is the product of the number of points she scored in the ninth and tenth games?

$\textbf{(A)}\ 35 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 48 \qquad \textbf{(D)}\ 56 \qquad \textbf{(E)}\ 72$

Solution

Problem 16

A shape is created by joining seven unit cubes, as shown. What is the ratio of the volume in cubic units to the surface area in square units?



$\textbf{(A)}\ 1 : 6 \qquad \textbf{(B)}\ 7 : 36 \qquad \textbf{(C)}\ 1 : 5 \qquad \textbf{(D)}\ 7 : 30 \qquad \textbf{(E)}\ 6 : 25$

Solution

Problem 17

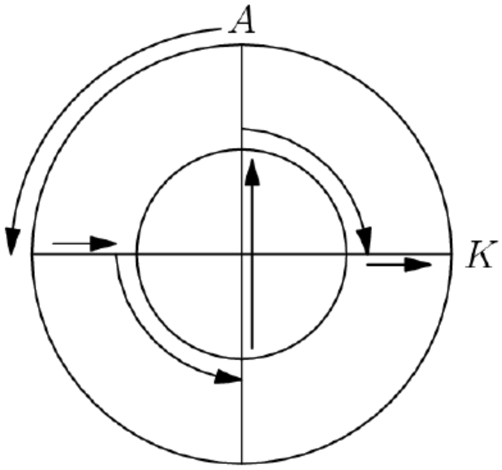
Ms. Osborne asks each student in her class to draw a rectangle with integer side lengths and a perimeter of 50 units. All of her students calculate the area of the rectangle they draw. What is the difference between the largest and smallest possible areas of the rectangles?

$\textbf{(A)}\ 76 \qquad \textbf{(B)}\ 120 \qquad \textbf{(C)}\ 128 \qquad \textbf{(D)}\ 132 \qquad \textbf{(E)}\ 136$

Solution

Problem 18

Two circles that share the same center have radii 10 meters and 20 meters. An aardvark runs along the path shown, starting at A and ending at K. How many meters does the aardvark run?

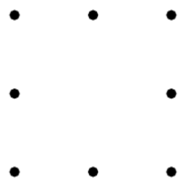


$\textbf{(A)}\ 10\pi+20 \qquad \textbf{(B)}\ 10\pi+30 \qquad \textbf{(C)}\ 10\pi+40 \qquad \textbf{(D)}\ 20\pi+20 \qquad \textbf{(E)}\ 20\pi+40$

Solution

Problem 19

Eight points are spaced around at intervals of one unit around a 2×2 square, as shown. Two of the 8 points are chosen at random. What is the probability that the two points are one unit apart?



$\textbf{(A)}\ \frac{1}{4} \qquad \textbf{(B)}\ \frac{2}{7} \qquad \textbf{(C)}\ \frac{4}{11} \qquad \textbf{(D)}\ \frac{1}{2} \qquad \textbf{(E)}\ \frac{4}{7}$

Solution

Problem 20

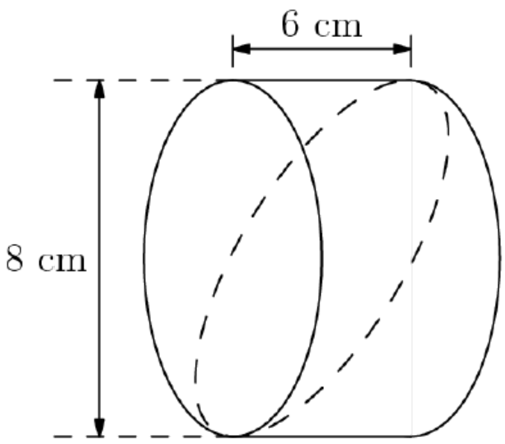
The students in Mr. Neatkin's class took a penmanship test. Two-thirds of the boys and $\frac{3}{4}$ of the girls passed the test, and an equal number of boys and girls passed the test. What is the minimum possible number of students in the class?

$\textbf{(A)}\ 12 \qquad \textbf{(B)}\ 17 \qquad \textbf{(C)}\ 24 \qquad \textbf{(D)}\ 27 \qquad \textbf{(E)}\ 36$

Solution

Problem 21

Jerry cuts a wedge from a 6-cm cylinder of bologna as shown by the dashed curve. Which answer choice is closest to the volume of his wedge in cubic centimeters?



$\textbf{(A)} 48 \qquad \textbf{(B)} 75 \qquad \textbf{(C)} 151 \qquad \textbf{(D)} 192 \qquad \textbf{(E)} 603$

Solution

Problem 22

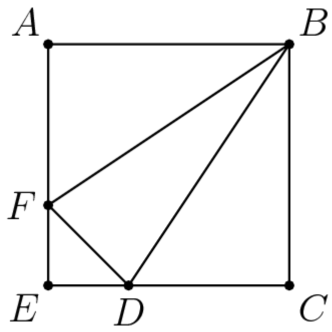
For how many positive integer values of n are both $\frac{n}{3}$ and $3n$ three-digit whole numbers?

$\textbf{(A)}\ 12 \qquad \textbf{(B)}\ 21 \qquad \textbf{(C)}\ 27 \qquad \textbf{(D)}\ 33 \qquad \textbf{(E)}\ 34$

Solution

Problem 23

In square $ABCE$, $AF = 2FE$ and $CD = 2DE$. What is the ratio of the area of $\triangle BFD$ to the area of square $ABCE$?



$\textbf{(A)}\ \frac{1}{6} \qquad \textbf{(B)}\ \frac{2}{9} \qquad \textbf{(C)}\ \frac{5}{18} \qquad \textbf{(D)}\ \frac{1}{3} \qquad \textbf{(E)}\ \frac{7}{20}$

Solution

Problem 24

Ten tiles numbered 1 through 10 are turned face down. One tile is turned up at random, and a die is rolled. What is the probability that the product of the numbers on the tile and the die will be a square?

$\textbf{(A)}\ \frac{1}{10} \qquad \textbf{(B)}\ \frac{1}{6} \qquad \textbf{(C)}\ \frac{11}{60} \qquad \textbf{(D)}\ \frac{1}{5} \qquad \textbf{(E)}\ \frac{7}{30}$

Solution

Problem 25

Margie's winning art design is shown. The smallest circle has radius 2 inches, with each successive circle's radius increasing by 2 inches. Approximately what percent of the design is black?

$\textbf{(A)}\ 42 \qquad \textbf{(B)}\ 44 \qquad \textbf{(C)}\ 45 \qquad \textbf{(D)}\ 46 \qquad \textbf{(E)}\ 48$

Solution

Retrieved from "https://artofproblemsolving.com/wiki/index.php?title=2008_AMC_8_Problems&oldid=133020"

2009 AMC 8 Problems

2009 AMC 8 (**Answer Key**) Printable version: | AoPS Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=43&year=2009) • PDF (http://www.artofproblemsolving.com/Forum/resources/files/usa/USA-AMC_8-2009-43)
Instructions 1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct. 2. You will receive 1 point for each correct answer. There is no penalty for wrong answers. 3. No aids are permitted other than scratch paper, graph paper, ruler, compass, protractor and erasers. In particular, calculators and computers are not permitted. 4. Figures are not necessarily drawn to scale. 5. You will have **40 minutes** working time to complete the test.
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25

Contents

Problem 1

Bridget bought a bag of apples at the grocery store. She gave half of the apples to Ann. Then she gave Cassie 3 apples, keeping 4 apples for herself. How many apples did Bridget buy?

$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 7 \qquad \textbf{(D)}\ 11 \qquad \textbf{(E)}\ 14$

Problem 2

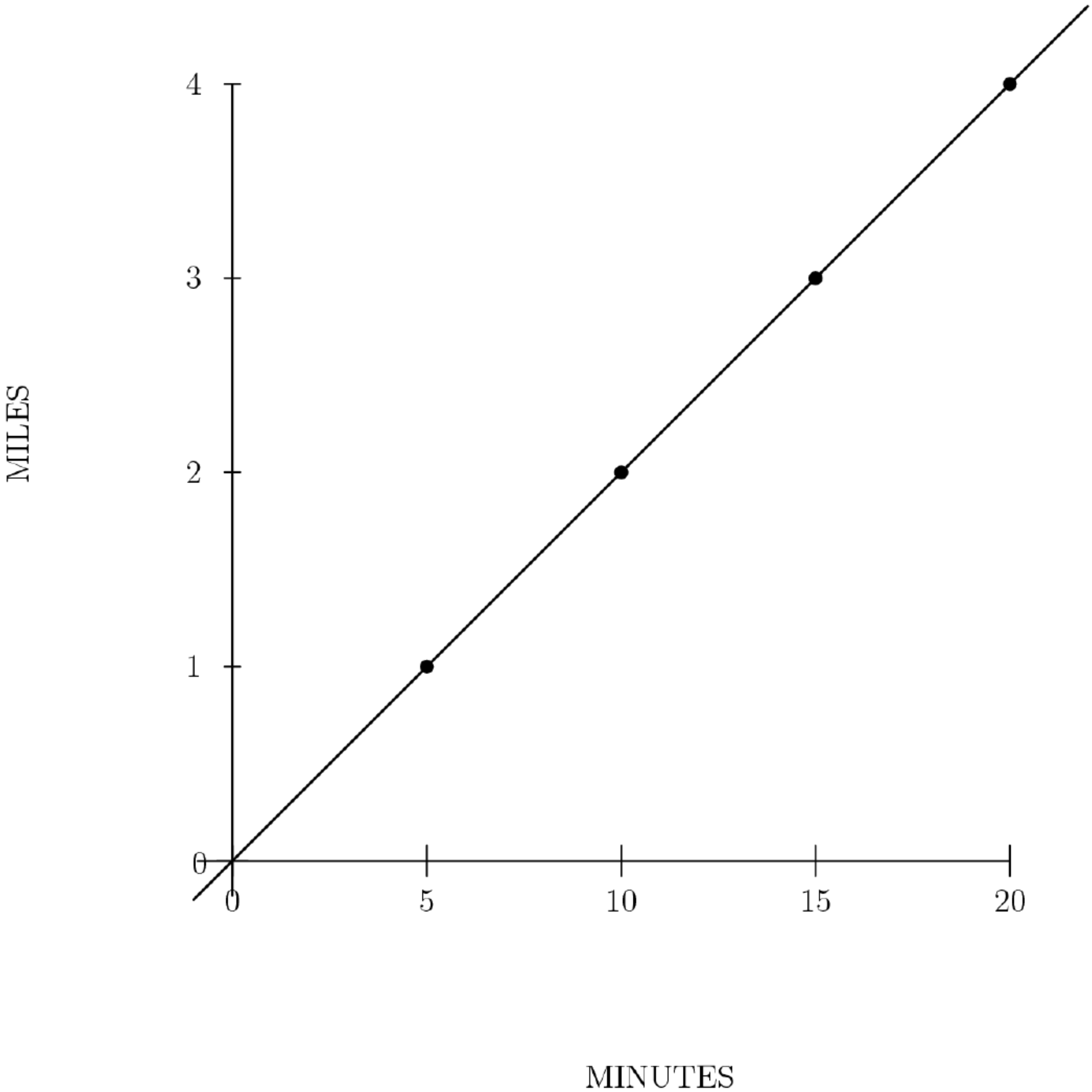
On average, for every 4 sports cars sold at the local dealership, 7 sedans are sold. The dealership predicts that it will sell 28 sports cars next month. How many sedans does it expect to sell?

$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 32 \qquad \textbf{(C)}\ 35 \qquad \textbf{(D)}\ 49 \qquad \textbf{(E)}\ 112$

Solution

Problem 3

The graph shows the constant rate at which Suzanna rides her bike. If she rides a total of a half an hour at the same speed, how many miles would she have ridden?

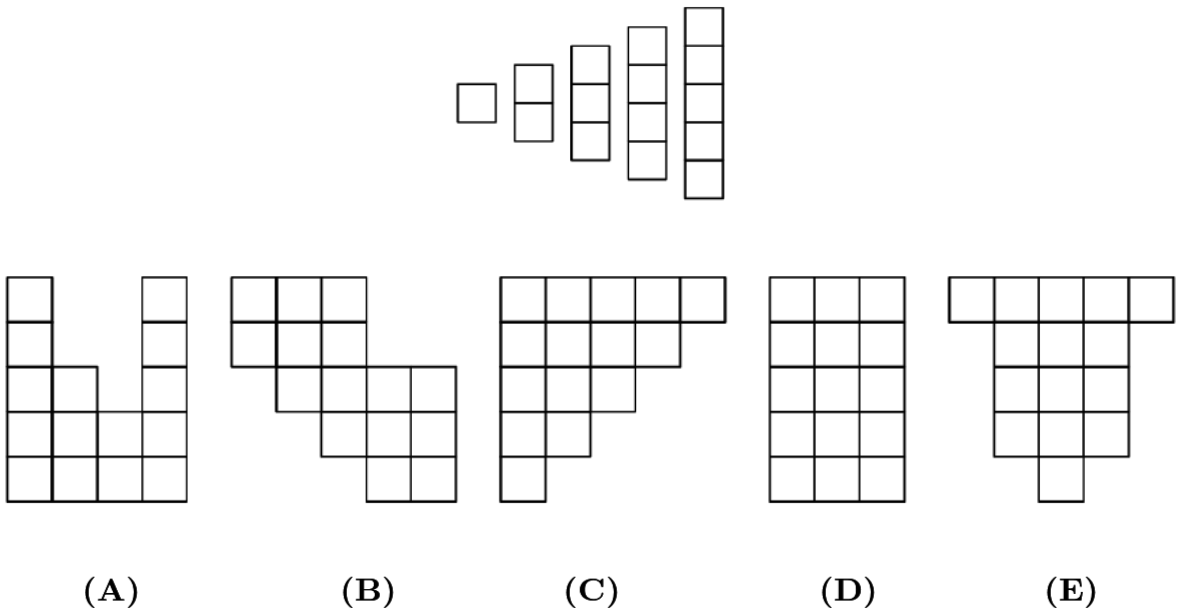


$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 5.5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 6.5 \qquad \textbf{(E)}\ 7$

Solution

Problem 4

The five pieces shown below can be arranged to form four of the five figures shown in the choices. Which figure cannot be formed?



Solution

Problem 5

A sequence of numbers starts with $1, 2$, and 3. The fourth number of the sequence is the sum of the previous three numbers in the sequence: $1+2+3=6$. In the same way, every number after the fourth is the sum of the previous three numbers. What is the eighth number in the sequence?

$\textbf{(A)}\ 11 \qquad \textbf{(B)}\ 20 \qquad \textbf{(C)}\ 37 \qquad \textbf{(D)}\ 68 \qquad \textbf{(E)}\ 99$

Solution

Problem 6

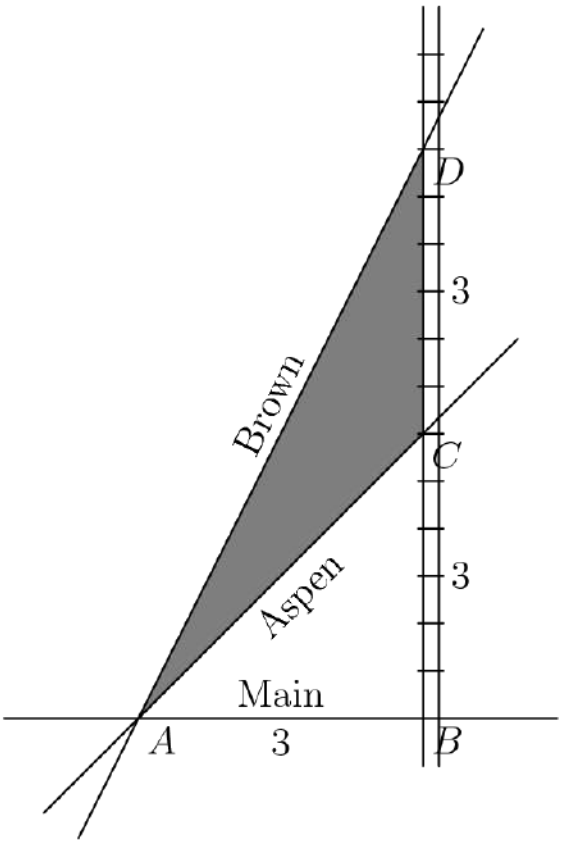
Steve's empty swimming pool will hold $24,000$ gallons of water when full. It will be filled by 4 hoses, each of which supplies 2.5 gallons of water per minute. How many hours will it take to fill Steve's pool?

$\textbf{(A)}\ 40 \qquad \textbf{(B)}\ 42 \qquad \textbf{(C)}\ 44 \qquad \textbf{(D)}\ 46 \qquad \textbf{(E)}\ 48$

Solution

Problem 7

The triangular plot of ACD lies between Aspen Road, Brown Road and a railroad. Main Street runs east and west, and the railroad runs north and south. The numbers in the diagram indicate distances in miles. The width of the railroad track can be ignored. How many square miles are in the plot of land ACD?



$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 4.5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 9$

Solution

Problem 8

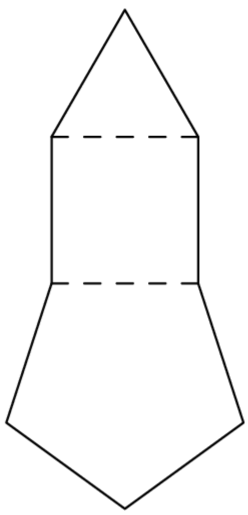
The length of a rectangle is increased by 10% and the width is decreased by 10%. What percent of the old area is the new area?

$\textbf{(A)}\ 90 \qquad \textbf{(B)}\ 99 \qquad \textbf{(C)}\ 100 \qquad \textbf{(D)}\ 101 \qquad \textbf{(E)}\ 110$

Solution

Problem 9

Construct a square on one side of an equilateral triangle. On one non-adjacent side of the square, construct a regular pentagon, as shown. On a non-adjacent side of the pentagon, construct a hexagon. Continue to construct regular polygons in the same way, until you construct an octagon. How many sides does the resulting polygon have?

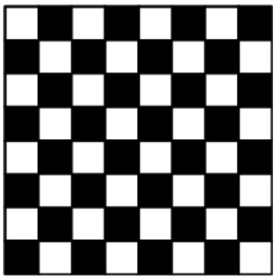


$\textbf{(A)}\ 21 \qquad \textbf{(B)}\ 23 \qquad \textbf{(C)}\ 25 \qquad \textbf{(D)}\ 27 \qquad \textbf{(E)}\ 29$

Solution

Problem 10

On a checkerboard composed of 64 unit squares, what is the probability that a randomly chosen unit square does not touch the outer edge of the board?



$\textbf{(A)}\ \frac{1}{16}\qquad\textbf{(B)}\ \frac{7}{16}\qquad\textbf{(C)}\ \frac{1}{2}\qquad\textbf{(D)}\ \frac{9}{16}\qquad\textbf{(E)}\ \frac{49}{64}$

Solution

Problem 11

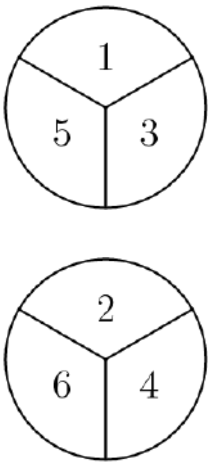
The Amaco Middle School bookstore sells pencils costing a whole number of cents. Some seventh graders each bought a pencil, paying a total of 1.43. Some of the 30 sixth graders each bought a pencil, and they paid a total of 1.95. How many more sixth graders than seventh graders bought a pencil?

$\textbf{(A)}\ 1\qquad\textbf{(B)}\ 2\qquad\textbf{(C)}\ 3\qquad\textbf{(D)}\ 4\qquad\textbf{(E)}\ 5$

Solution

Problem 12

The two spinners shown are spun once and each lands on one of the numbered sectors. What is the probability that the sum of the numbers in the two sectors is prime?



$\textbf{(A)}\ \frac{1}{2}\qquad\textbf{(B)}\ \frac{2}{3}\qquad\textbf{(C)}\ \frac{3}{4}\qquad\textbf{(D)}\ \frac{7}{9}\qquad\textbf{(E)}\ \frac{5}{6}$

Solution

Problem 13

A three-digit integer contains one of each of the digits 1, 3, and 5. What is the probability that the integer is divisible by 5?

$\textbf{(A)}\ \frac{1}{6}\qquad\textbf{(B)}\ \frac{1}{3}\qquad\textbf{(C)}\ \frac{1}{2}\qquad\textbf{(D)}\ \frac{2}{3}\qquad\textbf{(E)}\ \frac{5}{6}$

Solution

Problem 14

Austin and Temple are 50 miles apart along Interstate 35. Bonnie drove from Austin to her daughter's house in Temple, averaging 60 miles per hour. Leaving the car with her daughter, Bonnie rode a bus back to Austin along the same route and averaged 40 miles per hour on the return trip. What was the average speed for the round trip, in miles per hour?

$\textbf{(A)}\ 46 \qquad \textbf{(B)}\ 48 \qquad \textbf{(C)}\ 50 \qquad \textbf{(D)}\ 52 \qquad \textbf{(E)}\ 54$

Solution

Problem 15

A recipe that makes 5 servings of hot chocolate requires 2 squares of chocolate, $1/4$ cup sugar, 1 cup water and 4 cups milk. Jordan has 5 squares of chocolate, 2 cups of sugar, lots of water and 7 cups of milk. If she maintains the same ratio of ingredients, what is the greatest number of servings of hot chocolate she can make?

$\textbf{(A)}\ 5\frac{1}{8} \qquad \textbf{(B)}\ 6\frac{1}{4} \qquad \textbf{(C)}\ 7\frac{1}{2} \qquad \textbf{(D)}\ 8\frac{3}{4} \qquad \textbf{(E)}\ 9\frac{7}{8}$

Solution

Problem 16

How many 3-digit positive integers have digits whose product equals 24?

$\textbf{(A)}\ 12 \qquad \textbf{(B)}\ 15 \qquad \textbf{(C)}\ 18 \qquad \textbf{(D)}\ 21 \qquad \textbf{(E)}\ 24$

Solution

Problem 17

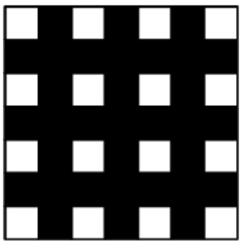
The positive integers x and y are the two smallest positive integers for which the product of 360 and x is a square and the product of 360 and y is a cube. What is the sum of x and y?

$\textbf{(A)}\ 80 \qquad \textbf{(B)}\ 85 \qquad \textbf{(C)}\ 115 \qquad \textbf{(D)}\ 165 \qquad \textbf{(E)}\ 610$

Solution

Problem 18

The diagram represents a 7-foot-by-7-foot floor that is tiled with 1-square-foot black tiles and white tiles. Notice that the corners have white tiles. If a 15-foot-by-15-foot floor is to be tiled in the same manner, how many white tiles will be needed?



$\textbf{(A)}\ 49 \qquad \textbf{(B)}\ 57 \qquad \textbf{(C)}\ 64 \qquad \textbf{(D)}\ 96 \qquad \textbf{(E)}\ 126$

Solution

Problem 19

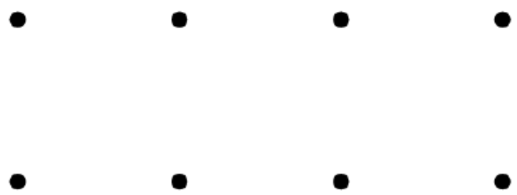
Two angles of an isosceles triangle measure 70° and x°. What is the sum of the three possible values of x?

$\textbf{(A)}\ 95 \qquad \textbf{(B)}\ 125 \qquad \textbf{(C)}\ 140 \qquad \textbf{(D)}\ 165 \qquad \textbf{(E)}\ 180$

Solution

Problem 20

How many non-congruent triangles have vertices at three of the eight points in the array shown below?



$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 7 \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 9$

Solution

Problem 21

Andy and Bethany have a rectangular array of numbers with 40 rows and 75 columns. Andy adds the numbers in each row. The average of his 40 sums is A. Bethany adds the numbers in each column. The average of her 75 sums is B. What is the value of $\frac{A}{B}$?

$\textbf{(A)}\ \frac{64}{225} \qquad \textbf{(B)}\ \frac{8}{15} \qquad \textbf{(C)}\ 1 \qquad \textbf{(D)}\ \frac{15}{8} \qquad \textbf{(E)}\ \frac{225}{64}$

Solution

Problem 22

How many whole numbers between 1 and 1000 do not contain the digit 1?

$\textbf{(A)}\ 512 \qquad \textbf{(B)}\ 648 \qquad \textbf{(C)}\ 720 \qquad \textbf{(D)}\ 728 \qquad \textbf{(E)}\ 800$

Solution

Problem 23

On the last day of school, Mrs. Awesome gave jelly beans to her class. She gave each boy as many jelly beans as there were boys in the class. She gave each girl as many jelly beans as there were girls in the class. She brought 400 jelly beans, and when she finished, she had six jelly beans left. There were two more boys than girls in her class. How many students were in her class?

$\textbf{(A)}\ 26 \qquad \textbf{(B)}\ 28 \qquad \textbf{(C)}\ 30 \qquad \textbf{(D)}\ 32 \qquad \textbf{(E)}\ 34$

Solution

Problem 24

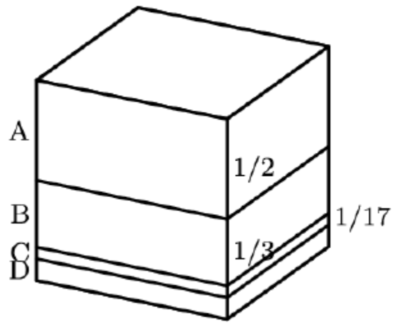
The letters A, B, C and D represent digits. If $\begin{array}{ccc}&\text{A}&\text{B}\\ +&\text{C}&\text{A}\\ \hline &\text{D}&\text{A}\end{array}$ and $\begin{array}{ccc}&\text{A}&\text{B}\\ -&\text{C}&\text{A}\\ \hline &&\text{A}\end{array}$, what digit does D represent?

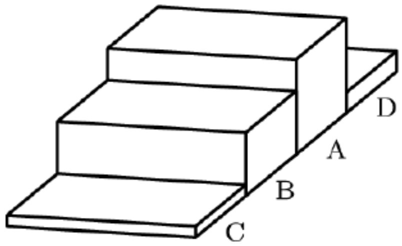
$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 7 \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 9$

Solution

Problem 25

A one-cubic-foot cube is cut into four pieces by three cuts parallel to the top face of the cube. The first cut is $1/2$ foot from the top face. The second cut is $1/3$ foot below the first cut, and the third cut is $1/17$ foot below the second cut. From the top to the bottom the pieces are labeled A, B, C, and D. The pieces are then glued together end to end as shown in the second diagram. What is the total surface area of this solid in square feet?





$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ \frac{419}{51} \qquad \textbf{(D)}\ \frac{158}{17} \qquad \textbf{(E)}\ 11$

Solution

See Also

2009 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2009))	
Preceded by **2008 AMC 8**	Followed by **2010 AMC 8**
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All AJHSME/AMC 8 Problems and Solutions	

- AMC 8
- AMC 8 Problems and Solutions
- Mathematics competition resources

2010 AMC 8 Problems

Contents

Problem 1

At Euclid Middle School, the mathematics teachers are Miss Germain, Mr. Newton, and Mrs. Young. There are 11 students in Mrs. Germain's class, 8 students in Mr. Newton's class, and 9 students in Mrs. Young's class taking the AMC 8 this year. How many mathematics students at Euclid Middle School are taking the contest?

$\textbf{(A)}\ 26 \qquad\textbf{(B)}\ 27\qquad\textbf{(C)}\ 28\qquad\textbf{(D)}\ 29\qquad\textbf{(E)}\ 30$

Solution

Problem 2

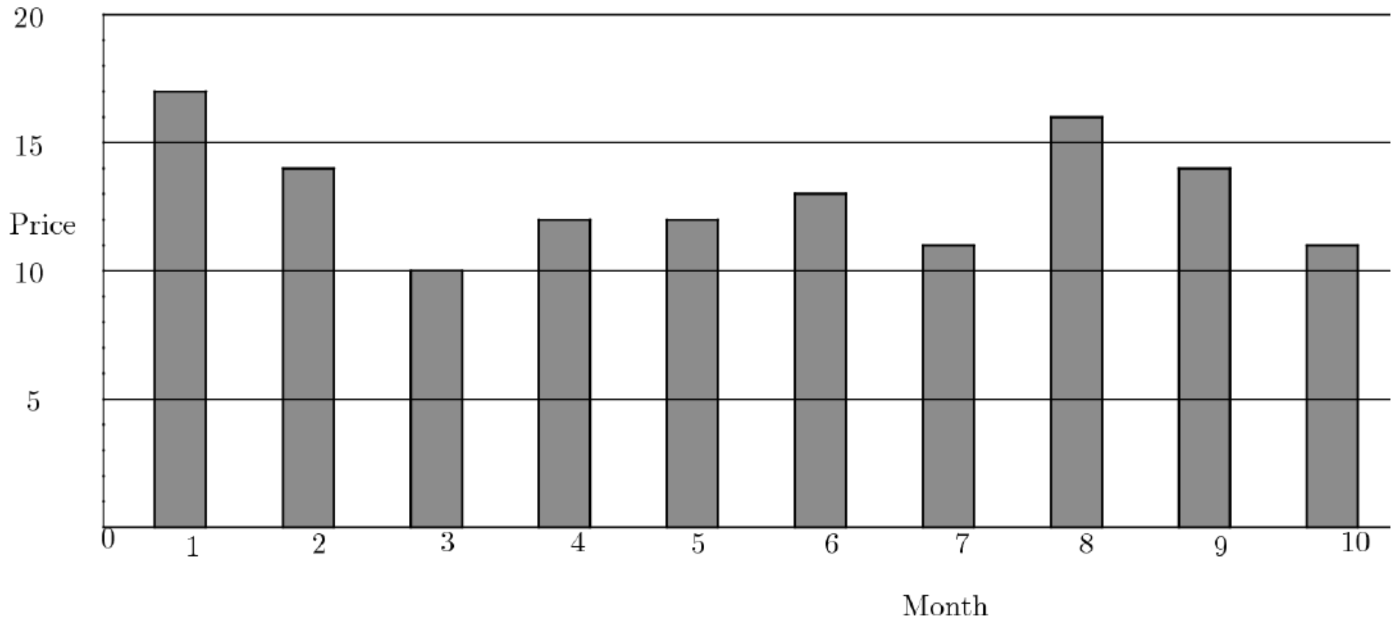
If $a@b = \frac{a\times b}{a+b}$ for a,b positive integers, then what is $5@10$?

$\textbf{(A)}\ \frac{3}{10} \qquad\textbf{(B)}\ 1 \qquad\textbf{(C)}\ 2 \qquad\textbf{(D)}\ \frac{10}{3} \qquad\textbf{(E)}\ 50$

Solution

Problem 3

The graph shows the price of five gallons of gasoline during the first ten months of the year. By what percent is the highest price more than the lowest price?



$\textbf{(A)}\ 50 \qquad \textbf{(B)}\ 62 \qquad \textbf{(C)}\ 70 \qquad \textbf{(D)}\ 89 \qquad \textbf{(E)}\ 100$

Solution

Problem 4

What is the sum of the mean, median, and mode of the numbers $2,3,0,3,1,4,0,3$?

$\textbf{(A)}\ 6.5 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 7.5 \qquad \textbf{(D)}\ 8.5 \qquad \textbf{(E)}\ 9$

Solution

Problem 5

Alice needs to replace a light bulb located 10 centimeters below the ceiling in her kitchen. The ceiling is 2.4 meters above the floor. Alice is 1.5 meters tall and can reach 46 centimeters above the top of her head. Standing on a stool, she can just reach the light bulb. What is the height of the stool, in centimeters?

$\textbf{(A)}\ 32 \qquad \textbf{(B)}\ 34 \qquad \textbf{(C)}\ 36 \qquad \textbf{(D)}\ 38 \qquad \textbf{(E)}\ 40$

Solution

Problem 6

Which of the following figures has the greatest number of lines of symmetry?

$\textbf{(A)}\ \text{equilateral triangle}$ $\textbf{(B)}\ \text{non-square rhombus}$ $\textbf{(C)}\ \text{non-square rectangle}$
$\textbf{(D)}\ \text{isosceles trapezoid}$ $\textbf{(E)}\ \text{square}$

Solution

Problem 7

Using only pennies, nickels, dimes, and quarters, what is the smallest number of coins Freddie would need so he could pay any amount of money less than a dollar?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 10 \qquad \textbf{(C)}\ 15 \qquad \textbf{(D)}\ 25 \qquad \textbf{(E)}\ 99$

Solution

Problem 8

As Emily is riding her bicycle on a long straight road, she spots Emerson skating in the same direction $1/2$ mile in front of her. After she passes him, she can see him in her rear mirror until he is $1/2$ mile behind her. Emily rides at a constant rate of 12 miles per hour, and Emerson skates at a constant rate of 8 miles per hour. For how many minutes can Emily see Emerson?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 12 \qquad \textbf{(D)}\ 15 \qquad \textbf{(E)}\ 16$

Solution

Problem 9

Ryan got 80% of the problems correct on a 25-problem test, 90% on a 40-problem test, and 70% on a 10-problem test. What percent of all the problems did Ryan answer correctly?

$\textbf{(A)}\ 64 \qquad \textbf{(B)}\ 75 \qquad \textbf{(C)}\ 80 \qquad \textbf{(D)}\ 84 \qquad \textbf{(E)}\ 86$

Solution

Problem 10

Six pepperoni circles will exactly fit across the diameter of a 12-inch pizza when placed. If a total of 24 circles of pepperoni are placed on this pizza without overlap, what fraction of the pizza is covered by pepperoni?

$\textbf{(A)}\ \frac{1}{2} \qquad \textbf{(B)}\ \frac{2}{3} \qquad \textbf{(C)}\ \frac{3}{4} \qquad \textbf{(D)}\ \frac{5}{6} \qquad \textbf{(E)}\ \frac{7}{8}$

Solution

Problem 11

The top of one tree is 16 feet higher than the top of another tree. The heights of the two trees are in the ratio $3:4$. In feet, how tall is the taller tree?

$\textbf{(A)}\ 48 \qquad \textbf{(B)}\ 64 \qquad \textbf{(C)}\ 80 \qquad \textbf{(D)}\ 96 \qquad \textbf{(E)}\ 112$

Solution

Problem 12

Of the 500 balls in a large bag, 80% are red and the rest are blue. How many of the red balls must be removed from the bag so that 75% of the remaining balls are red?

$\textbf{(A)}\ 25 \qquad \textbf{(B)}\ 50 \qquad \textbf{(C)}\ 75 \qquad \textbf{(D)}\ 100 \qquad \textbf{(E)}\ 150$

Solution

Problem 13

The lengths of the sides of a triangle in inches are three consecutive integers. The length of the shortest side is 30% of the perimeter. What is the length of the longest side?

$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 11$

Solution

Problem 14

What is the sum of the prime factors of 2010?

$\textbf{(A)}\ 67 \qquad \textbf{(B)}\ 75 \qquad \textbf{(C)}\ 77 \qquad \textbf{(D)}\ 201 \qquad \textbf{(E)}\ 210$

Solution

Problem 15

A jar contains five different colors of gumdrops: 30% are blue, 20% are brown, 15% red, 10% yellow, and the other 30 gumdrops are green. If half of the blue gumdrops are replaced with brown gumdrops, how many gumdrops will be brown?

$\textbf{(A)}\ 35 \qquad \textbf{(B)}\ 36 \qquad \textbf{(C)}\ 42 \qquad \textbf{(D)}\ 48 \qquad \textbf{(E)}\ 64$

Solution

Problem 16

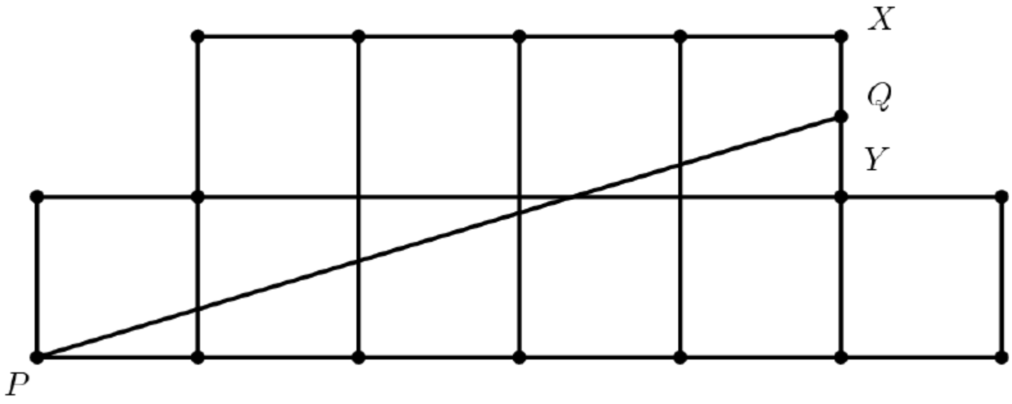
A square and a circle have the same area. What is the ratio of the side length of the square to the radius of the circle?

$\textbf{(A)}\ \frac{\sqrt{\pi}}{2} \qquad \textbf{(B)}\ \sqrt{\pi} \qquad \textbf{(C)}\ \pi \qquad \textbf{(D)}\ 2\pi \qquad \textbf{(E)}\ \pi^2$

Solution

Problem 17

The diagram shows an octagon consisting of 10 unit squares. The portion below $\overline{PQ}$ is a unit square and a triangle with base 5. If $\overline{PQ}$ bisects the area of the octagon, what is the ratio $\dfrac{XQ}{QY}$?

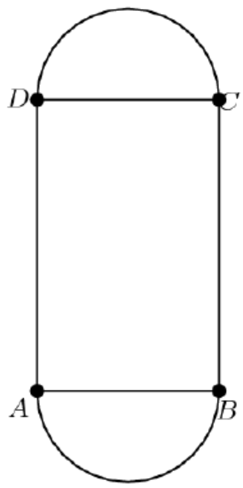


$\textbf{(A)}\ \frac{2}{5} \qquad \textbf{(B)}\ \frac{1}{2} \qquad \textbf{(C)}\ \frac{3}{5} \qquad \textbf{(D)}\ \frac{2}{3} \qquad \textbf{(E)}\ \frac{3}{4}$

Solution

Problem 18

A decorative window is made up of a rectangle with semicircles on either end. The ratio of AD to AB is $3:2$, and AB is 30 inches. What is the ratio of the area of the rectangle to the combined areas of the semicircles?

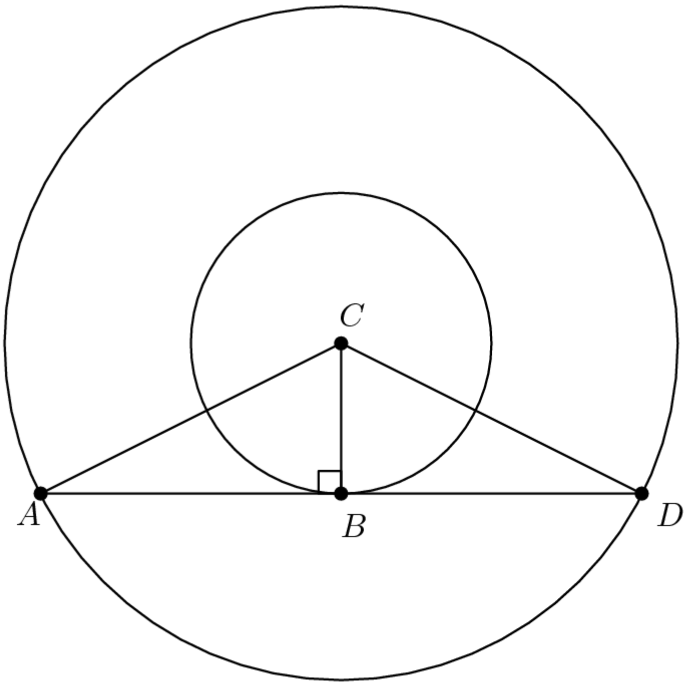


$\textbf{(A)}\ 2:3 \qquad \textbf{(B)}\ 3:2 \qquad \textbf{(C)}\ 6:\pi \qquad \textbf{(D)}\ 9:\pi \qquad \textbf{(E)}\ 30:\pi$

Solution

Problem 19

The two circles pictured have the same center C. Chord $\overline{AD}$ is tangent to the inner circle at B, AC is 10, and chord $\overline{AD}$ has length 16. What is the area between the two circles?



$\textbf{(A)}\ 36\pi \qquad \textbf{(B)}\ 49\pi \qquad \textbf{(C)}\ 64\pi \qquad \textbf{(D)}\ 81\pi \qquad \textbf{(E)}\ 100\pi$

Solution

Problem 20

In a room, $2/5$ of the people are wearing gloves, and $3/4$ of the people are wearing hats. What is the minimum number of people in the room wearing both a hat and a glove?

$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 15 \qquad \textbf{(E)}\ 20$

Solution

Problem 21

Hui is an avid reader. She bought a copy of the best seller *Math is Beautiful*. On the first day, Hui read $1/5$ of the pages plus 12 more, and on the second day she read $1/4$ of the remaining pages plus 15 pages. On the third day she read $1/3$ of the remaining pages plus 18 pages. She then realized that there were only 62 pages left to read, which she read the next day. How many pages are in this book?

$\textbf{(A)}\ 120 \qquad \textbf{(B)}\ 180 \qquad \textbf{(C)}\ 240 \qquad \textbf{(D)}\ 300 \qquad \textbf{(E)}\ 360$

Solution

Problem 22

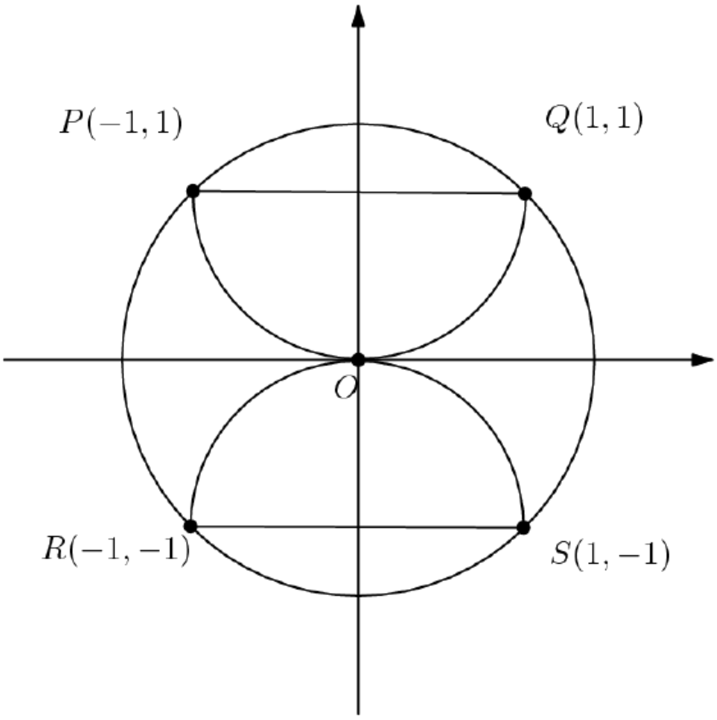
The hundreds digit of a three-digit number is 2 more than the units digit. The digits of the three-digit number are reversed, and the result is subtracted from the original three-digit number. What is the units digit of the result?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 4 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 8$

Solution

Problem 23

Semicircles POQ and ROS pass through the center O. What is the ratio of the combined areas of the two semicircles to the area of circle O?



$\textbf{(A)}\ \frac{\sqrt{2}}{4} \qquad \textbf{(B)}\ \frac{1}{2} \qquad \textbf{(C)}\ \frac{2}{\pi} \qquad \textbf{(D)}\ \frac{2}{3} \qquad \textbf{(E)}\ \frac{\sqrt{2}}{2}$

Solution

Problem 24

What is the correct ordering of the three numbers, 10^8, 5^{12}, and 2^{24}?

$\textbf{(A)}\ 2^{24}<10^8<5^{12}$

$\textbf{(B)}\ 2^{24}<5^{12}<10^8$

$\textbf{(C)}\ 5^{12}<2^{24}<10^8$

$\textbf{(D)}\ 10^8<5^{12}<2^{24}$

$\textbf{(E)}\ 10^8<2^{24}<5^{12}$

Solution

Problem 25

Everyday at school, Jo climbs a flight of 6 stairs. Jo can take the stairs 1, 2, or 3 at a time. For example, Jo could climb 3, then 1, then 2. In how many ways can Jo climb the stairs?

$\textbf{(A)}\ 13 \qquad \textbf{(B)}\ 18 \qquad \textbf{(C)}\ 20 \qquad \textbf{(D)}\ 22 \qquad \textbf{(E)}\ 24$

Solution

Retrieved from "https://artofproblemsolving.com/wiki/index.php?title=2010_AMC_8_Problems&oldid=131641"

2011 AMC 8 Problems

Contents

Problem 1

Margie bought 3 apples at a cost of 50 cents per apple. She paid with a 5-dollar bill. How much change did Margie receive?

$$\textbf{(A)}\ \$1.50 \qquad \textbf{(B)}\ \$2.00 \qquad \textbf{(C)}\ \$2.50 \qquad \textbf{(D)}\ \$3.00 \qquad \textbf{(E)}\ \$3.50$$

Solution

Problem 2

Karl's rectangular vegetable garden is 20 feet by 45 feet, and Makenna's is 25 feet by 40 feet. Which of the following statements are true?

$\textbf{(A)}\ \text{Karl's garden is larger by 100 square feet.}$

$\textbf{(B)}\ \text{Karl's garden is larger by 25 square feet.}$

$\textbf{(C)}\ \text{The gardens are the same size.}$

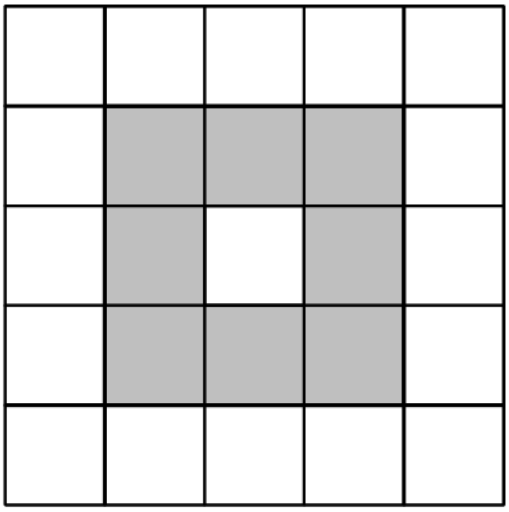
$\textbf{(D)}\ \text{Makenna's garden is larger by 25 square feet.}$

$\textbf{(E)}\ \text{Makenna's garden is larger by 100 square feet.}$

Solution

Problem 3

Extend the square pattern of 8 black and 17 white square tiles by attaching a border of black tiles around the square. What is the ratio of black tiles to white tiles in the extended pattern?



$\textbf{(A)}\ 8:17 \qquad\textbf{(B)}\ 25:49 \qquad\textbf{(C)}\ 36:25 \qquad\textbf{(D)}\ 32:17 \qquad\textbf{(E)}\ 36:17$

Solution

Problem 4

Here is a list of the numbers of fish that Tyler caught in nine outings last summer:

$$2, 0, 1, 3, 0, 3, 3, 1, 2.$$

Which statement about the mean, median, and mode is true?

$\textbf{(A)}\ \text{median} < \text{mean} < \text{mode} \qquad \textbf{(B)}\ \text{mean} < \text{mode} < \text{median}$

$\textbf{(C)}\ \text{mean} < \text{median} < \text{mode} \qquad \textbf{(D)}\ \text{median} < \text{mode} < \text{mean}$

$\textbf{(E)}\ \text{mode} < \text{median} < \text{mean}$

Solution

Problem 5

What time was it 2011 minutes after midnight on January 1, 2011?

$\textbf{(A)}$ January 1 at 9:31 PM

$\textbf{(B)}$ January 1 at 11:51 PM

$\textbf{(C)}$ January 2 at 3:11 AM

$\textbf{(D)}$ January 2 at 9:31 AM

$\textbf{(E)}$ January 2 at 6:01 PM

Solution

Problem 6

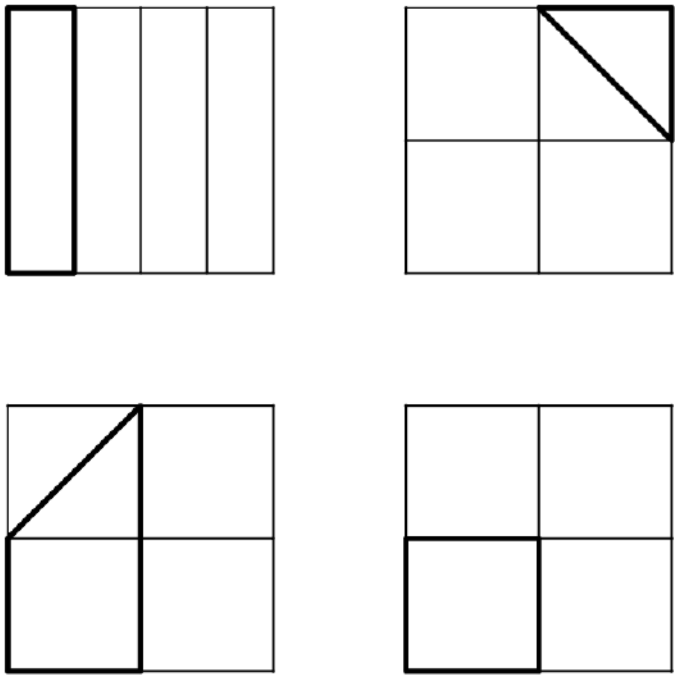
In a town of 351 adults, every adult owns a car, motorcycle, or both. If 331 adults own cars and 45 adults own motorcycles, how many of the car owners do not own a motorcycle?

$\textbf{(A)}\ 20 \qquad\textbf{(B)}\ 25 \qquad\textbf{(C)}\ 45 \qquad\textbf{(D)}\ 306 \qquad\textbf{(E)}\ 351$

Solution

Problem 7

Each of the following four large congruent squares is subdivided into combinations of congruent triangles or rectangles and is partially bolded. What percent of the total area is partially bolded?



$\textbf{(A)}12\frac{1}{2} \qquad \textbf{(B)}20 \qquad \textbf{(C)}25 \qquad \textbf{(D)}33\frac{1}{3} \qquad \textbf{(E)}37\frac{1}{2}$

Solution

Problem 8

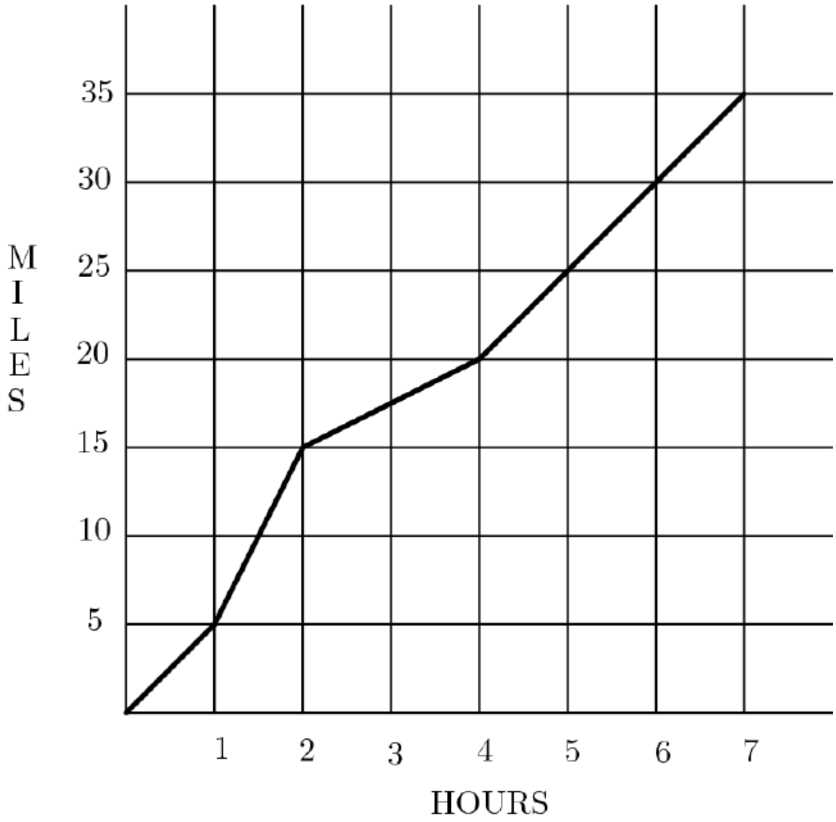
Bag A has three chips labeled 1, 3, and 5. Bag B has three chips labeled 2, 4, and 6. If one chip is drawn from each bag, how many different values are possible for the sum of the two numbers on the chips?

$\textbf{(A) }4 \qquad \textbf{(B) }5 \qquad \textbf{(C) }6 \qquad \textbf{(D) }7 \qquad \textbf{(E) }9$

Solution

Problem 9

Carmen takes a long bike ride on a hilly highway. The graph indicates the miles traveled during the time of her ride. What is Carmen's average speed for her entire ride in miles per hour?



$\textbf{(A)}2 \qquad \textbf{(B)}2.5 \qquad \textbf{(C)}4 \qquad \textbf{(D)}4.5 \qquad \textbf{(E)}5$

Solution

Problem 10

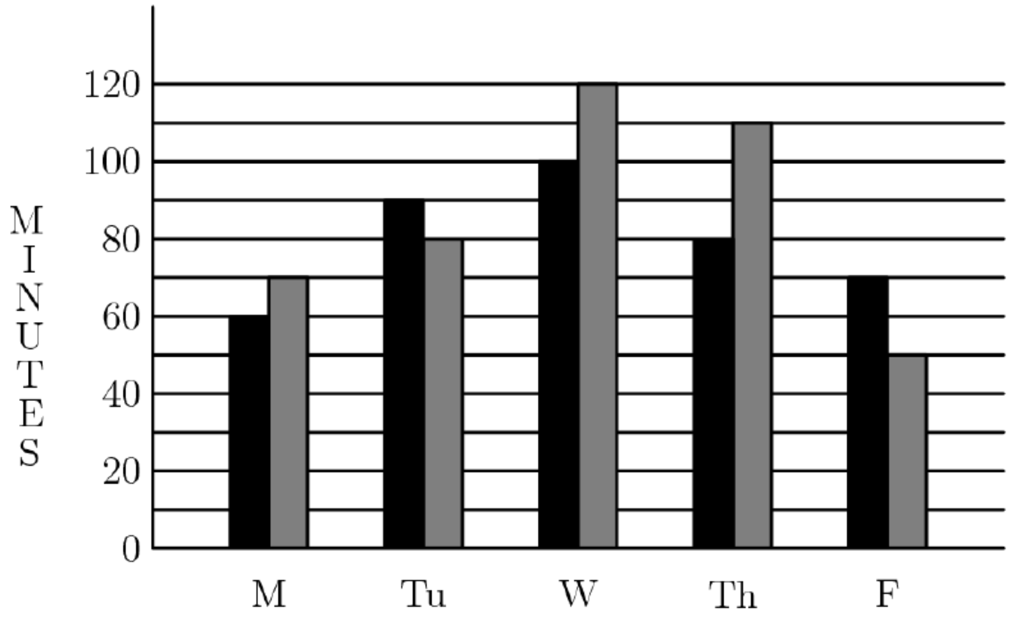
The taxi fare in Gotham City is \$2.40 for the first $\frac{1}{2}$ mile and additional mileage charged at the rate \$0.20 for each additional 0.1 mile. You plan to give the driver a \$2 tip. How many miles can you ride for \$10?

$\textbf{(A)}\ 3.0\qquad\textbf{(B)}\ 3.25\qquad\textbf{(C)}\ 3.3\qquad\textbf{(D)}\ 3.5\qquad\textbf{(E)}\ 3.75$

Solution

Problem 11

The graph shows the number of minutes studied by both Asha (black bar) and Sasha(grey bar) in one week. On the average, how many more minutes per day did Sasha study than Asha?



$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 12$

Solution

Problem 12

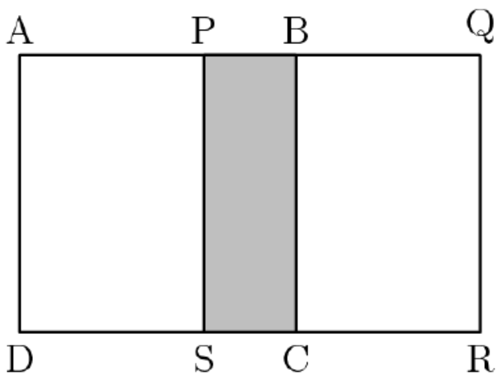
Angie, Bridget, Carlos, and Diego are seated at random around a square table, one person to a side. What is the probability that Angie and Carlos are seated opposite each other?

$\textbf{(A)}\ \frac14 \qquad \textbf{(B)}\ \frac13 \qquad \textbf{(C)}\ \frac12 \qquad \textbf{(D)}\ \frac23 \qquad \textbf{(E)}\ \frac34$

Solution

Problem 13

Two congruent squares, $ABCD$ and $PQRS$, have side length 15. They overlap to form the 15 by 25 rectangle $AQRD$ shown. What percent of the area of rectangle $AQRD$ is shaded?



$\textbf{(A)}\ 15 \qquad \textbf{(B)}\ 18 \qquad \textbf{(C)}\ 20 \qquad \textbf{(D)}\ 24 \qquad \textbf{(E)}\ 25$

Solution

Problem 14

There are 270 students at Colfax Middle School, where the ratio of boys to girls is $5 : 4$. There are 180 students at Winthrop Middle School, where the ratio of boys to girls is $4 : 5$. The two schools hold a dance and all students from both schools attend. What fraction of the students at the dance are girls?

$\textbf{(A)}\ \frac{7}{18} \qquad \textbf{(B)}\ \frac{7}{15} \qquad \textbf{(C)}\ \frac{22}{45} \qquad \textbf{(D)}\ \frac{1}{2} \qquad \textbf{(E)}\ \frac{23}{45}$

Solution

Problem 15

How many digits are in the product $4^5 \cdot 5^{10}$?

$\textbf{(A) } 8 \qquad \textbf{(B) } 9 \qquad \textbf{(C) } 10 \qquad \textbf{(D) } 11 \qquad \textbf{(E) } 12$

Solution

Problem 16

Let A be the area of the triangle with sides of length $25, 25$, and 30. Let B be the area of the triangle with sides of length $25, 25,$ and 40. What is the relationship between A and B?

$\textbf{(A)}\ A = \frac{9}{16}B \qquad \textbf{(B)}\ A = \frac{3}{4}B \qquad \textbf{(C)}\ A = B \qquad \textbf{(D)}\ A = \frac{4}{3}B$
$\textbf{(E)}\ A = \frac{16}{9}B$

Solution

Problem 17

Let w, x, y, and z be whole numbers. If $2^w \cdot 3^x \cdot 5^y \cdot 7^z = 588$, then what does $2w + 3x + 5y + 7z$ equal?

$\textbf{(A) } 21 \qquad \textbf{(B) } 25 \qquad \textbf{(C) } 27 \qquad \textbf{(D) } 35 \qquad \textbf{(E) } 56$

Solution

Problem 18

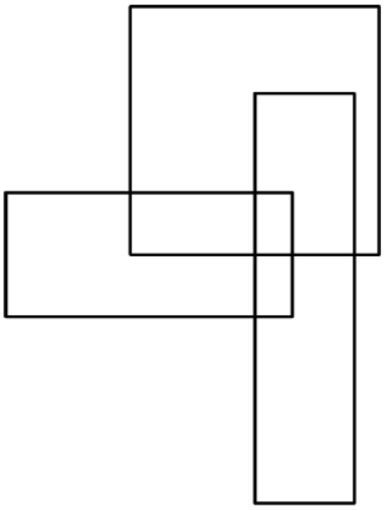
A fair 6-sided die is rolled twice. What is the probability that the first number that comes up is greater than or equal to the second number?

$\textbf{(A)}\ \frac{1}{6} \qquad \textbf{(B)}\ \frac{5}{12} \qquad \textbf{(C)}\ \frac{1}{2} \qquad \textbf{(D)}\ \frac{7}{12} \qquad \textbf{(E)}\ \frac{5}{6}$

Solution

Problem 19

How many rectangles are in this figure?

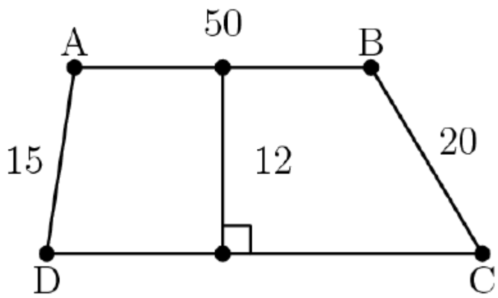


$\textbf{(A)}\ 8 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 11 \qquad \textbf{(E)}\ 12$

Solution

Problem 20

Quadrilateral $ABCD$ is a trapezoid, $AD = 15$, $AB = 50$, $BC = 20$, and the altitude is 12. What is the area of the trapezoid?



$\textbf{(A)}\ 600 \qquad \textbf{(B)}\ 650 \qquad \textbf{(C)}\ 700 \qquad \textbf{(D)}\ 750 \qquad \textbf{(E)}\ 800$

Solution

Problem 21

Students guess that Norb's age is $24, 28, 30, 32, 36, 38, 41, 44, 47$, and 49. Norb says, "At least half of you guessed too low, two of you are off by one, and my age is a prime number." How old is Norb?

$\textbf{(A)}\ 29 \qquad \textbf{(B)}\ 31 \qquad \textbf{(C)}\ 37 \qquad \textbf{(D)}\ 43 \qquad \textbf{(E)}\ 48$

Solution

Problem 22

What is the **tens** digit of 7^{2011}?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 7$

Solution

Problem 23

How many 4-digit positive integers have four different digits, where the leading digit is not zero, the integer is a multiple of 5, and 5 is the largest digit?

$\textbf{(A)}\ 24 \qquad \textbf{(B)}\ 48 \qquad \textbf{(C)}\ 60 \qquad \textbf{(D)}\ 84 \qquad \textbf{(E)}\ 108$

Solution

Problem 24

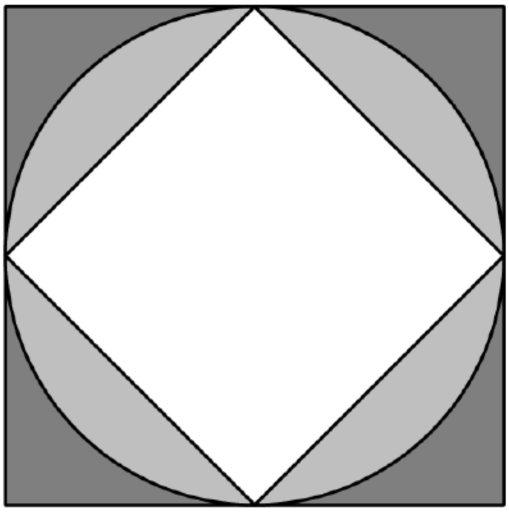
In how many ways can 10001 be written as the sum of two primes?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 2 \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

Solution

Problem 25

A circle with radius 1 is inscribed in a square and circumscribed about another square as shown. Which fraction is closest to the ratio of the circle's shaded area to the area between the two squares?



$\textbf{(A)}\ \frac{1}{2} \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ \frac{3}{2} \qquad \textbf{(D)}\ 2 \qquad \textbf{(E)}\ \frac{5}{2}$

Solution

2012 AMC 8 Problems

Contents

Problem 1

Rachelle uses 3 pounds of meat to make 8 hamburgers for her family. How many pounds of meat does she need to make 24 hamburgers for a neighborhood picnic?

$$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 6\frac{2}{3} \qquad \textbf{(C)}\ 7\frac{1}{2} \qquad \textbf{(D)}\ 8 \qquad \textbf{(E)}\ 9$$

Solution

Problem 2

In the country of East Westmore, statisticians estimate there is a baby born every 8 hours and a death every day. To the nearest hundred, how many people are added to the population of East Westmore each year?

$$\textbf{(A)}\ 600 \qquad \textbf{(B)}\ 700 \qquad \textbf{(C)}\ 800 \qquad \textbf{(D)}\ 900 \qquad \textbf{(E)}\ 1000$$

Solution

Problem 3

On February 13 $\textit{The Oshkosh Northwester}$ listed the length of daylight as 10 hours and 24 minutes, the sunrise was $6:57\text{AM}$, and the sunset as $8:15\text{PM}$. The length of daylight and sunrise were correct, but the sunset was wrong. When did the sun really set?

$\textbf{(A)}\ 5:10\text{PM} \qquad \textbf{(B)}\ 5:21\text{PM} \qquad \textbf{(C)}\ 5:41\text{PM} \qquad \textbf{(D)}\ 5:57\text{PM} \qquad \textbf{(E)}\ 6:03\text{PM}$

Solution

Problem 4

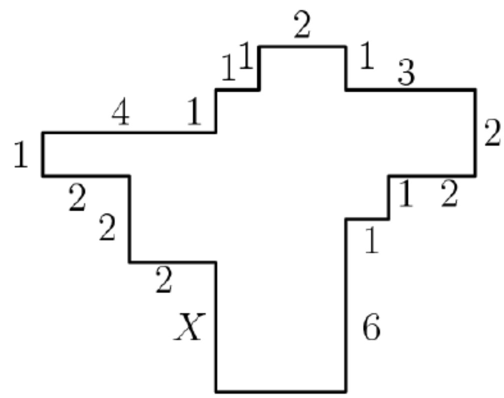
Peter's family ordered a 12-slice pizza for dinner. Peter ate one slice and shared another slice equally with his brother Paul. What fraction of the pizza did Peter eat?

$\textbf{(A)}\ \frac{1}{24} \qquad \textbf{(B)}\ \frac{1}{12} \qquad \textbf{(C)}\ \frac{1}{8} \qquad \textbf{(D)}\ \frac{1}{6} \qquad \textbf{(E)}\ \frac{1}{4}$

Solution

Problem 5

In the diagram, all angles are right angles and the lengths of the sides are given in centimeters. Note the diagram is not drawn to scale. What is the length in X, in centimeters?



$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 6

A rectangular photograph is placed in a frame that forms a border two inches wide on all sides of the photograph. The photograph measures 8 inches high and 10 inches wide. What is the area of the border, in square inches?

$\textbf{(A)}\ 36 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 64 \qquad \textbf{(D)}\ 72 \qquad \textbf{(E)}\ 88$

Solution

Problem 7

Isabella must take four 100-point tests in her math class. Her goal is to achieve an average grade of 95 on the tests. Her first two test scores were 97 and 91. After seeing her score on the third test, she realized she can still reach her goal. What is the lowest possible score she could have made on the third test?

$\textbf{(A)}\ 90 \qquad \textbf{(B)}\ 92 \qquad \textbf{(C)}\ 95 \qquad \textbf{(D)}\ 96 \qquad \textbf{(E)}\ 97$

Solution

Problem 8

A shop advertises everything is "half price in today's sale." In addition, a coupon gives a 20% discount on sale prices. Using the coupon, the price today represents what percentage off the original price?

$\textbf{(A)}\ 10 \qquad \textbf{(B)}\ 33 \qquad \textbf{(C)}\ 40 \qquad \textbf{(D)}\ 60 \qquad \textbf{(E)}\ 70$

Solution

Problem 9

The Fort Worth Zoo has a number of two-legged birds and a number of four-legged mammals. On one visit to the zoo, Margie counted 200 heads and 522 legs. How many of the animals that Margie counted were two-legged birds?

$\textbf{(A)}\ 61 \qquad \textbf{(B)}\ 122 \qquad \textbf{(C)}\ 139 \qquad \textbf{(D)}\ 150 \qquad \textbf{(E)}\ 161$

Solution

Problem 10

How many 4-digit numbers greater than 1000 are there that use the four digits of 2012?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 12$

Solution

Problem 11

The mean, median, and unique mode of the positive integers 3, 4, 5, 6, 6, 7, and x are all equal. What is the value of x?

$\textbf{(A)}\ 5 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 7 \qquad \textbf{(D)}\ 11 \qquad \textbf{(E)}\ 12$

Solution

Problem 12

What is the units digit of 13^{2012}?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 7 \qquad \textbf{(E)}\ 9$

Solution

Problem 13

Jamar bought some pencils costing more than a penny each at the school bookstore and paid $\$1.43$. Sharona bought some of the same pencils and paid $\$1.87$. How many more pencils did Sharona buy than Jamar?

$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 4 \qquad \textbf{(D)}\ 5 \qquad \textbf{(E)}\ 6$

Solution

Problem 14

In the BIG N, a middle school football conference, each team plays every other team exactly once. If a total of 21 conference games were played during the 2012 season, how many teams were members of the BIG N conference?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 7 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 10$

Solution

Problem 15

The smallest number greater than 2 that leaves a remainder of 2 when divided by 3, 4, 5, or 6 lies between what numbers?

$\textbf{(A)}\ 40\text{ and }50 \qquad \textbf{(B)}\ 51\text{ and }55 \qquad \textbf{(C)}\ 56\text{ and }60 \qquad \textbf{(D)}\ 61\text{ and }65 \qquad \textbf{(E)}\ 66\text{ and }99$

Solution

Problem 16

Each of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 is used only once to make two five-digit numbers so that they have the largest possible sum. Which of the following could be one of the numbers?

$\textbf{(A)}\ 76531 \qquad \textbf{(B)}\ 86724 \qquad \textbf{(C)}\ 87431 \qquad \textbf{(D)}\ 96240 \qquad \textbf{(E)}\ 97403$

Solution

Problem 17

A square with integer side length is cut into 10 squares, all of which have integer side length and at least 8 of which have area 1. What is the smallest possible value of the length of the side of the original square?

$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 4 \qquad \textbf{(C)}\ 5 \qquad \textbf{(D)}\ 6 \qquad \textbf{(E)}\ 7$

Solution

Problem 18

What is the smallest positive integer that is neither prime nor square and that has no prime factor less than 50?

$\textbf{(A)}\ 3127 \qquad \textbf{(B)}\ 3133 \qquad \textbf{(C)}\ 3137 \qquad \textbf{(D)}\ 3139 \qquad \textbf{(E)}\ 3149$

Solution

Problem 19

In a jar of red, green, and blue marbles, all but 6 are red marbles, all but 8 are green, and all but 4 are blue. How many marbles are in the jar?

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 10 \qquad \textbf{(E)}\ 12$

Solution

Problem 20

What is the correct ordering of the three numbers $\frac{5}{19}$, $\frac{7}{21}$, and $\frac{9}{23}$, in increasing order?

$\textbf{(A)}\ \frac{9}{23}<\frac{7}{21}<\frac{5}{19} \quad \textbf{(B)}\ \frac{5}{19}<\frac{7}{21}<\frac{9}{23} \quad \textbf{(C)}\ \frac{9}{23}<\frac{5}{19}<\frac{7}{21}$

$\textbf{(D)}\ \frac{5}{19}<\frac{9}{23}<\frac{7}{21} \quad \textbf{(E)}\ \frac{7}{21}<\frac{5}{19}<\frac{9}{23}$

Solution

Problem 21

Marla has a large white cube that has an edge of 10 feet. She also has enough green paint to cover 300 square feet. Marla uses all the paint to create a white square centered on each face, surrounded by a green border. What is the area of one of the white squares, in square feet?

$\textbf{(A)}\ 5\sqrt{2} \qquad \textbf{(B)}\ 10 \qquad \textbf{(C)}\ 10\sqrt{2} \qquad \textbf{(D)}\ 50 \qquad \textbf{(E)}\ 50\sqrt{2}$

Solution

Problem 22

Let R be a set of nine distinct integers. Six of the elements are 2, 3, 4, 6, 9, and 14. What is the number of possible values of the median of R?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 7 \qquad \textbf{(E)}\ 8$

Solution

Problem 23

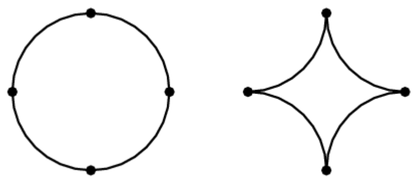
An equilateral triangle and a regular hexagon have equal perimeters. If the area of the triangle is 4, what is the area of the hexagon?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 4\sqrt{3} \qquad \textbf{(E)}\ 6\sqrt{3}$

Solution

Problem 24

A circle of radius 2 is cut into four congruent arcs. The four arcs are joined to form the star figure shown. What is the ratio of the area of the star figure to the area of the original circle?

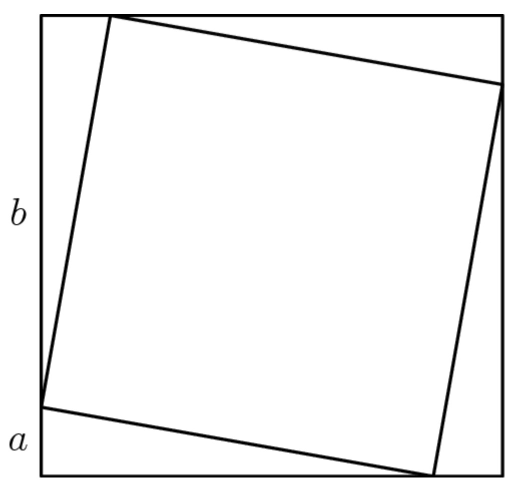


$\textbf{(A)}\ \frac{4-\pi}{\pi} \qquad \textbf{(B)}\ \frac{1}{\pi} \qquad \textbf{(C)}\ \frac{\sqrt{2}}{\pi} \qquad \textbf{(D)}\ \frac{\pi-1}{\pi} \qquad \textbf{(E)}\ \frac{3}{\pi}$

Solution

Problem 25

A square with area 4 is inscribed in a square with area 5, with one vertex of the smaller square on each side of the larger square. A vertex of the smaller square divides a side of the larger square into two segments, one of length a, and the other of length b. What is the value of ab?



$\textbf{(A)}\ \frac{1}{5} \qquad \textbf{(B)}\ \frac{2}{5} \qquad \textbf{(C)}\ \frac{1}{2} \qquad \textbf{(D)}\ 1 \qquad \textbf{(E)}\ 4$

Solution

2013 AMC 8 Problems

Contents

Problem 1

Danica wants to arrange her model cars in rows with exactly 6 cars in each row. She now has 23 model cars. What is the smallest number of additional cars she must buy in order to be able to arrange all her cars this way?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 2

A sign at the fish market says, "50% off, today only: half-pound packages for just $3 per package." What is the regular price for a full pound of fish, in dollars? (Assume that there are no deals for bulk)

$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 12 \qquad \textbf{(E)}\ 15$

Solution

Problem 3

What is the value of $4 \cdot (-1+2-3+4-5+6-7+\cdots+1000)$?

$\textbf{(A)}\ -10 \qquad \textbf{(B)}\ 0 \qquad \textbf{(C)}\ 1 \qquad \textbf{(D)}\ 500 \qquad \textbf{(E)}\ 2000$

Solution

Problem 4

Eight friends ate at a restaurant and agreed to share the bill equally. Because Judi forgot her money, each of her seven friends paid an extra $2.50 to cover her portion of the total bill. What was the total bill?

$\textbf{(A)}\ \$120 \qquad \textbf{(B)}\ \$128 \qquad \textbf{(C)}\ \$140 \qquad \textbf{(D)}\ \$144 \qquad \textbf{(E)}\ \$160$

Solution

Problem 5

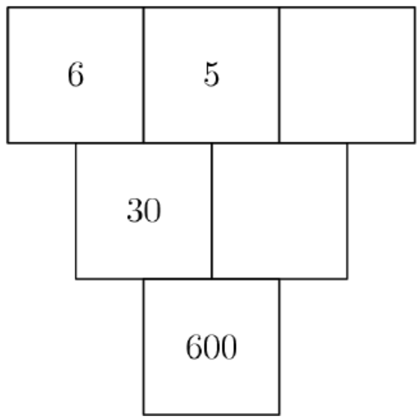
Hammie is in the 6^{th} grade and weighs 106 pounds. Her quadruplet sisters are tiny babies and weigh 5, 5, 6, and 8 pounds. Which is greater, the average (mean) weight of these five children or the median weight, and by how many pounds?

$\textbf{(A)}\ \text{median, by 60} \qquad \textbf{(B)}\ \text{median, by 20} \qquad \textbf{(C)}\ \text{average, by 5} \qquad \textbf{(D)}\ \text{average, by 15} \qquad \textbf{(E)}\ \text{average, by 2(}$

Solution

Problem 6

The number in each box below is the product of the numbers in the two boxes that touch it in the row above. For example, $30 = 6 \times 5$. What is the missing number in the top row?



$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 4 \qquad \textbf{(D)}\ 5 \qquad \textbf{(E)}\ 6$

Solution

Problem 7

Trey and his mom stopped at a railroad crossing to let a train pass. As the train began to pass, Trey counted 6 cars in the first 10 seconds. It took the train 2 minutes and 45 seconds to clear the crossing at a constant speed. Which of the following was the most likely number of cars in the train?

$\textbf{(A)}\ 60 \qquad \textbf{(B)}\ 80 \qquad \textbf{(C)}\ 100 \qquad \textbf{(D)}\ 120 \qquad \textbf{(E)}\ 140$

Solution

Problem 8

A fair coin is tossed 3 times. What is the probability of at least two consecutive heads?

$\textbf{(A)}\ \frac{1}{8} \qquad \textbf{(B)}\ \frac{1}{4} \qquad \textbf{(C)}\ \frac{3}{8} \qquad \textbf{(D)}\ \frac{1}{2} \qquad \textbf{(E)}\ \frac{3}{4}$

Solution

Problem 9

The Incredible Hulk can double the distance it jumps with each succeeding jump. If its first jump is 1 meter, the second jump is 2 meters, the third jump is 4 meters, and so on, then on which jump will it first be able to jump more than 1 kilometer?

$\textbf{(A)}\ 9^{\text{th}} \qquad \textbf{(B)}\ 10^{\text{th}} \qquad \textbf{(C)}\ 11^{\text{th}} \qquad \textbf{(D)}\ 12^{\text{th}} \qquad \textbf{(E)}\ 13^{\text{th}}$

Solution

Problem 10

What is the ratio of the least common multiple of 180 and 594 to the greatest common factor of 180 and 594?

$\textbf{(A)}\ 110 \qquad \textbf{(B)}\ 165 \qquad \textbf{(C)}\ 330 \qquad \textbf{(D)}\ 625 \qquad \textbf{(E)}\ 660$

Solution

Problem 11

Ted's grandfather used his treadmill on 3 days this week. He went 2 miles each day. On Monday he jogged at a speed of 5 miles per hour. He walked at the rate of 3 miles per hour on Wednesday and at 4 miles per hour on Friday. If Grandfather had always walked at 4 miles per hour, he would have spent less time on the treadmill. How many minutes less?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 12

At the 2013 Winnebago County Fair a vendor is offering a "fair special" on sandals. If you buy one pair of sandals at the regular price of 50, you get a second pair at a 40% discount, and a third pair at half the regular price. Javier took advantage of the "fair special" to buy three pairs of sandals. What percentage of the 150 dollar regular price did he save?

$\textbf{(A)}\ 25\% \qquad \textbf{(B)}\ 30\% \qquad \textbf{(C)}\ 33\% \qquad \textbf{(D)}\ 40\% \qquad \textbf{(E)}\ 45\%$

Solution

Problem 13

When Clara totaled her scores, she inadvertently reversed the units digit and the tens digit of one score. By which of the following might her incorrect sum have differed from the correct one?

$\textbf{(A)}\ 45 \qquad \textbf{(B)}\ 46 \qquad \textbf{(C)}\ 47 \qquad \textbf{(D)}\ 48 \qquad \textbf{(E)}\ 49$

Solution

Problem 14

Abe holds 1 green and 1 red jelly bean in his hand. Bob holds 1 green, 1 yellow, and 2 red jelly beans in his hand. Each randomly picks a jelly bean to show the other. What is the probability that the colors match?

$\textbf{(A)}\ \frac14 \qquad \textbf{(B)}\ \frac13 \qquad \textbf{(C)}\ \frac38 \qquad \textbf{(D)}\ \frac12 \qquad \textbf{(E)}\ \frac23$

Solution

Problem 15

If $3^p + 3^4 = 90, 2^r + 44 = 76$, and $5^3 + 6^s = 1421$, what is the product of p, r, and s?

$\textbf{(A)}\ 27 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 50 \qquad \textbf{(D)}\ 70 \qquad \textbf{(E)}\ 90$

Solution

Problem 16

A number of students from Fibonacci Middle School are taking part in a community service project. The ratio of 8^{th}-graders to 6^{th}-graders is $5:3$, and the ratio of 8^{th}-graders to 7^{th}-graders is $8:5$. What is the smallest number of students that could be participating in the project?

$\textbf{(A)}\ 16 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 55 \qquad \textbf{(D)}\ 79 \qquad \textbf{(E)}\ 89$

Solution

Problem 17

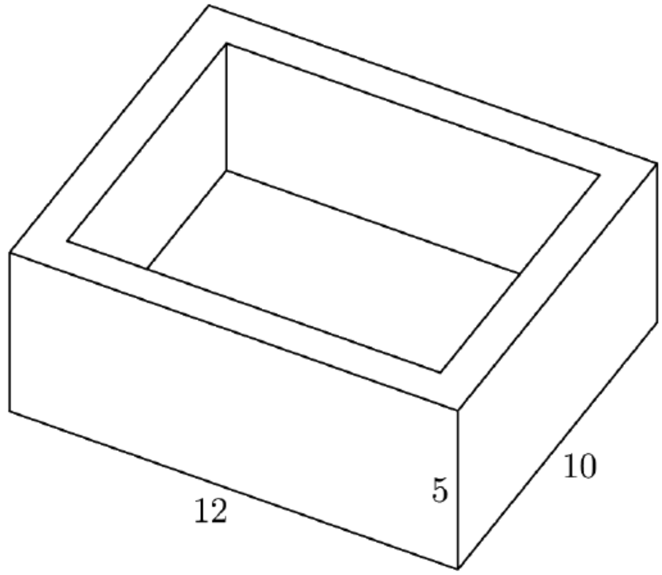
The sum of six consecutive positive integers is 2013. What is the largest of these six integers?

$\textbf{(A)}\ 335 \qquad \textbf{(B)}\ 338 \qquad \textbf{(C)}\ 340 \qquad \textbf{(D)}\ 345 \qquad \textbf{(E)}\ 350$

Solution

Problem 18

Isabella uses one-foot cubical blocks to build a rectangular fort that is 12 feet long, 10 feet wide, and 5 feet high. The floor and the four walls are all one foot thick. How many blocks does the fort contain?



$\textbf{(A)}\ 204 \qquad \textbf{(B)}\ 280 \qquad \textbf{(C)}\ 320 \qquad \textbf{(D)}\ 340 \qquad \textbf{(E)}\ 600$

Solution

Problem 19

Bridget, Cassie, and Hannah are discussing the results of their last math test. Hannah shows Bridget and Cassie her test, but Bridget and Cassie don't show theirs to anyone. Cassie says, 'I didn't get the lowest score in our class,' and Bridget adds, 'I didn't get the highest score.' What is the ranking of the three girls from the highest score to the lowest score?

$\textbf{(A)}\ \text{Hannah, Cassie, Bridget} \qquad \textbf{(B)}\ \text{Hannah, Bridget, Cassie}$
$\textbf{(C)}\ \text{Cassie, Bridget, Hannah} \qquad \textbf{(D)}\ \text{Cassie, Hannah, Bridget}$
$\textbf{(E)}\ \text{Bridget, Cassie, Hannah}$

Solution

Problem 20

A 1×2 rectangle is inscribed in a semicircle with longer side on the diameter. What is the area of the semicircle?

$\textbf{(A)}\ \frac{\pi}{2} \qquad \textbf{(B)}\ \frac{2\pi}{3} \qquad \textbf{(C)}\ \pi \qquad \textbf{(D)}\ \frac{4\pi}{3} \qquad \textbf{(E)}\ \frac{5\pi}{3}$

Solution

Problem 21

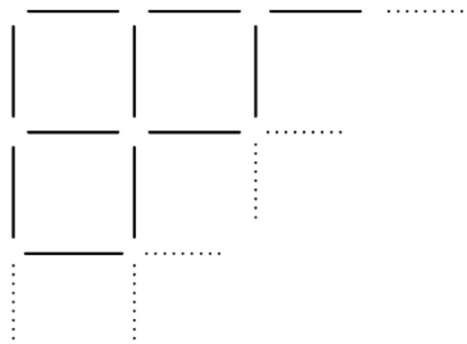
Samantha lives 2 blocks west and 1 block south of the southwest corner of City Park. Her school is 2 blocks east and 2 blocks north of the northeast corner of City Park. On school days she bikes on streets to the southwest corner of City Park, then takes a diagonal path through the park to the northeast corner, and then bikes on streets to school. If her route is as short as possible, how many different routes can she take?

$\textbf{(A)}\ 3 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 12 \qquad \textbf{(E)}\ 18$

Solution

Problem 22

Toothpicks are used to make a grid that is 60 toothpicks long and 32 toothpicks wide. How many toothpicks are used altogether?

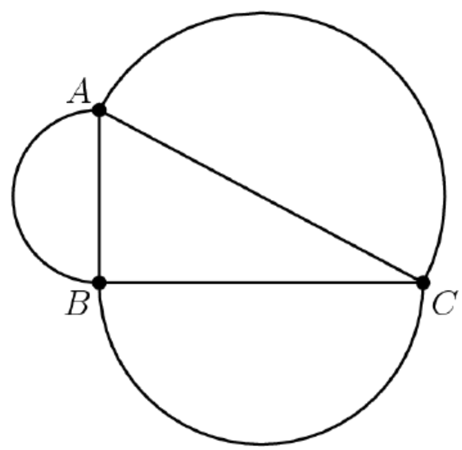


$\textbf{(A)}\ 1920 \qquad \textbf{(B)}\ 1952 \qquad \textbf{(C)}\ 1980 \qquad \textbf{(D)}\ 2013 \qquad \textbf{(E)}\ 3932$

Solution

Problem 23

Angle ABC of $\triangle ABC$ is a right angle. The sides of $\triangle ABC$ are the diameters of semicircles as shown. The area of the semicircle on $\overline{AB}$ equals 8π, and the arc of the semicircle on $\overline{AC}$ has length 8.5π. What is the radius of the semicircle on $\overline{BC}$?

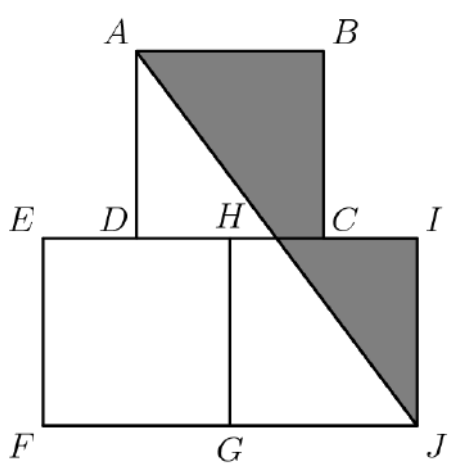


$\textbf{(A)}\ 7 \qquad \textbf{(B)}\ 7.5 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 8.5 \qquad \textbf{(E)}\ 9$

Solution

Problem 24

Squares $ABCD$, $EFGH$, and $GHIJ$ are equal in area. Points C and D are the midpoints of sides IH and HE, respectively. What is the ratio of the area of the shaded pentagon $AJICB$ to the sum of the areas of the three squares?

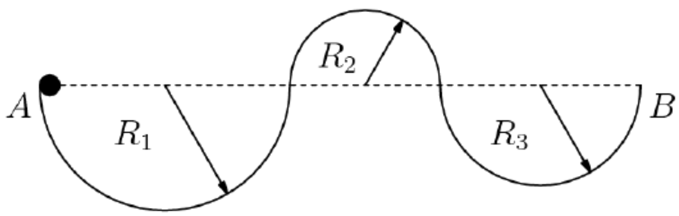


$\textbf{(A) }\frac{1}{4}\qquad\textbf{(B) }\frac{7}{24}\qquad\textbf{(C) }\frac{1}{3}\qquad\textbf{(D) }\frac{3}{8}\qquad\textbf{(E) }\frac{5}{12}$

Solution

Problem 25

A ball with diameter 4 inches starts at point A to roll along the track shown. The track is comprised of 3 semicircular arcs whose radii are $R_1 = 100$ inches, $R_2 = 60$ inches, and $R_3 = 80$ inches, respectively. The ball always remains in contact with the track and does not slip. What is the distance the center of the ball travels over the course from A to B?



$\textbf{(A)}\ 238\pi \qquad\textbf{(B)}\ 240\pi \qquad\textbf{(C)}\ 260\pi \qquad\textbf{(D)}\ 280\pi \qquad\textbf{(E)}\ 500\pi$

Solution

2014 AMC 8 Problems

Contents

Problem 1

Harry and Terry are each told to calculate $8-(2+5)$. Harry gets the correct answer. Terry ignores the parentheses and calculates $8-2+5$. If Harry's answer is H and Terry's answer is T. What's the difference between H and T?

$\textbf{(A) }-10\qquad\textbf{(B) }-6\qquad\textbf{(C) }0\qquad\textbf{(D) }6\qquad\textbf{(E) }10$

Solution

Problem 2

Paul owes Paula 35 cents and has a pocket full of 5-cent coins, 10-cent coins, and 25-cent coins that he can use to pay her. What is the difference between the largest and the smallest number of coins he can use to pay her?

$\textbf{(A) }1\qquad\textbf{(B) }2\qquad\textbf{(C) }3\qquad\textbf{(D) }4\qquad\textbf{(E) }5$

Solution

Problem 3

Isabella had a week to read a book for a school assignment. She read an average of 36 pages per day for the first three days and an average of 44 pages per day for the next three days. She then finished the book by reading 10 pages on the last day. How many pages were in the book?

$\textbf{(A) }240\qquad\textbf{(B) }250\qquad\textbf{(C) }260\qquad\textbf{(D) }270\qquad\textbf{(E) }280$

Solution

Problem 4

The sum of two prime numbers is 85. What is the product of these two prime numbers?

$\textbf{(A) }85\qquad\textbf{(B) }91\qquad\textbf{(C) }115\qquad\textbf{(D) }133\qquad \textbf{(E) }166$

Solution

Problem 5

Margie's car can go 32 miles on a gallon of gas, and gas currently costs $4 per gallon. How many miles can Margie drive on $20?

$\textbf{(A) }64\qquad\textbf{(B) }128\qquad\textbf{(C) }160\qquad\textbf{(D) }320\qquad \textbf{(E) }640$

Solution

Problem 6

Six rectangles each with a common base width of 2 have lengths of 1, 4, 9, 16, 25, and 36. What is the sum of the areas of the six rectangles?

$\textbf{(A) }91\qquad\textbf{(B) }93\qquad\textbf{(C) }162\qquad\textbf{(D) }182\qquad \textbf{(E) }202$

Solution

Problem 7

There are four more girls than boys in Ms. Raub's class of 28 students. What is the ratio of number of girls to the number of boys in her class?

$\textbf{(A) }3:4\qquad\textbf{(B) }4:3\qquad\textbf{(C) }3:2\qquad\textbf{(D) }7:4\qquad \textbf{(E) }2:1$

Solution

Problem 8

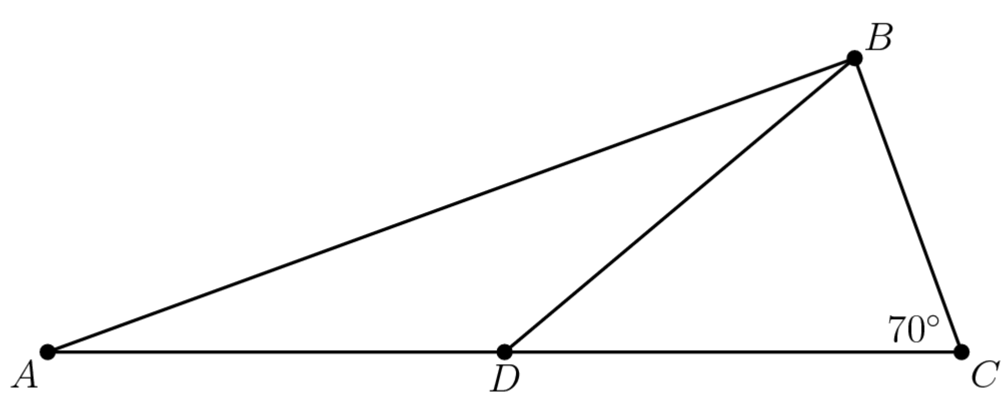
Eleven members of the Middle School Math Club each paid the same integer amount for a guest speaker to talk about problem solving at their math club meeting. In all, they paid their guest speaker $\$\underline{1} \underline{A} \underline{2}$. What is the missing digit A of this 3-digit number?

$\textbf{(A) }0\qquad\textbf{(B) }1\qquad\textbf{(C) }2\qquad\textbf{(D) }3\qquad \textbf{(E) }4$

Solution

Problem 9

In $\triangle ABC$, D is a point on side $\overline{AC}$ such that $BD=DC$ and $\angle BCD$ measures 70°. What is the degree measure of $\angle ADB$?



$\textbf{(A) }100 \qquad \textbf{(B) }120 \qquad \textbf{(C) }135 \qquad \textbf{(D) }140 \qquad \textbf{(E) }150$

Solution

Problem 10

The first AMC 8 was given in 1985 and it has been given annually since that time. Samantha turned 12 years old the year that she took the seventh AMC 8. In what year was Samantha born?

$\textbf{(A) }1979 \qquad \textbf{(B) }1980 \qquad \textbf{(C) }1981 \qquad \textbf{(D) }1982 \qquad \textbf{(E) }1983$

Solution

Problem 11

Jack wants to bike from his house to Jill's house, which is located three blocks east and two blocks north of Jack's house. After biking each block, Jack can continue either east or north, but he needs to avoid a dangerous intersection one block east and one block north of his house. In how many ways can he reach Jill's house by biking a total of five blocks?

$\textbf{(A) }4 \qquad \textbf{(B) }5 \qquad \textbf{(C) }6 \qquad \textbf{(D) }8 \qquad \textbf{(E) }10$

Solution

Problem 12

A magazine printed photos of three celebrities along with three photos of the celebrities as babies. The baby pictures did not identify the celebrities. Readers were asked to match each celebrity with the correct baby pictures. What is the probability that a reader guessing at random will match all three correctly as a fraction?

$\textbf{(A) }\frac{1}{9} \qquad \textbf{(B) }\frac{1}{6} \qquad \textbf{(C) }\frac{1}{4} \qquad \textbf{(D) }\frac{1}{3} \qquad \textbf{(E) }\frac{1}{2}$

Solution

Problem 13

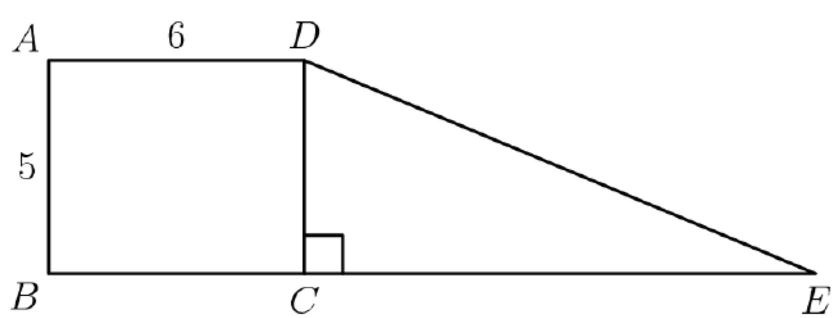
If n and m are integers and n^2+m^2 is even, which of the following is impossible?

$\textbf{(A)}$ n and m are even $\qquad \textbf{(B)}$ n and m are odd $\qquad \textbf{(C)}$ $n+m$ is even $\qquad \textbf{(D)}$ $n+m$ is odd $\qquad \textbf{(E)}$ none of these are impossible

Solution

Problem 14

Rectangle $ABCD$ and right triangle DCE have the same area. They are joined to form a trapezoid, as shown. What is DE?

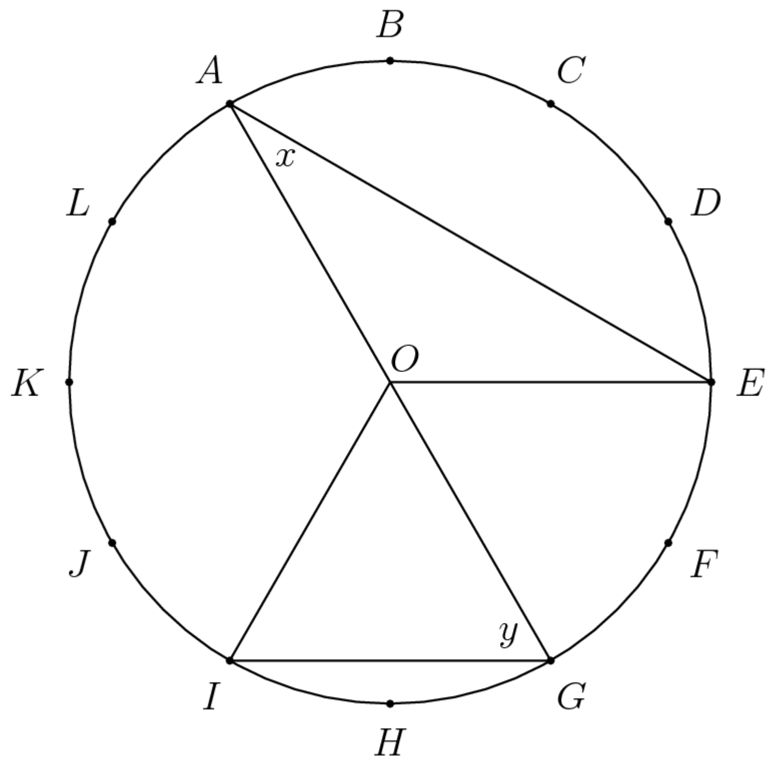


$\textbf{(A) }12 \qquad \textbf{(B) }13 \qquad \textbf{(C) }14 \qquad \textbf{(D) }15 \qquad \textbf{(E) }16$

Solution

Problem 15

The circumference of the circle with center O is divided into 12 equal arcs, marked the letters A through L as seen below. What is the number of degrees in the sum of the angles x and y?



$\textbf{(A) }75\qquad\textbf{(B) }80\qquad\textbf{(C) }90\qquad\textbf{(D) }120\qquad\textbf{(E) }150$

Solution

Problem 16

The "Middle School Eight" basketball conference has 8 teams. Every season, each team plays every other conference team twice (home and away), and each team also plays 4 games against non-conference opponents. What is the total number of games in a season involving the "Middle School Eight" teams?

$\textbf{(A) }60\qquad\textbf{(B) }88\qquad\textbf{(C) }96\qquad\textbf{(D) }144\qquad\textbf{(E) }160$

Solution

Problem 17

George walks 1 mile to school. He leaves home at the same time each day, walks at a steady speed of 3 miles per hour, and arrives just as school begins. Today he was distracted by the pleasant weather and walked the first $\frac{1}{2}$ mile at a speed of only 2 miles per hour. At how many miles per hour must George run the last $\frac{1}{2}$ mile in order to arrive just as school begins today?

$\textbf{(A) }4\qquad\textbf{(B) }6\qquad\textbf{(C) }8\qquad\textbf{(D) }10\qquad\textbf{(E) }12$

Solution

Problem 18

Four children were born at City Hospital yesterday. Assume each child is equally likely to be a boy or a girl. Which of the following outcomes is most likely?

$\textbf{(A)}$ all 4 are boys $\textbf{(B)}$ all 4 are girls $\textbf{(C)}$ 2 are girls and 2 are boys $\textbf{(D)}$ 3 are of one gender and 1 is of the other gender $\textbf{(E)}$ all of these outcomes are equally likely

Solution

Problem 19

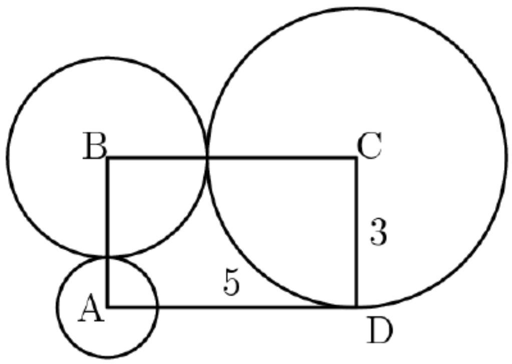
A cube with 3-inch edges is to be constructed from 27 smaller cubes with 1-inch edges. Twenty-one of the cubes are colored red and 6 are colored white. If the 3-inch cube is constructed to have the smallest possible white surface area showing, what fraction of the surface area is white?

$\textbf{(A) }\frac{5}{54}\qquad\textbf{(B) }\frac{1}{9}\qquad\textbf{(C) }\frac{5}{27}\qquad\textbf{(D) }\frac{2}{9}\qquad\textbf{(E) }\frac{1}{3}$

Solution

Problem 20

Rectangle $ABCD$ has sides $CD=3$ and $DA=5$. A circle with a radius of 1 is centered at A, a circle with a radius of 2 is centered at B, and a circle with a radius of 3 is centered at C. Which of the following is closest to the area of the region inside the rectangle but outside all three circles?



$\textbf{(A) }3.5\qquad\textbf{(B) }4.0\qquad\textbf{(C) }4.5\qquad\textbf{(D) }5.0\qquad\textbf{(E) }5.5$

Solution

Problem 21

The 7-digit numbers $\underline{74A52B1}$ and $\underline{326AB4C}$ are each multiples of 3. Which of the following could be the value of C?

$\textbf{(A) }1\qquad\textbf{(B) }2\qquad\textbf{(C) }3\qquad\textbf{(D) }5\qquad\textbf{(E) }8$

Solution

Problem 22

A 2-digit number is such that the product of the digits plus the sum of the digits is equal to the number. What is the units digit of the number?

$\textbf{(A) }1\qquad\textbf{(B) }3\qquad\textbf{(C) }5\qquad\textbf{(D) }7\qquad\textbf{(E) }9$

Solution

Problem 23

Three members of the Euclid Middle School girls' softball team had the following conversation.

Ashley: I just realized that our uniform numbers are all 2-digit primes.

Bethany: And the sum of your two uniform numbers is the date of my birthday earlier this month.

Caitlin: That's funny. The sum of your two uniform numbers is the date of my birthday later this month.

Ashley: And the sum of your two uniform numbers is today's date.

What number does Caitlin wear?

$\textbf{(A) }11\qquad\textbf{(B) }13\qquad\textbf{(C) }17\qquad\textbf{(D) }19\qquad\textbf{(E) }23$

Solution

Problem 24

One day the Beverage Barn sold 252 cans of soda to 100 customers, and every customer bought at least one can of soda. What is the maximum possible median number of cans of soda bought per customer on that day?

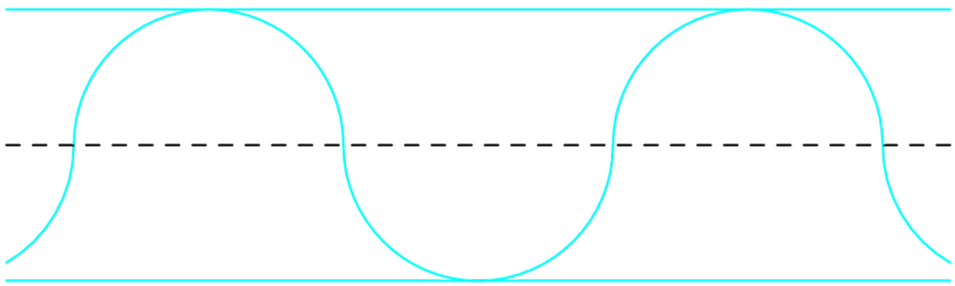
$\textbf{(A) }2.5\qquad\textbf{(B) }3.0\qquad\textbf{(C) }3.5\qquad\textbf{(D) }4.0\qquad\textbf{(E) }4.5$

Solution

Problem 25

A straight one-mile stretch of highway, 40 feet wide, is closed. Robert rides his bike on a path composed of semicircles as shown. If he rides at 5 miles per hour, how many hours will it take to cover the one-mile stretch?

Note: 1 mile= 5280 feet



$\textbf{(A) }\frac{\pi}{11}\qquad\textbf{(B) }\frac{\pi}{10}\qquad\textbf{(C) }\frac{\pi}{5}\qquad\textbf{(D) }\frac{2\pi}{5}\qquad\textbf{(E) }\frac{2\pi}{3}$

Solution

2015 AMC 8 Problems

Contents

Problem 1

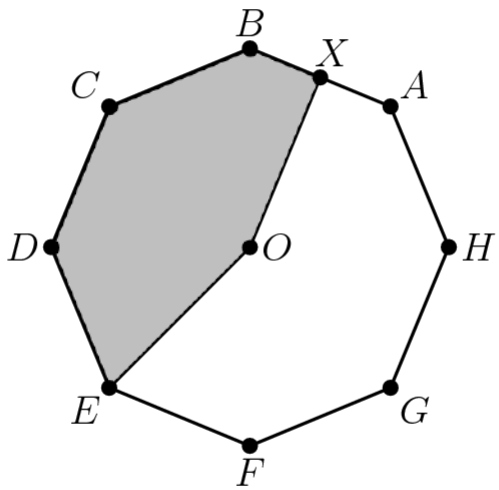
How many square yards of carpet are required to cover a rectangular floor that is 12 feet long and 9 feet wide? (There are 3 feet in a yard.)

$\textbf{(A) }12\qquad\textbf{(B) }36\qquad\textbf{(C) }108\qquad\textbf{(D) }324\qquad\textbf{(E) }972$

Solution

Problem 2

Point O is the center of the regular octagon $ABCDEFGH$, and X is the midpoint of the side $\overline{AB}$. What fraction of the area of the octagon is shaded?



$\textbf{(A) }\frac{11}{32} \quad\textbf{(B) }\frac{3}{8} \quad\textbf{(C) }\frac{13}{32} \quad\textbf{(D) }\frac{7}{16}\quad \textbf{(E) }\frac{15}{32}$

Solution

Problem 3

Jack and Jill are going swimming at a pool that is one mile from their house. They leave home simultaneously. Jill rides her bicycle to the pool at a constant speed of 10 miles per hour. Jack walks to the pool at a constant speed of 4 miles per hour. How many minutes before Jack does Jill arrive?

$\textbf{(A)}\ 5 \qquad\textbf{(B)}\ 6 \qquad\textbf{(C)}\ 8 \qquad\textbf{(D)}\ 9 \qquad\textbf{(E)}\ 10$

Solution

Problem 4

The Centerville Middle School chess team consists of two boys and three girls. A photographer wants to take a picture of the team to appear in the local newspaper. She decides to have them sit in a row with a boy at each end and the three girls in the middle. How many such arrangements are possible?

$\textbf{(A)}\ 2 \qquad\textbf{(B)}\ 4 \qquad\textbf{(C)}\ 5 \qquad\textbf{(D)}\ 6 \qquad\textbf{(E)}\ 12$

Solution

Problem 5

Billy's basketball team scored the following points over the course of the first 11 games of the season:

$$42, 47, 53, 53, 58, 58, 58, 61, 64, 65, 73$$

If his team scores 40 in the 12th game, which of the following statistics will show an increase?

$\textbf{(A)}\ \text{range} \qquad\textbf{(B)}\ \text{median} \qquad\textbf{(C)}\ \text{mean} \qquad\textbf{(D)}\ \text{mode} \qquad\textbf{(E)}\ \text{mid-range}$

Solution

Problem 6

In $\triangle ABC$, $AB=BC=29$, and $AC=42$. What is the area of $\triangle ABC$?

$\textbf{(A) }100\qquad\textbf{(B) }420\qquad\textbf{(C) }500\qquad\textbf{(D) }609\qquad \textbf{(E) }701$

Solution

Problem 7

Each of two boxes contains three chips numbered $1, 2, 3$. A chip is drawn randomly from each box and the numbers on the two chips are multiplied. What is the probability that their product is even?

$\textbf{(A) } \frac{1}{9} \qquad \textbf{(B) } \frac{2}{9} \qquad \textbf{(C) } \frac{4}{9} \qquad \textbf{(D) } \frac{1}{2} \qquad \textbf{(E) } \frac{5}{9}$

Solution

Problem 8

What is the smallest whole number larger than the perimeter of any triangle with a side of length 5 and a side of length 19?

$\textbf{(A) } 24 \qquad \textbf{(B) } 29 \qquad \textbf{(C) } 43 \qquad \textbf{(D) } 48 \qquad \textbf{(E) } 57$

Solution

Problem 9

On her first day of work, Janabel sold one widget. On day two, she sold three widgets. On day three, she sold five widgets, and on each succeeding day, she sold two more widgets than she had sold on the previous day. How many widgets in total had Janabel sold after working 20 days?

$\textbf{(A) } 39 \qquad \textbf{(B) } 40 \qquad \textbf{(C) } 210 \qquad \textbf{(D) } 400 \qquad \textbf{(E) } 401$

Solution

Problem 10

How many integers between 1000 and 9999 have four distinct digits?

$\textbf{(A) } 3024 \qquad \textbf{(B) } 4536 \qquad \textbf{(C) } 5040 \qquad \textbf{(D) } 6480 \qquad \textbf{(E) } 6561$

Solution

Problem 11

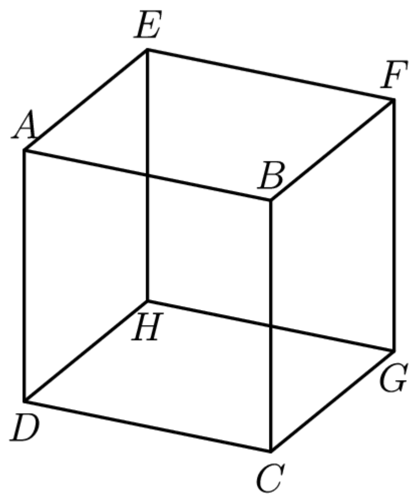
In the small country of Mathland, all automobile license plates have four symbols. The first must be a vowel ($A, E, I, O,$ or U), the second and third must be two different letters among the 21 non-vowels, and the fourth must be a digit (0 through 9). If the symbols are chosen at random subject to these conditions, what is the probability that the plate will read "$AMC8$"?

$\textbf{(A) } \frac{1}{22,050} \qquad \textbf{(B) } \frac{1}{21,000} \qquad \textbf{(C) } \frac{1}{10,500} \qquad \textbf{(D) } \frac{1}{2,100} \qquad \textbf{(E) } \frac{1}{1,050}$

Solution

Problem 12

How many pairs of parallel edges, such as $\overline{AB}$ and $\overline{GH}$ or $\overline{EH}$ and $\overline{FG}$, does a cube have?



$\textbf{(A)}\ 6 \qquad \textbf{(B)}\ 12 \qquad \textbf{(C)}\ 18 \qquad \textbf{(D)}\ 24 \qquad \textbf{(E)}\ 36$

Solution

Problem 13

How many subsets of two elements can be removed from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11\}$ so that the mean (average) of the remaining numbers is 6?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 5 \qquad \textbf{(E)}\ 6$

Solution

Problem 14

Which of the following integers cannot be written as the sum of four consecutive odd integers?

$\textbf{(A)}\ 16 \qquad \textbf{(B)}\ 40 \qquad \textbf{(C)}\ 72 \qquad \textbf{(D)}\ 100 \qquad \textbf{(E)}\ 200$

Solution

Problem 15

At Euler Middle School, 198 students voted on two issues in a school referendum with the following results: 149 voted in favor of the first issue and 119 voted in favor of the second issue. If there were exactly 29 students who voted against both issues, how many students voted in favor of both issues?

$\textbf{(A)}\ 49 \qquad \textbf{(B)}\ 70 \qquad \textbf{(C)}\ 79 \qquad \textbf{(D)}\ 99 \qquad \textbf{(E)}\ 149$

Solution

Problem 16

In a middle-school mentoring program, a number of the sixth graders are paired with a ninth-grade student as a buddy. No ninth grader is assigned more than one sixth-grade buddy. If $\frac{1}{3}$ of all the ninth graders are paired with $\frac{2}{5}$ of all the sixth graders, what fraction of the total number of sixth and ninth graders have a buddy?

$\textbf{(A)}\ \frac{2}{15} \qquad \textbf{(B)}\ \frac{4}{11} \qquad \textbf{(C)}\ \frac{11}{30} \qquad \textbf{(D)}\ \frac{3}{8} \qquad \textbf{(E)}\ \frac{11}{15}$

Solution

Problem 17

Jeremy's father drives him to school in rush hour traffic in 20 minutes. One day there is no traffic, so his father can drive him 18 miles per hour faster and gets him to school in 12 minutes. How far in miles is it to school?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 8 \qquad \textbf{(D)}\ 9 \qquad \textbf{(E)}\ 12$

Solution

Problem 18

An arithmetic sequence is a sequence in which each term after the first is obtained by adding a constant to the previous term. For example, $2, 5, 8, 11, 14$ is an arithmetic sequence with five terms, in which the first term is 2 and the constant added is 3. Each row and each column in this 5×5 array is an arithmetic sequence with five terms. The square in the center is labelled X as shown. What is the value of X?

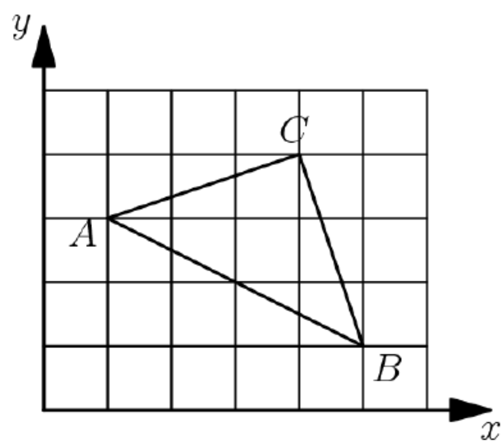
1				25
		X		
17				81

$\textbf{(A)}\ 21 \qquad \textbf{(B)}\ 31 \qquad \textbf{(C)}\ 36 \qquad \textbf{(D)}\ 40 \qquad \textbf{(E)}\ 42$

Solution

Problem 19

A triangle with vertices as $A=(1,3)$, $B=(5,1)$, and $C=(4,4)$ is plotted on a 6×5 grid. What fraction of the grid is covered by the triangle?



$\textbf{(A)}\ \frac{1}{6} \qquad \textbf{(B)}\ \frac{1}{5} \qquad \textbf{(C)}\ \frac{1}{4} \qquad \textbf{(D)}\ \frac{1}{3} \qquad \textbf{(E)}\ \frac{1}{2}$

Solution

Problem 20

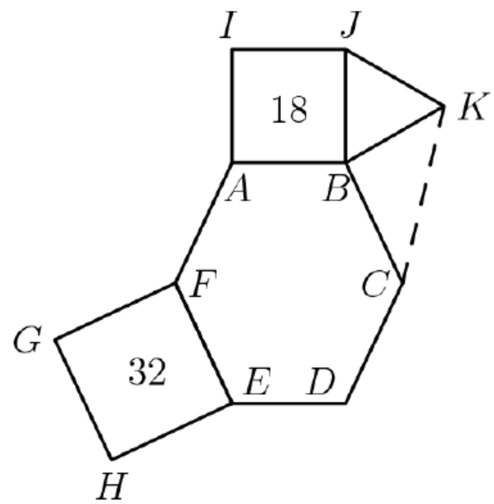
Ralph went to the store and bought 12 pairs of socks for a total of $\$24$. Some of the socks he bought cost $\$1$ a pair, some of the socks he bought cost $\$3$ a pair, and some of the socks he bought cost $\$4$ a pair. If he bought at least one pair of each type, how many pairs of $\$1$ socks did Ralph buy?

$\textbf{(A)}\ 4 \qquad \textbf{(B)}\ 5 \qquad \textbf{(C)}\ 6 \qquad \textbf{(D)}\ 7 \qquad \textbf{(E)}\ 8$

Solution

Problem 21

In the given figure hexagon $ABCDEF$ is equiangular, $ABJI$ and $FEHG$ are squares with areas 18 and 32 respectively, $\triangle JBK$ is equilateral and $FE = BC$. What is the area of $\triangle KBC$?



$\textbf{(A) }6\sqrt{2}\qquad\textbf{(B) }9\qquad\textbf{(C) }12\qquad\textbf{(D) }9\sqrt{2}\qquad\textbf{(E) }32$

Solution

Problem 22

On June 1, a group of students are standing in rows, with 15 students in each row. On June 2, the same group is standing with all of the students in one long row. On June 3, the same group is standing with just one student in each row. On June 4, the same group is standing with 6 students in each row. This process continues through June 12 with a different number of students per row each day. However, on June 13, they cannot find a new way of organizing the students. What is the smallest possible number of students in the group?

$\textbf{(A) }21\qquad\textbf{(B) }30\qquad\textbf{(C) }60\qquad\textbf{(D) }90\qquad\textbf{(E) }1080$

Solution

Problem 23

Tom has twelve slips of paper which he wants to put into five cups labeled A, B, C, D, E. He wants the sum of the numbers on the slips in each cup to be an integer. Furthermore, he wants the five integers to be consecutive and increasing from A to E. The numbers on the papers are $2, 2, 2, 2.5, 2.5, 3, 3, 3, 3, 3.5, 4,$ and 4.5. If a slip with 2 goes into cup E and a slip with 3 goes into cup B, then the slip with 3.5 must go into what cup?

$\textbf{(A) }A\qquad\textbf{(B) }B\qquad\textbf{(C) }C\qquad\textbf{(D) }D\qquad\textbf{(E) }E$

Solution

Problem 24

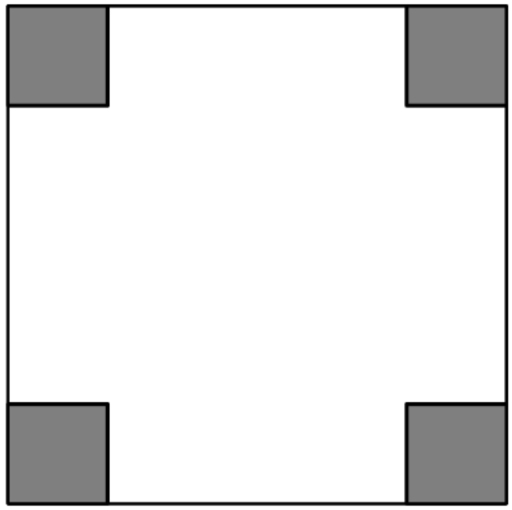
A baseball league consists of two four-team divisions. Each team plays every other team in its division N games. Each team plays every team in the other division M games with $N > 2M$ and $M > 4$. Each team plays a 76-game schedule. How many games does a team play within its own division?

$\textbf{(A) }36\qquad\textbf{(B) }48\qquad\textbf{(C) }54\qquad\textbf{(D) }60\qquad\textbf{(E) }72$

Solution

Problem 25

One-inch squares are cut from the corners of this 5 inch square. What is the area in square inches of the largest square that can fit into the remaining space?



$\textbf{(A)}\ 9\qquad\textbf{(B)}\ 12\frac{1}{2}\qquad\textbf{(C)}\ 15\qquad\textbf{(D)}\ 15\frac{1}{2}\qquad\textbf{(E)}\ 17$

Solution

2016 AMC 8 Problems

Contents

Problem 1

The longest professional tennis match lasted a total of 11 hours and 5 minutes. How many minutes is that?

$\textbf{(A) }605\qquad\textbf{(B) }655\qquad\textbf{(C) }665\qquad\textbf{(D) }1005\qquad \textbf{(E) }1105$

Solution

Problem 2

In rectangle $ABCD$, $AB=6$ and $AD=8$. Point M is the midpoint of $\overline{AD}$. What is the area of $\triangle AMC$?

$\textbf{(A) } 12 \qquad \textbf{(B) } 15 \qquad \textbf{(C) } 18 \qquad \textbf{(D) } 20 \qquad \textbf{(E) } 24$

Solution

Problem 3

Four students take an exam. Three of their scores are $70, 80,$ and 90. If the average of their four scores is 70, then what is the remaining score?

$\textbf{(A) } 40 \qquad \textbf{(B) } 50 \qquad \textbf{(C) } 55 \qquad \textbf{(D) } 60 \qquad \textbf{(E) } 70$

Solution

Problem 4

When Cheenu was a boy he could run 15 miles in 3 hours and 30 minutes. As an old man he can now walk 10 miles in 4 hours. How many minutes longer does it take for him to travel a mile now compared to when he was a boy?

$\textbf{(A) } 6 \qquad \textbf{(B) } 10 \qquad \textbf{(C) } 15 \qquad \textbf{(D) } 18 \qquad \textbf{(E) } 30$

Solution

Problem 5

The number N is a two-digit number.

• When N is divided by 9, the remainder is 1.

• When N is divided by 10, the remainder is 3.

What is the remainder when N is divided by 11?

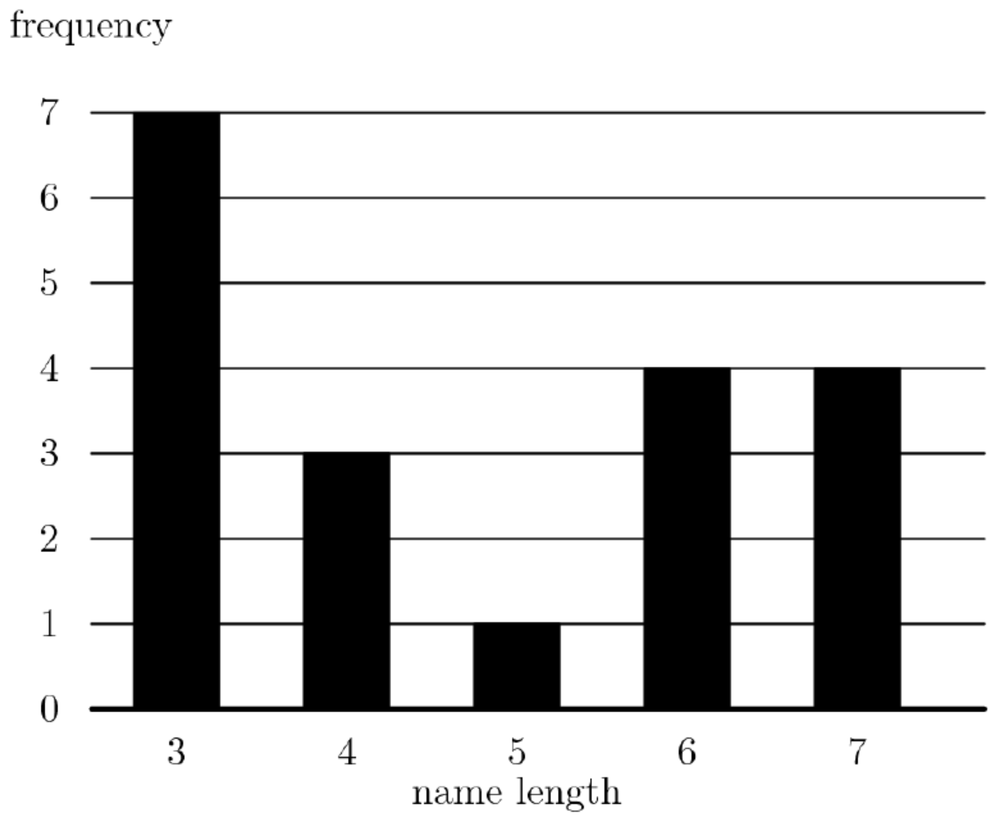
$\textbf{(A) } 0 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 4 \qquad \textbf{(D) } 5 \qquad \textbf{(E) } 7$

Solution

Problem 6

The following bar graph represents the length (in letters) of the names of 19 people. What is the median length of these names?

$\textbf{(A) } 3 \qquad \textbf{(B) } 4 \qquad \textbf{(C) } 5 \qquad \textbf{(D) } 6 \qquad \textbf{(E) } 7$



Solution

Problem 7

Which of the following numbers is not a perfect square?

$\textbf{(A) }1^{2016}\qquad\textbf{(B) }2^{2017}\qquad\textbf{(C) }3^{2018}\qquad\textbf{(D) }4^{2019}\qquad \textbf{(E) }5^{2020}$

Solution

Problem 8

Find the value of the expression

$$100-98+96-94+92-90+\cdots+8-6+4-2.$$

$\textbf{(A) }20\qquad\textbf{(B) }40\qquad\textbf{(C) }50\qquad\textbf{(D) }80\qquad \textbf{(E) }100$

Solution

Problem 9

What is the sum of the distinct prime integer divisors of 2016?

$\textbf{(A) }9\qquad\textbf{(B) }12\qquad\textbf{(C) }16\qquad\textbf{(D) }49\qquad \textbf{(E) }63$

Solution

Problem 10

Suppose that $a * b$ means $3a-b.$ What is the value of x if

$$2*(5*x)=1$$

$\textbf{(A) } \frac{1}{10} \qquad \textbf{(B) } 2 \qquad \textbf{(C) } \frac{10}{3} \qquad \textbf{(D) } 10 \qquad \textbf{(E) } 14$

Solution

Problem 11

Determine how many two-digit numbers satisfy the following property: when the number is added to the number obtained by reversing its digits, the sum is $132.$

$\textbf{(A) } 5 \qquad \textbf{(B) } 7 \qquad \textbf{(C) } 9 \qquad \textbf{(D) } 11 \qquad \textbf{(E) } 12$

Solution

Problem 12

Jefferson Middle School has the same number of boys and girls. $\frac{3}{4}$ of the girls and $\frac{2}{3}$ of the boys went on a field trip. What fraction of the students on the field trip were girls?

$\textbf{(A) } \frac{1}{2} \qquad \textbf{(B) } \frac{9}{17} \qquad \textbf{(C) } \frac{7}{13} \qquad \textbf{(D) } \frac{2}{3} \qquad \textbf{(E) } \frac{14}{15}$

Solution

Problem 13

Two different numbers are randomly selected from the set $-2, -1, 0, 3, 4, 5$ and multiplied together. What is the probability that the product is 0?

$\textbf{(A) } \frac{1}{6} \qquad \textbf{(B) } \frac{1}{5} \qquad \textbf{(C) } \frac{1}{4} \qquad \textbf{(D) } \frac{1}{3} \qquad \textbf{(E) } \frac{1}{2}$

Solution

Problem 14

Karl's car uses a gallon of gas every 35 miles, and his gas tank holds 14 gallons when it is full. One day, Karl started with a full tank of gas, drove 350 miles, bought 8 gallons of gas, and continued driving to his destination. When he arrived, his gas tank was half full. How many miles did Karl drive that day?

$\textbf{(A) } 525 \qquad \textbf{(B) } 560 \qquad \textbf{(C) } 595 \qquad \textbf{(D) } 665 \qquad \textbf{(E) } 735$

Solution

Problem 15

What is the largest power of 2 that is a divisor of $13^4 - 11^4$?

$\textbf{(A) } 8 \qquad \textbf{(B) } 16 \qquad \textbf{(C) } 32 \qquad \textbf{(D) } 64 \qquad \textbf{(E) } 128$

Solution

Problem 16

Annie and Bonnie are running laps around a 400-meter oval track. They started together, but Annie has pulled ahead because she runs 25% faster than Bonnie. How many laps will Annie have run when she first passes Bonnie?

$\textbf{(A) } 1\frac{1}{4} \qquad \textbf{(B) } 3\frac{1}{3} \qquad \textbf{(C) } 4 \qquad \textbf{(D) } 5 \qquad \textbf{(E) } 25$

Solution

Problem 17

An ATM password at Fred's Bank is composed of four digits from 0 to 9, with repeated digits allowable. If no password may begin with the sequence $9, 1, 1,$ then how many passwords are possible?

$\textbf{(A)}\ 30\qquad\textbf{(B)}\ 7290\qquad\textbf{(C)}\ 9000\qquad\textbf{(D)}\ 9990\qquad\textbf{(E)}\ 9999$

Solution

Problem 18

In an All-Area track meet, 216 sprinters enter a $100-$meter dash competition. The track has 6 lanes, so only 6 sprinters can compete at a time. At the end of each race, the five non-winners are eliminated, and the winner will compete again in a later race. How many races are needed to determine the champion sprinter?

$\textbf{(A)}\ 36\qquad\textbf{(B)}\ 42\qquad\textbf{(C)}\ 43\qquad\textbf{(D)}\ 60\qquad\textbf{(E)}\ 72$

Solution

Problem 19

The sum of 25 consecutive even integers is $10,000$. What is the largest of these 25 consecutive integers?

$\textbf{(A)}\ 360\qquad\textbf{(B)}\ 388\qquad\textbf{(C)}\ 412\qquad\textbf{(D)}\ 416\qquad\textbf{(E)}\ 424$

Solution

Problem 20

The least common multiple of a and b is 12, and the least common multiple of b and c is 15. What is the least possible value of the least common multiple of a and c?

$\textbf{(A)}\ 20\qquad\textbf{(B)}\ 30\qquad\textbf{(C)}\ 60\qquad\textbf{(D)}\ 120\qquad\textbf{(E)}\ 180$

Solution

Problem 21

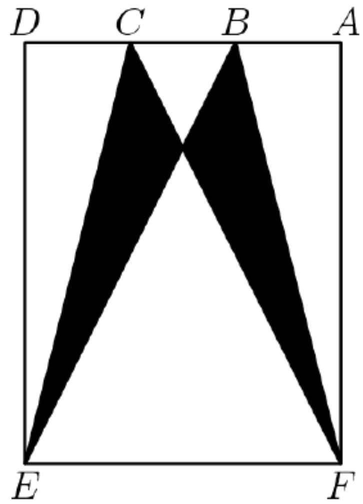
A top hat contains 3 red chips and 2 green chips. Chips are drawn randomly, one at a time without replacement, until all 3 of the reds are drawn or until both green chips are drawn. What is the probability that the 3 reds are drawn?

$\textbf{(A)}\ \dfrac{3}{10}\qquad\textbf{(B)}\ \dfrac{2}{5}\qquad\textbf{(C)}\ \dfrac{1}{2}\qquad\textbf{(D)}\ \dfrac{3}{5}\qquad\textbf{(E)}\ \dfrac{7}{10}$

Solution

Problem 22

Rectangle $DEFA$ below is a 3×4 rectangle with $DC=CB=BA=1$. The area of the "bat wings" (shaded area) is



$\textbf{(A) } 2 \qquad \textbf{(B) } 2\frac{1}{2} \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 3\frac{1}{2} \qquad \textbf{(E) } 4$

Solution

Problem 23

Two congruent circles centered at points A and B each pass through the other circle's center. The line containing both A and B is extended to intersect the circles at points C and D. The circles intersect at two points, one of which is E. What is the degree measure of $\angle CED$?

$\textbf{(A) } 90 \qquad \textbf{(B) } 105 \qquad \textbf{(C) } 120 \qquad \textbf{(D) } 135 \qquad \textbf{(E) } 150$

Solution

Problem 24

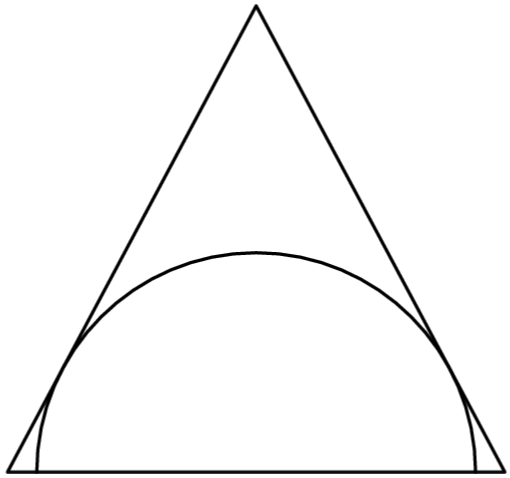
The digits 1, 2, 3, 4, and 5 are each used once to write a five-digit number $PQRST$. The three-digit number PQR is divisible by 4, the three-digit number QRS is divisible by 5, and the three-digit number RST is divisible by 3. What is P?

$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } 5$

Solution

Problem 25

A semicircle is inscribed in an isosceles triangle with base 16 and height 15 so that the diameter of the semicircle is contained in the base of the triangle as shown. What is the radius of the semicircle?



$\textbf{(A) }4\sqrt{3}\qquad\textbf{(B) }\dfrac{120}{17}\qquad\textbf{(C) }10\qquad\textbf{(D) }\dfrac{17\sqrt{2}}{2}\qquad\textbf{(E)}\dfrac{17\sqrt{3}}{2}$

Solution

2017 AMC 8 Problems

Contents

Problem 1

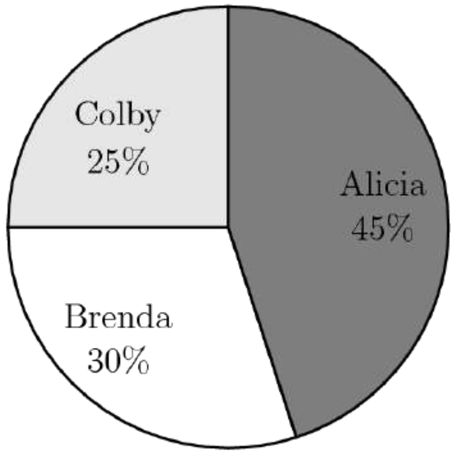
Which of the following values is the largest?

$\textbf{(A) } 2+0+1+7 \qquad \textbf{(B) } 2 \times 0 +1+7 \qquad \textbf{(C) } 2+0 \times 1 + 7 \qquad \textbf{(D) } 2+0+1 \times 7 \qquad \textbf{(E) } 2 \times 0 \times 1 \times 7$

Solution

Problem 2

Alicia, Brenda, and Colby were the candidates in a recent election for student president. The pie chart below shows how the votes were distributed among the three candidates. If Brenda received 36 votes, then how many votes were cast all together?



$\textbf{(A) } 70 \qquad \textbf{(B) } 84 \qquad \textbf{(C) } 100 \qquad \textbf{(D) } 106 \qquad \textbf{(E) } 120$

Solution

Problem 3

What is the value of the expression $\sqrt{16\sqrt{8\sqrt{4}}}$?

$\textbf{(A) } 4 \qquad \textbf{(B) } 4\sqrt{2} \qquad \textbf{(C) } 8 \qquad \textbf{(D) } 8\sqrt{2} \qquad \textbf{(E) } 16$

Solution

Problem 4

When 0.000315 is multiplied by $7,928,564$ the product is closest to which of the following?

$\textbf{(A) } 210 \qquad \textbf{(B) } 240 \qquad \textbf{(C) } 2100 \qquad \textbf{(D) } 2400 \qquad \textbf{(E) } 24000$

Solution

Problem 5

What is the value of the expression $\frac{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7 \cdot 8}{1+2+3+4+5+6+7+8}$?

$\textbf{(A) } 1020 \qquad \textbf{(B) } 1120 \qquad \textbf{(C) } 1220 \qquad \textbf{(D) } 2240 \qquad \textbf{(E) } 3360$

Solution

Problem 6

If the degree measures of the angles of a triangle are in the ratio $3:3:4$, what is the degree measure of the largest angle of the triangle?

$\textbf{(A) } 18 \qquad \textbf{(B) } 36 \qquad \textbf{(C) } 60 \qquad \textbf{(D) } 72 \qquad \textbf{(E) } 90$

Solution

Problem 7

Let Z be a 6-digit positive integer, such as 247247, whose first three digits are the same as its last three digits taken in the same order. Which of the following numbers must also be a factor of Z?

$\textbf{(A) } 11 \qquad \textbf{(B) } 19 \qquad \textbf{(C) } 101 \qquad \textbf{(D) } 111 \qquad \textbf{(E) } 1111$

Solution

Problem 8

Malcolm wants to visit Isabella after school today and knows the street where she lives but doesn't know her house number. She tells him, "My house number has two digits, and exactly three of the following four statements about it are true."

(1) It is prime.

(2) It is even

(3) It is divisible by 7.

(4) One of its digits is 9.

This information allows Malcolm to determine Isabella's house number. What is its units digit?

$\textbf{(A) }4\qquad\textbf{(B) }6\qquad\textbf{(C) }7\qquad\textbf{(D) }8\qquad\textbf{(E) }9$

Solution

Problem 9

All of Marcy's marbles are blue, red, green, or yellow. One third of her marbles are blue, one fourth of them are red, and six of them are green. What is the smallest number of yellow marbles?

$\textbf{(A) }1\qquad\textbf{(B) }2\qquad\textbf{(C) }3\qquad\textbf{(D) }4\qquad\textbf{(E) }5$

Solution

Problem 10

A box contains five cards, numbered 1, 2, 3, 4, and 5. Three cards are selected randomly without replacement from the box. What is the probability that 4 is the largest value selected?

$\textbf{(A) }\frac{1}{10}\qquad\textbf{(B) }\frac{1}{5}\qquad\textbf{(C) }\frac{3}{10}\qquad\textbf{(D) }\frac{2}{5}\qquad\textbf{(E) }\frac{1}{2}$

Solution

Problem 11

A square-shaped floor is covered with congruent square tiles. If the total number of tiles that lie on the two diagonals is 37, how many tiles cover the floor?

$\textbf{(A) }148\qquad\textbf{(B) }324\qquad\textbf{(C) }361\qquad\textbf{(D) }1296\qquad\textbf{(E) }1369$

Solution

Problem 12

The smallest positive integer greater than 1 that leaves a remainder of 1 when divided by 4, 5, and 6 lies between which of the following pairs of numbers?

$\textbf{(A) }2\text{ and }19\qquad\textbf{(B) }20\text{ and }39\qquad\textbf{(C) }40\text{ and }59\qquad\textbf{(D) }60\text{ and }79\qquad\textbf{(E) }80\text{ and }124$

Solution

Problem 13

Peter, Emma, and Kyler played chess with each other. Peter won 4 games and lost 2 games. Emma won 3 games and lost 3 games. If Kyler lost 3 games, how many games did he win?

$\textbf{(A) }0\qquad\textbf{(B) }1\qquad\textbf{(C) }2\qquad\textbf{(D) }3\qquad\textbf{(E) }4$

Solution

Problem 14

Chloe and Zoe are both students in Ms. Demeanor's math class. Last night they each solved half of the problems in their homework assignment alone and then solved the other half together. Chloe had correct answers to only 80% of the problems she solved alone, but overall 88% of her answers were correct. Zoe had correct answers to 90% of the problems she solved alone. What was Zoe's overall percentage of correct answers?

$\textbf{(A) }89\qquad\textbf{(B) }92\qquad\textbf{(C) }93\qquad\textbf{(D) }96\qquad\textbf{(E) }98$

Solution

Problem 15

In the arrangement of letters and numerals below, by how many different paths can one spell AMC8? Beginning at the A in the middle, a path allows only moves from one letter to an adjacent (above, below, left, or right, but not diagonal) letter. One example of such a path is traced in the picture.

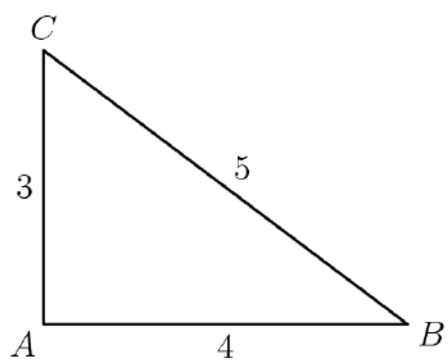
	8	C	8	
8	C	M	C	8
C	M	A	M	C
8	C	M	C	8
	8	C	8	

$\textbf{(A) } 8 \qquad \textbf{(B) } 9 \qquad \textbf{(C) } 12 \qquad \textbf{(D) } 24 \qquad \textbf{(E) } 36$

Solution

Problem 16

In the figure below, choose point D on $\overline{BC}$ so that $\triangle ACD$ and $\triangle ABD$ have equal perimeters. What is the area of $\triangle ABD$?



$\textbf{(A) } \frac{3}{4} \qquad \textbf{(B) } \frac{3}{2} \qquad \textbf{(C) } 2 \qquad \textbf{(D) } \frac{12}{5} \qquad \textbf{(E) } \frac{5}{2}$

Solution

Problem 17

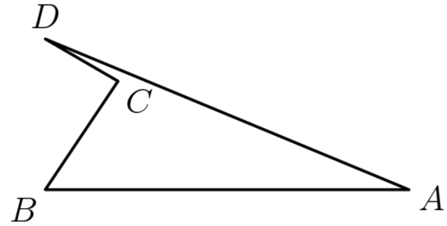
Starting with some gold coins and some empty treasure chests, I tried to put 9 gold coins in each treasure chest, but that left 2 treasure chests empty. So instead I put 6 gold coins in each treasure chest, but then I had 3 gold coins left over. How many gold coins did I have?

$\textbf{(A) } 9 \qquad \textbf{(B) } 27 \qquad \textbf{(C) } 45 \qquad \textbf{(D) } 63 \qquad \textbf{(E) } 81$

Solution

Problem 18

In the non-convex quadrilateral $ABCD$ shown below, $\angle BCD$ is a right angle, $AB = 12$, $BC = 4$, $CD = 3$, and $AD = 13$.



What is the area of quadrilateral $ABCD$?

$\textbf{(A) } 12 \qquad \textbf{(B) } 24 \qquad \textbf{(C) } 26 \qquad \textbf{(D) } 30 \qquad \textbf{(E) } 36$

Solution

Problem 19

For any positive integer M, the notation $M!$ denotes the product of the integers 1 through M. What is the largest integer n for which 5^n is a factor of the sum $98! + 99! + 100!$?

$\textbf{(A) }23\qquad\textbf{(B) }24\qquad\textbf{(C) }25\qquad\textbf{(D) }26\qquad\textbf{(E) }27$

Solution

Problem 20

An integer between 1000 and 9999, inclusive, is chosen at random. What is the probability that it is an odd integer whose digits are all distinct?

$\textbf{(A) }\frac{14}{75}\qquad\textbf{(B) }\frac{56}{225}\qquad\textbf{(C) }\frac{107}{400}\qquad\textbf{(D) }\frac{7}{25}\qquad\textbf{(E) }\frac{9}{25}$

Solution

Problem 21

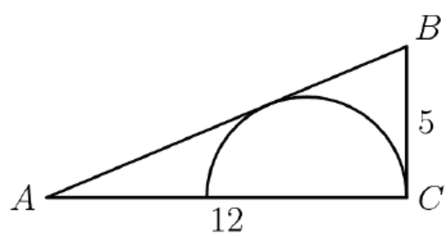
Suppose a, b, and c are nonzero real numbers, and $a+b+c=0$. What are the possible value(s) for $\frac{a}{|a|}+\frac{b}{|b|}+\frac{c}{|c|}+\frac{abc}{|abc|}$?

$\textbf{(A) }0\qquad\textbf{(B) }1\text{ and }-1\qquad\textbf{(C) }2\text{ and }-2\qquad\textbf{(D) }0,2,\text{ and }-2\qquad\textbf{(E) }0,1,\text{ and }-1$

Solution

Problem 22

In the right triangle ABC, $AC=12$, $BC=5$, and angle C is a right angle. A semicircle is inscribed in the triangle as shown. What is the radius of the semicircle?



$\textbf{(A) }\frac{7}{6}\qquad\textbf{(B) }\frac{13}{5}\qquad\textbf{(C) }\frac{59}{18}\qquad\textbf{(D) }\frac{10}{3}\qquad\textbf{(E) }\frac{60}{13}$

Solution

Problem 23

Each day for four days, Linda traveled for one hour at a speed that resulted in her traveling one mile in an integer number of minutes. Each day after the first, her speed decreased so that the number of minutes to travel one mile increased by 5 minutes over the preceding day. Each of the four days, her distance traveled was also an integer number of miles. What was the total number of miles for the four trips?

$\textbf{(A) }10\qquad\textbf{(B) }15\qquad\textbf{(C) }25\qquad\textbf{(D) }50\qquad\textbf{(E) }82$

Solution

Problem 24

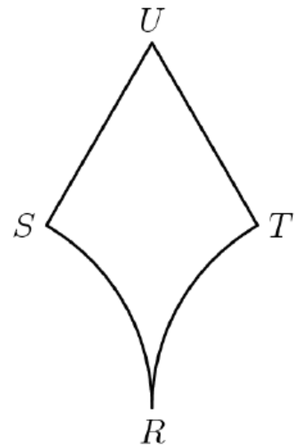
Mrs. Sanders has three grandchildren, who call her regularly. One calls her every three days, one calls her every four days, and one calls her every five days. All three called her on December 31, 2016. On how many days during the next year did she not receive a phone call from any of her grandchildren?

$\textbf{(A) }78\qquad\textbf{(B) }80\qquad\textbf{(C) }144\qquad\textbf{(D) }146\qquad\textbf{(E) }152$

Solution

Problem 25

In the figure shown, $\overline{US}$ and $\overline{UT}$ are line segments each of length 2, and $m\angle TUS = 60^\circ$. Arcs $\overset{\frown}{\mathrm{TR}}$ and $\overset{\frown}{\mathrm{SR}}$ are each one-sixth of a circle with radius 2. What is the area of the region shown?



$\textbf{(A)}\ 3\sqrt{3}-\pi \qquad \textbf{(B)}\ 4\sqrt{3}-\frac{4\pi}{3} \qquad \textbf{(C)}\ 2\sqrt{3} \qquad \textbf{(D)}\ 4\sqrt{3}-\frac{2\pi}{3} \qquad \textbf{(E)}\ 4+\frac{4\pi}{3}$

Solution

2018 AMC 8 Problems

Contents

Problem 1

An amusement park has a collection of scale models, with ratio $1 : 20$, of buildings and other sights from around the country. The height of the United States Capitol is 289 feet. What is the height in feet of its replica to the nearest whole number?

$\textbf{(A) }14\qquad\textbf{(B) }15\qquad\textbf{(C) }16\qquad\textbf{(D) }18\qquad\textbf{(E) }20$

Solution

Problem 2

What is the value of the product

$$\left(1+\frac{1}{1}\right)\cdot\left(1+\frac{1}{2}\right)\cdot\left(1+\frac{1}{3}\right)\cdot\left(1+\frac{1}{4}\right)\cdot\left(1+\frac{1}{5}\right)\cdot\left(1+\frac{1}{6}\right)?$$

$\textbf{(A) } \frac{7}{6} \qquad \textbf{(B) } \frac{4}{3} \qquad \textbf{(C) } \frac{7}{2} \qquad \textbf{(D) } 7 \qquad \textbf{(E) } 8$

Solution

Problem 3

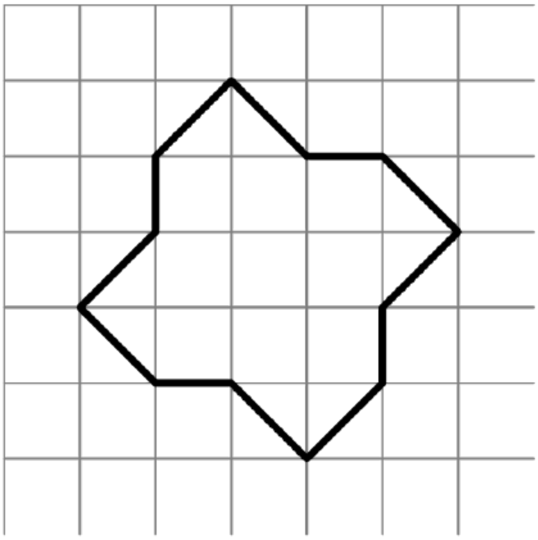
Students Arn, Bob, Cyd, Dan, Eve, and Fon are arranged in that order in a circle. They start counting: Arn first, then Bob, and so forth. When the number contains a 7 as a digit (such as 47) or is a multiple of 7 that person leaves the circle and the counting continues. Who is the last one present in the circle?

$\textbf{(A) } \text{Arn}\qquad\textbf{(B) }\text{Bob}\qquad\textbf{(C) }\text{Cyd}\qquad\textbf{(D) }\text{Dan}\qquad \textbf{(E) }\text{Eve}$

Solution

Problem 4

The twelve-sided figure shown has been drawn on $1 \text{ cm}\times 1 \text{ cm}$ graph paper. What is the area of the figure in cm^2?



$\textbf{(A) } 12 \qquad \textbf{(B) } 12.5 \qquad \textbf{(C) } 13 \qquad \textbf{(D) } 13.5 \qquad \textbf{(E) } 14$

Solution

Problem 5

What is the value of $1+3+5+\cdots+2017+2019-2-4-6-\cdots-2016-2018$?

$\textbf{(A) }-1010\qquad\textbf{(B) }-1009\qquad\textbf{(C) }1008\qquad\textbf{(D) }1009\qquad \textbf{(E) }1010$

Solution

Problem 6

On a trip to the beach, Anh traveled 50 miles on the highway and 10 miles on a coastal access road. He drove three times as fast on the highway as on the coastal road. If Anh spent 30 minutes driving on the coastal road, how many minutes did his entire trip take?

$\textbf{(A) }50\qquad\textbf{(B) }70\qquad\textbf{(C) }80\qquad\textbf{(D) }90\qquad \textbf{(E) }100$

Solution

Problem 7

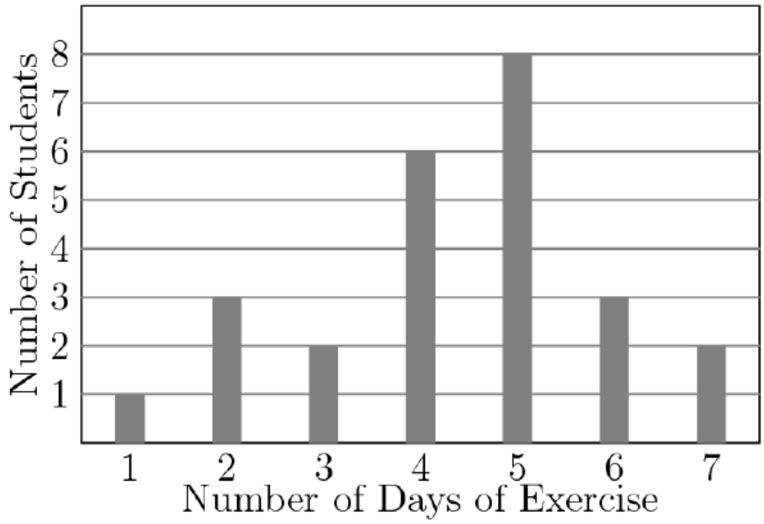
The 5-digit number $\underline{2}$ $\underline{0}$ $\underline{1}$ $\underline{8}$ $\underline{U}$ is divisible by 9. What is the remainder when this number is divided by 8?

$\textbf{(A) }1\qquad\textbf{(B) }3\qquad\textbf{(C) }5\qquad\textbf{(D) }6\qquad \textbf{(E) }7$

Solution

Problem 8

Mr. Garcia asked the members of his health class how many days last week they exercised for at least 30 minutes. The results are summarized in the following bar graph, where the heights of the bars represent the number of students.



What was the mean number of days of exercise last week, rounded to the nearest hundredth, reported by the students in Mr. Garcia's class?

$\textbf{(A) } 3.50 \qquad \textbf{(B) } 3.57 \qquad \textbf{(C) } 4.36 \qquad \textbf{(D) } 4.50 \qquad \textbf{(E) } 5.00$

Solution

Problem 9

Tyler is tiling the floor of his 12 foot by 16 foot living room. He plans to place one-foot by one-foot square tiles to form a border along the edges of the room and to fill in the rest of the floor with two-foot by two-foot square tiles. How many tiles will he use?

$\textbf{(A) } 48 \qquad \textbf{(B) } 87 \qquad \textbf{(C) } 91 \qquad \textbf{(D) } 96 \qquad \textbf{(E) } 120$

Solution

Problem 10

The $harmonic\ mean$ of a set of non-zero numbers is the reciprocal of the average of the reciprocals of the numbers. What is the harmonic mean of 1, 2, and 4?

$\textbf{(A) } \frac{3}{7} \qquad \textbf{(B) } \frac{7}{12} \qquad \textbf{(C) } \frac{12}{7} \qquad \textbf{(D) } \frac{7}{4} \qquad \textbf{(E) } \frac{7}{3}$

Solution

Problem 11

Abby, Bridget, and four of their classmates will be seated in two rows of three for a group picture, as shown.

$$\begin{matrix} \text{X} & \text{X} & \text{X} \\ \text{X} & \text{X} & \text{X} \end{matrix}$$

If the seating positions are assigned randomly, what is the probability that Abby and Bridget are adjacent to each other in the same row or the same column?

$\textbf{(A) } \frac{1}{3} \qquad \textbf{(B) } \frac{2}{5} \qquad \textbf{(C) } \frac{7}{15} \qquad \textbf{(D) } \frac{1}{2} \qquad \textbf{(E) } \frac{2}{3}$

Solution

Problem 12

The clock in Sri's car, which is not accurate, gains time at a constant rate. One day as he begins shopping he notes that his car clock and his watch (which is accurate) both say 12:00 noon. When he is done shopping, his watch says 12:30 and his car clock says 12:35. Later that day, Sri loses his watch. He looks at his car clock and it says 7:00. What is the actual time?

$\textbf{(A) }5:50\qquad\textbf{(B) }6:00\qquad\textbf{(C) }6:30\qquad\textbf{(D) }6:55\qquad\textbf{(E) }8:10$

Solution

Problem 13

Laila took five math tests, each worth a maximum of 100 points. Laila's score on each test was an integer between 0 and 100, inclusive. Laila received the same score on the first four tests, and she received a higher score on the last test. Her average score on the five tests was 82. How many values are possible for Laila's score on the last test?

$\textbf{(A) }4\qquad\textbf{(B) }5\qquad\textbf{(C) }9\qquad\textbf{(D) }10\qquad\textbf{(E) }18$

Solution

Problem 14

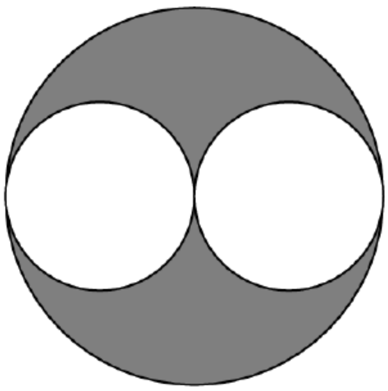
Let N be the greatest five-digit number whose digits have a product of 120. What is the sum of the digits of N?

$\textbf{(A) }15\qquad\textbf{(B) }16\qquad\textbf{(C) }17\qquad\textbf{(D) }18\qquad\textbf{(E) }20$

Solution

Problem 15

In the diagram below, a diameter of each of the two smaller circles is a radius of the larger circle. If the two smaller circles have a combined area of 1 square unit, then what is the area of the shaded region, in square units?



$\textbf{(A) } \frac{1}{4} \qquad \textbf{(B) } \frac{1}{3} \qquad \textbf{(C) } \frac{1}{2} \qquad \textbf{(D) } 1 \qquad \textbf{(E) } \frac{\pi}{2}$

Solution

Problem 16

Professor Chang has nine different language books lined up on a bookshelf: two Arabic, three German, and four Spanish. How many ways are there to arrange the nine books on the shelf keeping the Arabic books together and keeping the Spanish books together?

$\textbf{(A) }1440\qquad\textbf{(B) }2880\qquad\textbf{(C) }5760\qquad\textbf{(D) }182,440\qquad\textbf{(E) }362,880$

Solution

Problem 17

Bella begins to walk from her house toward her friend Ella's house. At the same time, Ella begins to ride her bicycle toward Bella's house. They each maintain a constant speed, and Ella rides 5 times as fast as Bella walks. The distance between their houses is 2 miles, which is $10,560$ feet, and Bella covers $2\tfrac{1}{2}$ feet with each step. How many steps will Bella take by the time she meets Ella?

$\textbf{(A) }704\qquad\textbf{(B) }845\qquad\textbf{(C) }1056\qquad\textbf{(D) }1760\qquad \textbf{(E) }3520$

Solution

Problem 18

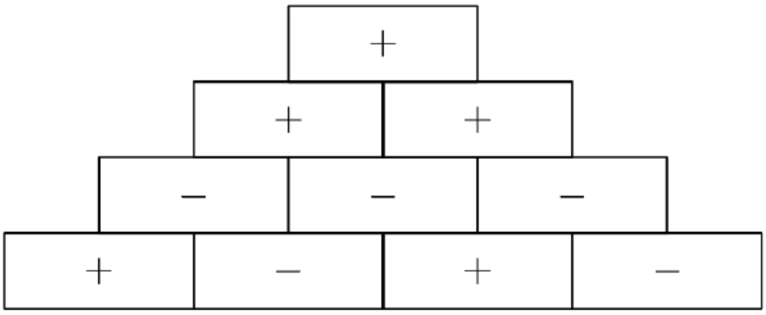
How many positive factors does $23,232$ have?

$\textbf{(A) } 9 \qquad \textbf{(B) } 12 \qquad \textbf{(C) } 28 \qquad \textbf{(D) } 36 \qquad \textbf{(E) } 42$

Solution

Problem 19

In a sign pyramid a cell gets a "+" if the two cells below it have the same sign, and it gets a "-" if the two cells below it have different signs. The diagram below illustrates a sign pyramid with four levels. How many possible ways are there to fill the four cells in the bottom row to produce a "+" at the top of the pyramid?

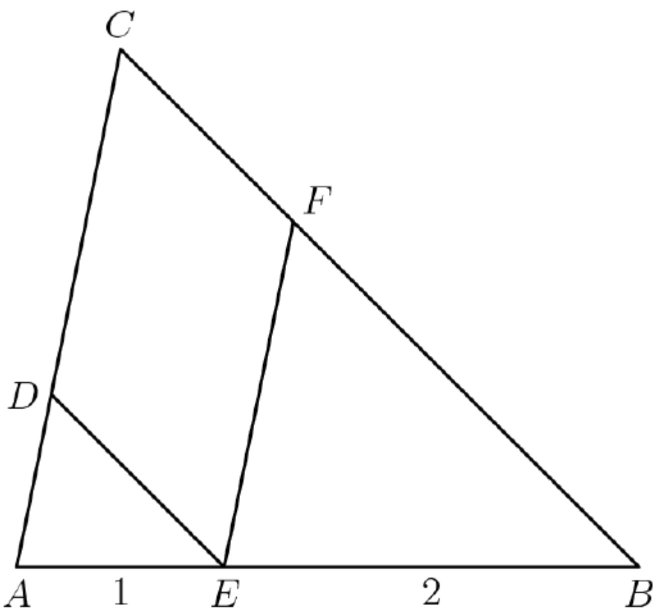


$\textbf{(A) } 2 \qquad \textbf{(B) } 4 \qquad \textbf{(C) } 8 \qquad \textbf{(D) } 12 \qquad \textbf{(E) } 16$

Solution

Problem 20

In $\triangle ABC,$ a point E is on $\overline{AB}$ with $AE=1$ and $EB=2.$ Point D is on $\overline{AC}$ so that $\overline{DE} \parallel \overline{BC}$ and point F is on $\overline{BC}$ so that $\overline{EF} \parallel \overline{AC}.$ What is the ratio of the area of $CDEF$ to the area of $\triangle ABC?$



$\textbf{(A) } \frac{4}{9} \qquad \textbf{(B) } \frac{1}{2} \qquad \textbf{(C) } \frac{5}{9} \qquad \textbf{(D) } \frac{3}{5} \qquad \textbf{(E) } \frac{2}{3}$

Solution

Problem 21

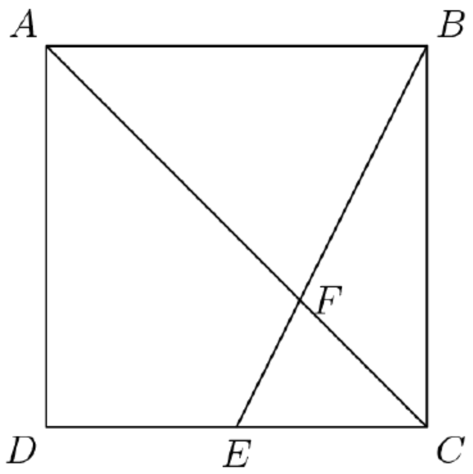
How many positive three-digit integers have a remainder of 2 when divided by 6, a remainder of 5 when divided by 9, and a remainder of 7 when divided by 11?

$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } 5$

Solution

Problem 22

Point E is the midpoint of side $\overline{CD}$ in square $ABCD,$ and $\overline{BE}$ meets diagonal $\overline{AC}$ at $F.$ The area of quadrilateral $AFED$ is $45.$ What is the area of $ABCD?$

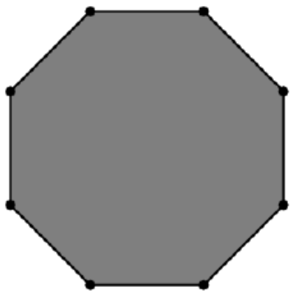


$\textbf{(A) } 100 \qquad \textbf{(B) } 108 \qquad \textbf{(C) } 120 \qquad \textbf{(D) } 135 \qquad \textbf{(E) } 144$

Solution

Problem 23

From a regular octagon, a triangle is formed by connecting three randomly chosen vertices of the octagon. What is the probability that at least one of the sides of the triangle is also a side of the octagon?

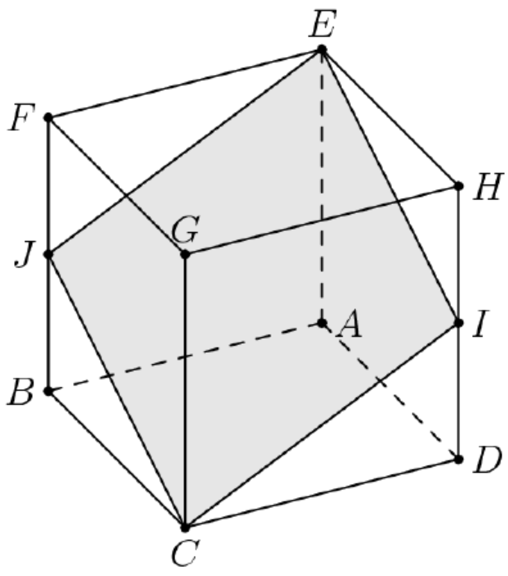


$\textbf{(A) } \frac{2}{7} \qquad \textbf{(B) } \frac{5}{42} \qquad \textbf{(C) } \frac{11}{14} \qquad \textbf{(D) } \frac{5}{7} \qquad \textbf{(E) } \frac{6}{7}$

Solution

Problem 24

In the cube $ABCDEFGH$ with opposite vertices C and $E,$ J and I are the midpoints of edges $\overline{FB}$ and $\overline{HD},$ respectively. Let R be the ratio of the area of the cross-section $EJCI$ to the area of one of the faces of the cube. What is $R^2?$



$\textbf{(A) } \frac{5}{4} \qquad \textbf{(B) } \frac{4}{3} \qquad \textbf{(C) } \frac{3}{2} \qquad \textbf{(D) } \frac{25}{16} \qquad \textbf{(E) } \frac{9}{4}$

Solution

Problem 25

How many perfect cubes lie between 2^8+1 and $2^{18}+1$, inclusive?

$\textbf{(A) } 4 \qquad \textbf{(B) } 9 \qquad \textbf{(C) } 10 \qquad \textbf{(D) } 57 \qquad \textbf{(E) } 58$

Solution

2019 AMC 8 Problems

Contents

Problem 1

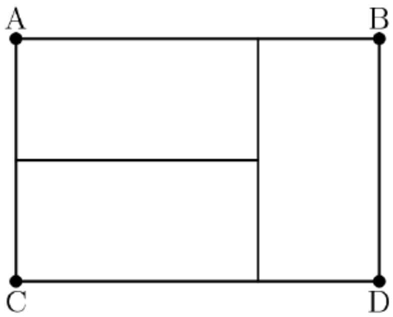
Ike and Mike go into a sandwich shop with a total of $\$30.00$ to spend. Sandwiches cost $\$4.50$ each and soft drinks cost $\$1.00$ each. Ike and Mike plan to buy as many sandwiches as they can and use the remaining money to buy soft drinks. Counting both soft drinks and sandwiches, how many items will they buy?

$\textbf{(A) }6\qquad\textbf{(B) }7\qquad\textbf{(C) }8\qquad\textbf{(D) }9\qquad\textbf{(E) }10$

Solution

Problem 2

Three identical rectangles are put together to form rectangle $ABCD$, as shown in the figure below. Given that the length of the shorter side of each of the smaller rectangles is 5 feet, what is the area in square feet of rectangle $ABCD$?



$\textbf{(A) }45\qquad\textbf{(B) }75\qquad\textbf{(C) }100\qquad\textbf{(D) }125\qquad\textbf{(E) }150$

Solution

Problem 3

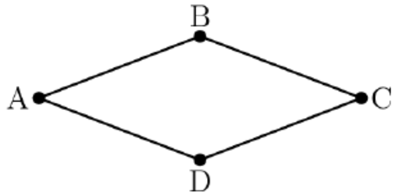
Which of the following is the correct order of the fractions $\frac{15}{11}, \frac{19}{15},$ and $\frac{17}{13},$ from least to greatest?

$\textbf{(A) }\frac{15}{11}<\frac{17}{13}<\frac{19}{15}\qquad\textbf{(B) }\frac{15}{11}<\frac{19}{15}<\frac{17}{13}\qquad\textbf{(C) }\frac{17}{13}<\frac{19}{15}<\frac{15}{11}\qquad\textbf{(D) }\frac{19}{15}<\frac{15}{11}<\frac{17}{13}\qquad\textbf{(E) }\frac{19}{15}<\frac{17}{13}<\frac{15}{11}$

Solution

Problem 4

Quadrilateral $ABCD$ is a rhombus with perimeter 52 meters. The length of diagonal $\overline{AC}$ is 24 meters. What is the area in square meters of rhombus $ABCD$?

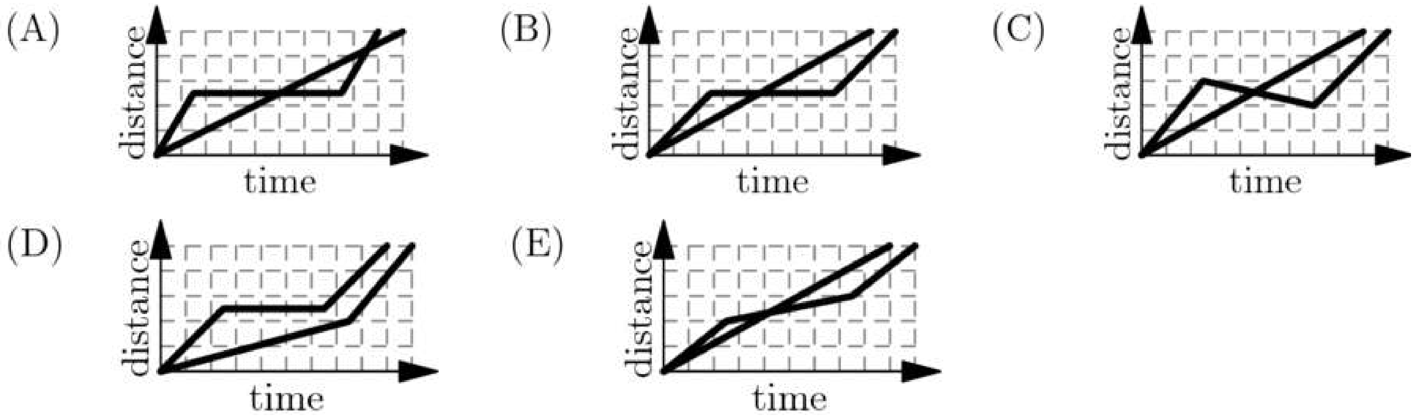


$\textbf{(A) }60\qquad\textbf{(B) }90\qquad\textbf{(C) }105\qquad\textbf{(D) }120\qquad\textbf{(E) }144$

Solution

Problem 5

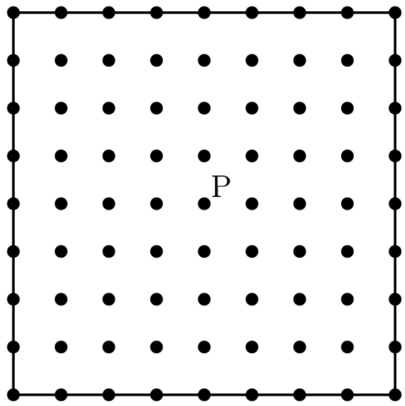
A tortoise challenges a hare to a race. The hare eagerly agrees and quickly runs ahead, leaving the slow-moving tortoise behind. Confident that he will win, the hare stops to take a nap. Meanwhile, the tortoise walks at a slow steady pace for the entire race. The hare awakes and runs to the finish line, only to find the tortoise already there. Which of the following graphs matches the description of the race, showing the distance d traveled by the two animals over time t from start to finish?



Solution

Problem 6

There are 81 grid points (uniformly spaced) in the square shown in the diagram below, including the points on the edges. Point P is in the center of the square. Given that point Q is randomly chosen among the other 80 points, what is the probability that the line PQ is a line of symmetry for the square?



$\textbf{(A) }\frac{1}{5}\qquad\textbf{(B) }\frac{1}{4}\qquad\textbf{(C) }\frac{2}{5}\qquad\textbf{(D) }\frac{9}{20}\qquad\textbf{(E) }\frac{1}{2}$

Solution

Problem 7

Shauna takes five tests, each worth a maximum of 100 points. Her scores on the first three tests are 76, 94, and 87. In order to average 81 for all five tests, what is the lowest score she could earn on one of the other two tests?

$\textbf{(A) }48\qquad\textbf{(B) }52\qquad\textbf{(C) }66\qquad\textbf{(D) }70\qquad\textbf{(E) }74$

Solution

Problem 8

Gilda has a bag of marbles. She gives 20% of them to her friend Pedro. Then Gilda gives 10% of what is left to another friend, Ebony. Finally, Gilda gives 25% of what is now left in the bag to her brother Jimmy. What percentage of her original bag of marbles does Gilda have left for herself?

$\textbf{(A) }20\qquad\textbf{(B) }33\frac{1}{3}\qquad\textbf{(C) }38\qquad\textbf{(D) }45\qquad\textbf{(E) }54$

Solution

Problem 9

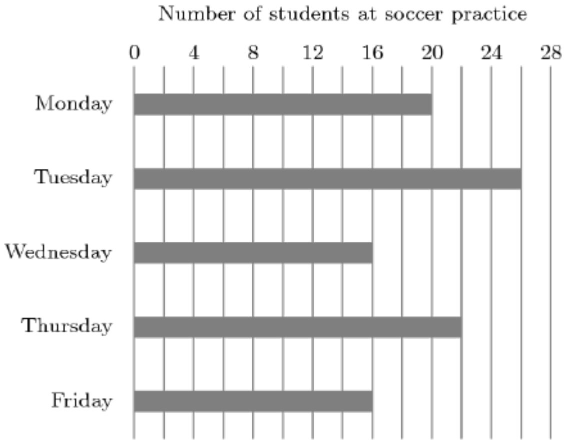
Alex and Felicia each have cats as pets. Alex buys cat food in cylindrical cans that are 6 cm in diameter and 12 cm high. Felicia buys cat food in cylindrical cans that are 12 cm in diameter and 6 cm high. What is the ratio of the volume one of Alex's cans to the volume one of Felicia's cans?

$\textbf{(A)}\ 1:4 \qquad \textbf{(B)}\ 1:2 \qquad \textbf{(C)}\ 1:1 \qquad \textbf{(D)}\ 2:1 \qquad \textbf{(E)}\ 4:1$

Solution

Problem 10

The diagram shows the number of students at soccer practice each weekday during last week. After computing the mean and median values, Coach discovers that there were actually 21 participants on Wednesday. Which of the following statements describes the change in the mean and median after the correction is made?



$\textbf{(A)}$ The mean increases by 1 and the median does not change.

$\textbf{(B)}$ The mean increases by 1 and the median increases by 1.

$\textbf{(C)}$ The mean increases by 1 and the median increases by 5.

$\textbf{(D)}$ The mean increases by 5 and the median increases by 1.

$\textbf{(E)}$ The mean increases by 5 and the median increases by 5.

Solution

Problem 11

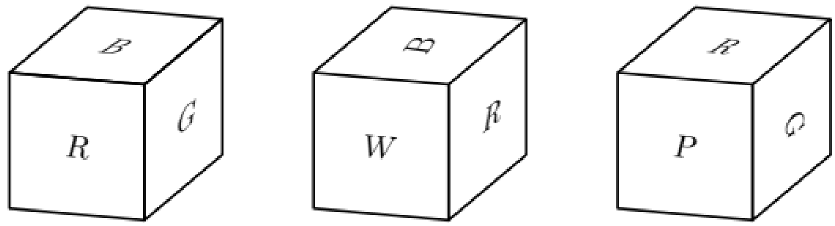
The eighth grade class at Lincoln Middle School has 93 students. Each student takes a math class or a foreign language class or both. There are 70 eighth graders taking a math class, and there are 54 eight graders taking a foreign language class. How many eight graders take *only* a math class and *not* a foreign language class?

$\textbf{(A)}\ 16 \qquad \textbf{(B)}\ 23 \qquad \textbf{(C)}\ 31 \qquad \textbf{(D)}\ 39 \qquad \textbf{(E)}\ 70$

Solution

Problem 12

The faces of a cube are painted in six different colors: red (R), white (W), green (G), brown (B), aqua (A), and purple (P). Three views of the cube are shown below. What is the color of the face opposite the aqua face?



$\textbf{(A)}\ \text{red} \qquad \textbf{(B)}\ \text{white} \qquad \textbf{(C)}\ \text{green} \qquad \textbf{(D)}\ \text{brown} \qquad \textbf{(E)}\ \text{purple}$

Solution

Problem 13

A *palindrome* is a number that has the same value when read from left to right or from right to left. (For example, 12321 is a palindrome.) Let N be the least three-digit integer which is not a palindrome but which is the sum of three distinct two-digit palindromes. What is the sum of the digits of N?

$\textbf{(A)}\ 2 \qquad \textbf{(B)}\ 3 \qquad \textbf{(C)}\ 4 \qquad \textbf{(D)}\ 5 \qquad \textbf{(E)}\ 6$

Solution

Problem 14

Isabella has 6 coupons that can be redeemed for free ice cream cones at Pete's Sweet Treats. In order to make the coupons last, she decides that she will redeem one every 10 days until she has used them all. She knows that Pete's is closed on Sundays, but as she circles the 6 dates on her calendar, she realizes that no circled date falls on a Sunday. On what day of the week does Isabella redeem her first coupon?

$\textbf{(A) }\text{Monday}\qquad\textbf{(B) }\text{Tuesday}\qquad\textbf{(C) }\text{Wednesday}\qquad\textbf{(D) }\text{Thursday}\qquad\textbf{(E) }\text{Friday}$

Solution

Problem 15

On a beach 50 people are wearing sunglasses and 35 people are wearing caps. Some people are wearing both sunglasses and caps. If one of the people wearing a cap is selected at random, the probability that this person is is also wearing sunglasses is $\frac{2}{5}$. If instead, someone wearing sunglasses is selected at random, what is the probability that this person is also wearing a cap?

$\textbf{(A) }\frac{14}{85}\qquad\textbf{(B) }\frac{7}{25}\qquad\textbf{(C) }\frac{2}{5}\qquad\textbf{(D) }\frac{4}{7}\qquad\textbf{(E) }\frac{7}{10}$

Solution

Problem 16

Qiang drives 15 miles at an average speed of 30 miles per hour. How many additional miles will he have to drive at 55 miles per hour to average 50 miles per hour for the entire trip?

$\textbf{(A) }45\qquad\textbf{(B) }62\qquad\textbf{(C) }90\qquad\textbf{(D) }110\qquad\textbf{(E) }135$

Solution

Problem 17

What is the value of the product

$$\left(\frac{1\cdot3}{2\cdot2}\right)\left(\frac{2\cdot4}{3\cdot3}\right)\left(\frac{3\cdot5}{4\cdot4}\right)\cdots\left(\frac{97\cdot99}{98\cdot98}\right)\left(\frac{98\cdot100}{99\cdot99}\right)?$$

$\textbf{(A) }\frac{1}{2}\qquad\textbf{(B) }\frac{50}{99}\qquad\textbf{(C) }\frac{9800}{9801}\qquad\textbf{(D) }\frac{100}{99}\qquad\textbf{(E) }50$

Solution

Problem 18

The faces of each of two fair dice are numbered 1, 2, 3, 5, 7, and 8. When the two dice are tossed, what is the probability that their sum will be an even number?

$\textbf{(A) }\frac{4}{9}\qquad\textbf{(B) }\frac{1}{2}\qquad\textbf{(C) }\frac{5}{9}\qquad\textbf{(D) }\frac{3}{5}\qquad\textbf{(E) }\frac{2}{3}$

Solution

Problem 19

In a tournament there are six teams that play each other twice. A team earns 3 points for a win, 1 point for a draw, and 0 points for a loss. After all the games have been played it turns out that the top three teams earned the same number of total points. What is the greatest possible number of total points for each of the top three teams?

$\textbf{(A) }22\qquad\textbf{(B) }23\qquad\textbf{(C) }24\qquad\textbf{(D) }26\qquad\textbf{(E) }30$

Solution

Problem 20

How many different real numbers x satisfy the equation

$$(x^{2}-5)^{2}=16?$$

$\textbf{(A) }0\qquad\textbf{(B) }1\qquad\textbf{(C) }2\qquad\textbf{(D) }4\qquad\textbf{(E) }8$

Solution

Problem 21

What is the area of the triangle formed by the lines $y=5$, $y=1+x$, and $y=1-x$?

$\textbf{(A) }4\qquad\textbf{(B) }8\qquad\textbf{(C) }10\qquad\textbf{(D) }12\qquad\textbf{(E) }16$

Solution

Problem 22

A store increased the original price of a shirt by a certain percent and then decreased the new price by the same amount. Given that the resulting price was 84% of the original price, by what percent was the price increased and decreased?

$\textbf{(A) }16\qquad\textbf{(B) }20\qquad\textbf{(C) }28\qquad\textbf{(D) }36\qquad\textbf{(E) }40$

Solution

Problem 23

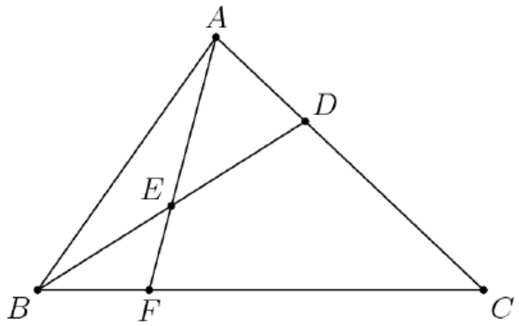
After Euclid High School's last basketball game, it was determined that $\frac{1}{4}$ of the team's points were scored by Alexa and $\frac{2}{7}$ were scored by Brittany. Chelsea scored 15 points. None of the other 7 team members scored more than 2 points. What was the total number of points scored by the other 7 team members?

$\textbf{(A) } 10 \qquad \textbf{(B) } 11 \qquad \textbf{(C) } 12 \qquad \textbf{(D) } 13 \qquad \textbf{(E) } 14$

Solution

Problem 24

In triangle ABC, point D divides side $\overline{AC}$ so that $AD:DC=1:2$. Let E be the midpoint of $\overline{BD}$ and let F be the point of intersection of line BC and line AE. Given that the area of $\triangle ABC$ is 360, what is the area of $\triangle EBF$?



$\textbf{(A) } 24 \qquad \textbf{(B) } 30 \qquad \textbf{(C) } 32 \qquad \textbf{(D) } 36 \qquad \textbf{(E) } 40$

Solution

Problem 25

Alice has 24 apples. In how many ways can she share them with Becky and Chris so that each of the people has at least 2 apples?

$\textbf{(A) } 105 \qquad \textbf{(B) } 114 \qquad \textbf{(C) } 190 \qquad \textbf{(D) } 210 \qquad \textbf{(E) } 380$

Solution

2020 AMC 8 Problems

Contents

Problem 1

Luka is making lemonade to sell at a school fundraiser. His recipe requires 4 times as much water as sugar and twice as much sugar as lemon juice. He uses 3 cups of lemon juice. How many cups of water does he need?

$\textbf{(A) } 6 \qquad \textbf{(B) } 8 \qquad \textbf{(C) } 12 \qquad \textbf{(D) } 18 \qquad \textbf{(E) } 24$

Solution

Problem 2

Four friends do yardwork for their neighbors over the weekend, earning $\$15, \$20, \$25,$ and $\$40,$ respectively. They decide to split their earnings equally among themselves. In total how much will the friend who earned $\$40$ give to the others?

$\textbf{(A) } \$5 \qquad \textbf{(B) } \$10 \qquad \textbf{(C) } \$15 \qquad \textbf{(D) } \$20 \qquad \textbf{(E) } \$25$

Solution

Problem 3

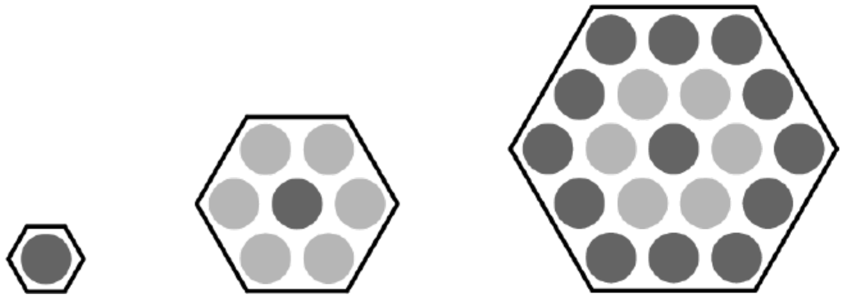
Carrie has a rectangular garden that measures 6 feet by 8 feet. She plants the entire garden with strawberry plants. Carrie is able to plant 4 strawberry plants per square foot, and she harvests an average of 10 strawberries per plant. How many strawberries can she expect to harvest?

$\textbf{(A) } 560 \qquad \textbf{(B) } 960 \qquad \textbf{(C) } 1120 \qquad \textbf{(D) } 1920 \qquad \textbf{(E) } 3840$

Solution

Problem 4

Three hexagons of increasing size are shown below. Suppose the dot pattern continues so that each successive hexagon contains one more band of dots. How many dots are in the next hexagon?



$\textbf{(A) }35 \qquad \textbf{(B) }37 \qquad \textbf{(C) }39 \qquad \textbf{(D) }43 \qquad \textbf{(E) }49$

Solution

Problem 5

Three fourths of a pitcher is filled with pineapple juice. The pitcher is emptied by pouring an equal amount of juice into each of 5 cups. What percent of the total capacity of the pitcher did each cup receive?

$\textbf{(A) }5 \qquad \textbf{(B) }10 \qquad \textbf{(C) }15 \qquad \textbf{(D) }20 \qquad \textbf{(E) }25$

Solution

Problem 6

Aaron, Darren, Karen, Maren, and Sharon rode on a small train that has five cars that seat one person each. Maren sat in the last car. Aaron sat directly behind Sharon. Darren sat in one of the cars in front of Aaron. At least one person sat between Karen and Darren. Who sat in the middle car?

$\textbf{(A) }\text{Aaron} \qquad \textbf{(B) }\text{Darren} \qquad \textbf{(C) }\text{Karen} \qquad \textbf{(D) }\text{Maren} \qquad \textbf{(E) }\text{Sharon}$

Solution

Problem 7

How many integers between 2020 and 2400 have four distinct digits arranged in increasing order? (For example, 2347 is one integer.)

$\textbf{(A) }9 \qquad \textbf{(B) }10 \qquad \textbf{(C) }15 \qquad \textbf{(D) }21 \qquad \textbf{(E) }28$

Solution

Problem 8

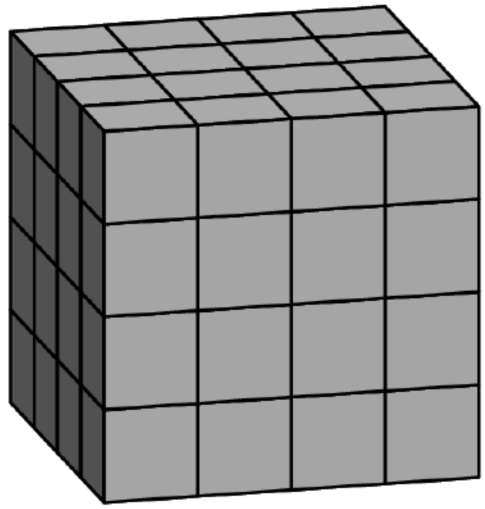
Ricardo has 2020 coins, some of which are pennies (1-cent coins) and the rest of which are nickels (5-cent coins). He has at least one penny and at least one nickel. What is the difference in cents between the greatest possible and least possible amounts of money that Ricardo can have?

$\textbf{(A) }8062 \qquad \textbf{(B) }8068 \qquad \textbf{(C) }8072 \qquad \textbf{(D) }8076 \qquad \textbf{(E) }8082$

Solution

Problem 9

Akash's birthday cake is in the form of a $4 \times 4 \times 4$ inch cube. The cake has icing on the top and the four side faces, and no icing on the bottom. Suppose the cake is cut into 64 smaller cubes, each measuring $1 \times 1 \times 1$ inch, as shown below. How many small pieces will have icing on exactly two sides?



$\textbf{(A) }12\qquad\textbf{(B) }16\qquad\textbf{(C) }18\qquad\textbf{(D) }20\qquad\textbf{(E) }24$

Solution

Problem 10

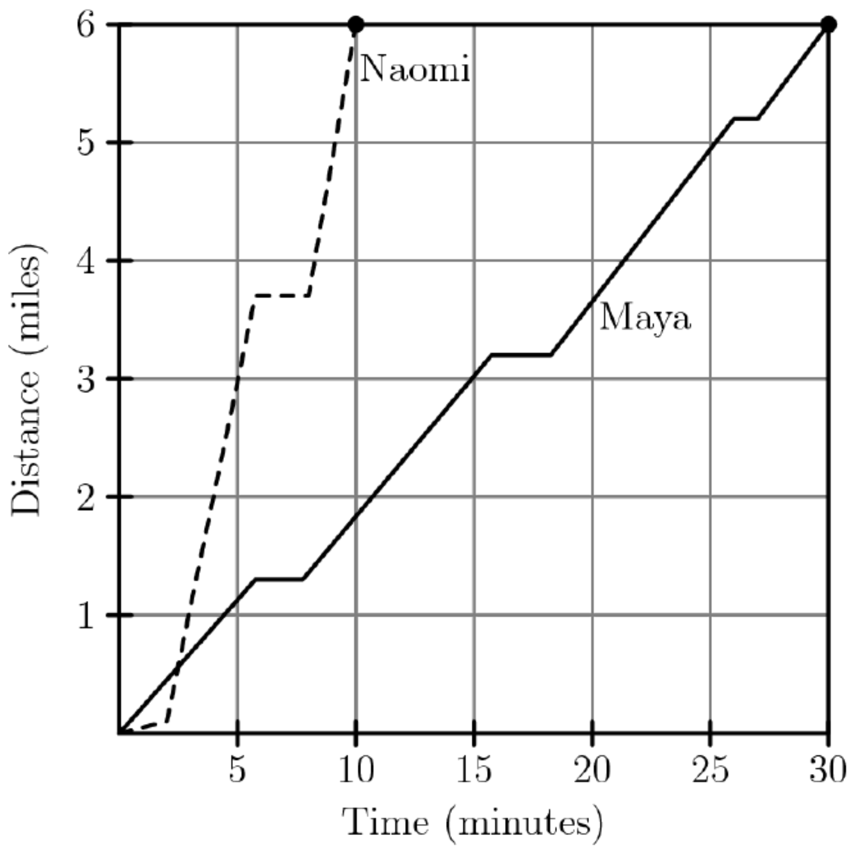
Zara has a collection of 4 marbles: an Aggie, a Bumblebee, a Steelie, and a Tiger. She wants to display them in a row on a shelf, but does not want to put the Steelie and the Tiger next to one another. In how many ways can she do this?

$\textbf{(A) }6\qquad\textbf{(B) }8\qquad\textbf{(C) }12\qquad\textbf{(D) }18\qquad\textbf{(E) }24$

Solution

Problem 11

After school, Maya and Naomi headed to the beach, 6 miles away. Maya decided to bike while Naomi took a bus. The graph below shows their journeys, indicating the time and distance traveled. What was the difference, in miles per hour, between Naomi's and Maya's average speeds?



$\textbf{(A) }6 \qquad \textbf{(B) }12 \qquad \textbf{(C) }18 \qquad \textbf{(D) }20 \qquad \textbf{(E) }24$

Solution

Problem 12

For a positive integer n, the factorial notation $n!$ represents the product of the integers from n to 1. (For example, $6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$.) What value of N satisfies the following equation?

$$5! \cdot 9! = 12 \cdot N!$$

$\textbf{(A) }10 \qquad \textbf{(B) }11 \qquad \textbf{(C) }12 \qquad \textbf{(D) }13 \qquad \textbf{(E) }14$

Solution

Problem 13

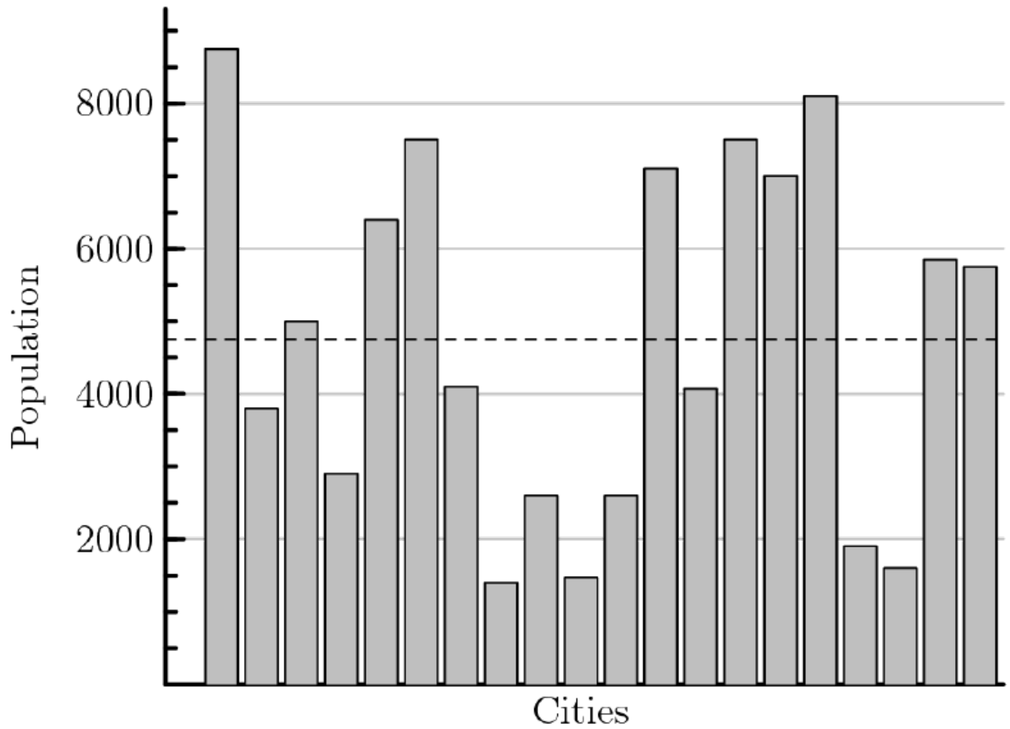
Jamal has a drawer containing 6 green socks, 18 purple socks, and 12 orange socks. After adding more purple socks, Jamal noticed that there is now a 60% chance that a sock randomly selected from the drawer is purple. How many purple socks did Jamal add?

$\textbf{(A) }6 \qquad \textbf{(B) }9 \qquad \textbf{(C) }12 \qquad \textbf{(D) }18 \qquad \textbf{(E) }24$

Solution

Problem 14

There are 20 cities in the County of Newton. Their populations are shown in the bar chart below. The average population of all the cities is indicated by the horizontal dashed line. Which of the following is closest to the total population of all 20 cities?



$\textbf{(A) }65{,}000 \qquad \textbf{(B) }75{,}000 \qquad \textbf{(C) }85{,}000 \qquad \textbf{(D) }95{,}000 \qquad \textbf{(E) }105{,}000$

Solution

Problem 15

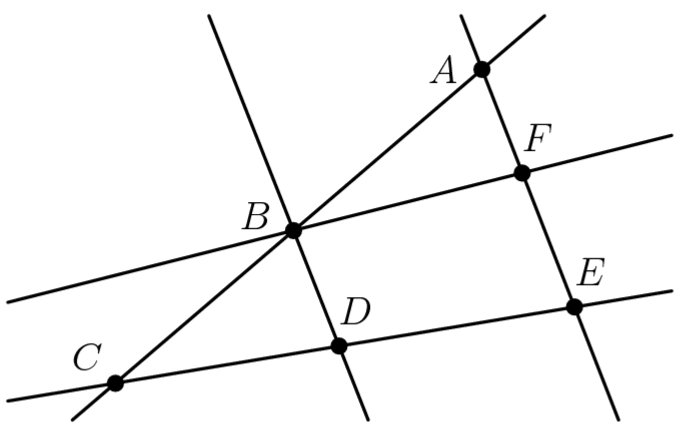
Suppose 15% of x equals 20% of $y.$ What percentage of x is $y?$

$\textbf{(A) }5 \qquad \textbf{(B) }35 \qquad \textbf{(C) }75 \qquad \textbf{(D) }133\frac{1}{3} \qquad \textbf{(E) }300$

Solution

Problem 16

Each of the points $A,B,C,D,E,$ and F in the figure below represents a different digit from 1 to $6.$ Each of the five lines shown passes through some of these points. The digits along each line are added to produce five sums, one for each line. The total of the five sums is $47.$ What is the digit represented by B?



$\textbf{(A) }1 \qquad \textbf{(B) }2 \qquad \textbf{(C) }3 \qquad \textbf{(D) }4 \qquad \textbf{(E) }5$

Solution

Problem 17

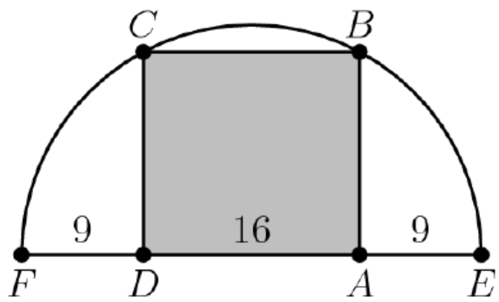
How many factors of 2020 have more than 3 factors? (As an example, 12 has 6 factors, namely $1, 2, 3, 4, 6,$ and $12.$)

$\textbf{(A) }6 \qquad \textbf{(B) }7 \qquad \textbf{(C) }8 \qquad \textbf{(D) }9 \qquad \textbf{(E) }10$

Solution

Problem 18

Rectangle $ABCD$ is inscribed in a semicircle with diameter $\overline{FE},$ as shown in the figure. Let $DA=16,$ and let $FD=AE=9.$ What is the area of $ABCD?$



$\textbf{(A) }240 \qquad \textbf{(B) }248 \qquad \textbf{(C) }256 \qquad \textbf{(D) }264 \qquad \textbf{(E) }272$

Solution

Problem 19

A number is called flippy if its digits alternate between two distinct digits. For example, 2020 and 37373 are flippy, but 3883 and 123123 are not. How many five-digit flippy numbers are divisible by $15?$

$\textbf{(A) }3 \qquad \textbf{(B) }4 \qquad \textbf{(C) }5 \qquad \textbf{(D) }6 \qquad \textbf{(E) }8$

Solution

Problem 20

A scientist walking through a forest recorded as integers the heights of 5 trees standing in a row. She observed that each tree was either twice as tall or half as tall as the one to its right. Unfortunately some of her data was lost when rain fell on her notebook. Her notes are shown below, with blanks indicating the missing numbers. Based on her observations, the scientist was able to reconstruct the lost data. What was the average height of the trees, in meters?

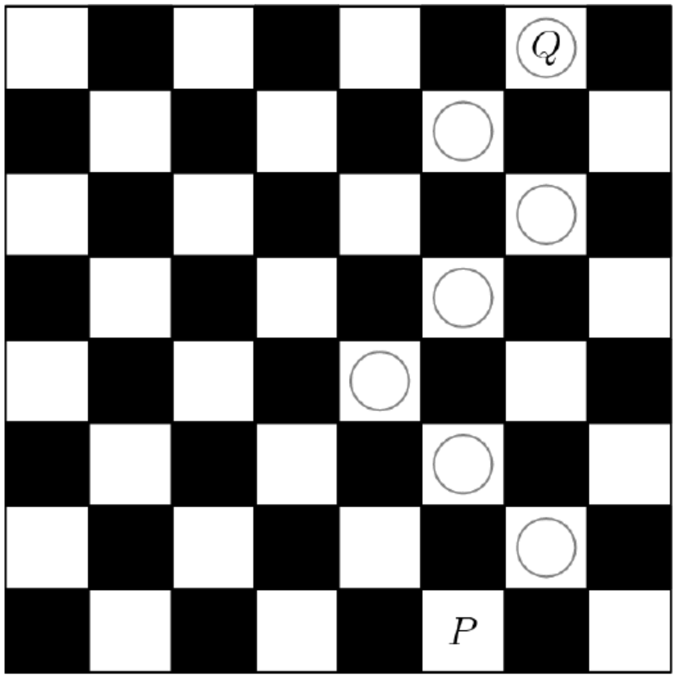
Tree 1	___ meters
Tree 2	11 meters
Tree 3	___ meters
Tree 4	___ meters
Tree 5	___ meters
Average height	___ .2 meters

$\textbf{(A) }22.2 \qquad \textbf{(B) }24.2 \qquad \textbf{(C) }33.2 \qquad \textbf{(D) }35.2 \qquad \textbf{(E) }37.2$

Solution

Problem 21

A game board consists of 64 squares that alternate in color between black and white. The figure below shows square P in the bottom row and square Q in the top row. A marker is placed at $P.$ A step consists of moving the marker onto one of the adjoining white squares in the row above. How many 7-step paths are there from P to $Q?$ (The figure shows a sample path.)

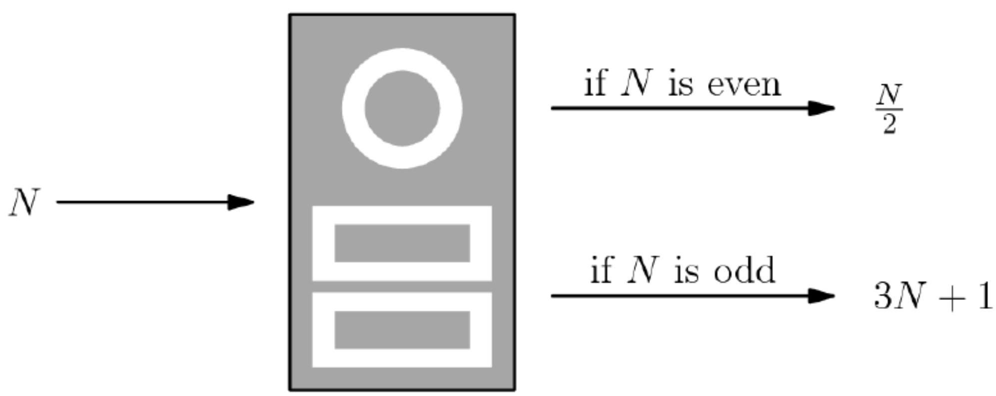


$\textbf{(A) }28\qquad\textbf{(B) }30\qquad\textbf{(C) }32\qquad\textbf{(D) }33\qquad\textbf{(E) }35$

Solution

Problem 22

When a positive integer N is fed into a machine, the output is a number calculated according to the rule shown below.



For example, starting with an input of $N=7,$ the machine will output $3 \cdot 7 +1 = 22.$ Then if the output is repeatedly inserted into the machine five more times, the final output is $26.$

$$7 \to 22 \to 11 \to 34 \to 17 \to 52 \to 26$$

When the same 6-step process is applied to a different starting value of $N,$ the final output is $1.$ What is the sum of all such integers $N?$

$$N \to \_\_ \to \_\_ \to \_\_ \to \_\_ \to \_\_ \to 1$$

$\textbf{(A) }73\qquad\textbf{(B) }74\qquad\textbf{(C) }75\qquad\textbf{(D) }82\qquad\textbf{(E) }83$

Solution

Problem 23

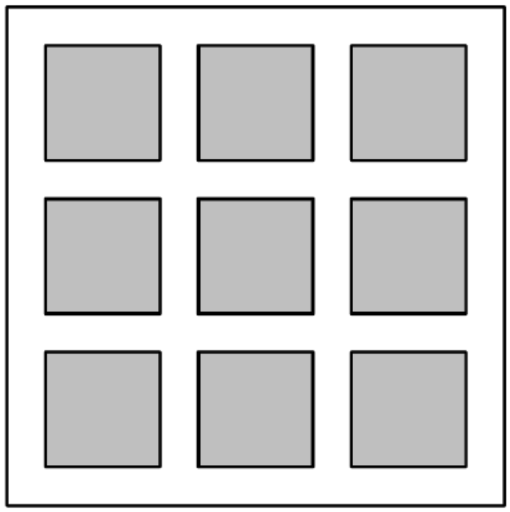
Five different awards are to be given to three students. Each student will receive at least one award. In how many different ways can the awards be distributed?

$\textbf{(A) }120 \qquad \textbf{(B) }150 \qquad \textbf{(C) }180 \qquad \textbf{(D) }210 \qquad \textbf{(E) }240$

Solution

Problem 24

A large square region is paved with n^2 gray square tiles, each measuring s inches on a side. A border d inches wide surrounds each tile. The figure below shows the case for $n=3$. When , the gray tiles cover of the area of the large square region. What is the ratio for this larger value of

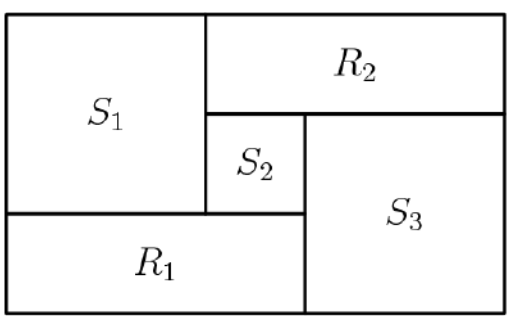


$\textbf{(A) }\frac{6}{25} \qquad \textbf{(B) }\frac{1}{4} \qquad \textbf{(C) }\frac{9}{25} \qquad \textbf{(D) }\frac{7}{16} \qquad \textbf{(E) }\frac{9}{16}$

Solution

Problem 25

Rectangles R_1 and R_2, and squares $S_1,\, S_2,$ and S_3, shown below, combine to form a rectangle that is 3322 units wide and 2020 units high. What is the side length of S_2 in units?



$\textbf{(A) }651 \qquad \textbf{(B) }655 \qquad \textbf{(C) }656 \qquad \textbf{(D) }662 \qquad \textbf{(E) }666$

Solution

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2022 AMC 8 Problems

2022 AMC 8 (**Answer Key**)
Printable versions: • AoPS Resources (https://artofproblemsolving.com/community/contest/collection/c3413_amc_8/2022) • PDF (https://artofproblemsolving.com/community/contest/download/c3413_amc_8/2022)

Instructions

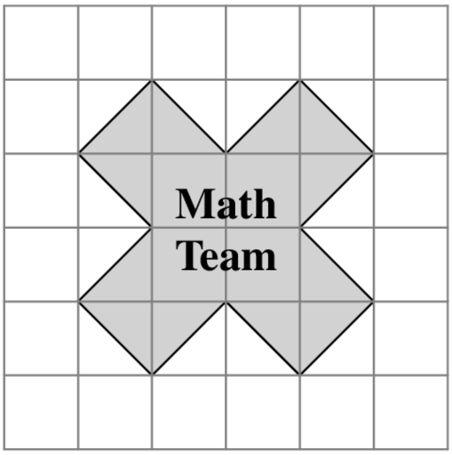
1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
2. You will receive 1 point for each correct answer. There is no penalty for wrong answers.
3. No aids are permitted other than plain scratch paper, writing utensils, ruler, and erasers. In particular, graph paper, compass, protractor, calculators, computers, smartwatches, and smartphones are not permitted. Rules (https://amc-reg.maa.org/manual/AMC8.pdf)
4. Figures are not necessarily drawn to scale.
5. You will have **40 minutes** working time to complete the test.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25

Contents

Problem 1

The Math Team designed a logo shaped like a multiplication symbol, shown below on a grid of 1-inch squares. What is the area of the logo in square inches?



$\textbf{(A) } 10 \qquad \textbf{(B) } 12 \qquad \textbf{(C) } 13 \qquad \textbf{(D) } 14 \qquad \textbf{(E) } 15$

Solution

Problem 2

Consider these two operations:

$$a \blacklozenge b = a^2 - b^2$$
$$a \bigstar b = (a-b)^2$$

What is the value of $(5 \blacklozenge 3) \bigstar 6?$

$\textbf{(A) } -20 \qquad \textbf{(B) } 4 \qquad \textbf{(C) } 16 \qquad \textbf{(D) } 100 \qquad \textbf{(E) } 220$

Solution

Problem 3

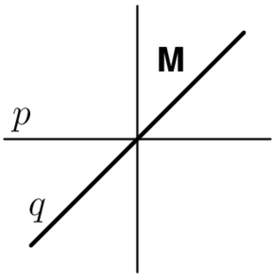
When three positive integers a, b, and c are multiplied together, their product is 100. Suppose $a < b < c$. In how many ways can the numbers be chosen?

$\textbf{(A) } 0 \qquad \textbf{(B) } 1 \qquad \textbf{(C) } 2 \qquad \textbf{(D) } 3 \qquad \textbf{(E) } 4$

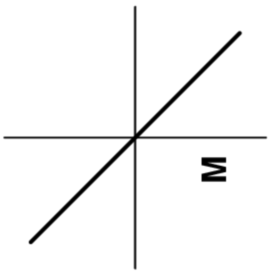
Solution

Problem 4

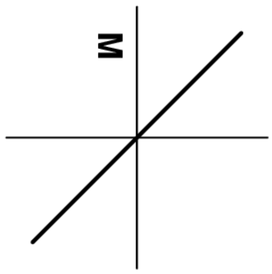
The letter **M** in the figure below is first reflected over the line q and then reflected over the line p. What is the resulting image?



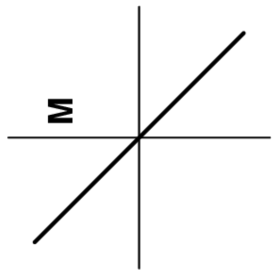
(A)



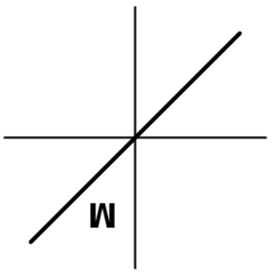
(B)



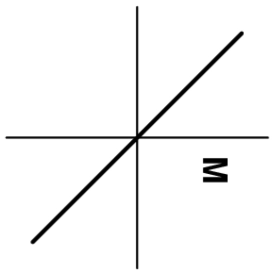
(C)



(D)



(E)



Solution

Problem 5

Anna and Bella are celebrating their birthdays together. Five years ago, when Bella turned 6 years old, she received a newborn kitten as a birthday present. Today the sum of the ages of the two children and the kitten is 30 years. How many years older than Bella is Anna?

$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } ~5$

Solution

Problem 6

Three positive integers are equally spaced on a number line. The middle number is $15,$ and the largest number is 4 times the smallest number. What is the smallest of these three numbers?

$\textbf{(A) } 4 \qquad \textbf{(B) } 5 \qquad \textbf{(C) } 6 \qquad \textbf{(D) } 7 \qquad \textbf{(E) } 8$

Solution

Problem 7

When the World Wide Web first became popular in the 1990s, download speeds reached a maximum of about 56 kilobits per second. Approximately how many minutes would the download of a 4.2-megabyte song have taken at that speed? (Note that there are 8000 kilobits in a megabyte.)

$\textbf{(A) } 0.6 \qquad \textbf{(B) } 10 \qquad \textbf{(C) } 1800 \qquad \textbf{(D) } 7200 \qquad \textbf{(E) } 36000$

Solution

Problem 8

What is the value of

$$\frac{1}{3}\cdot\frac{2}{4}\cdot\frac{3}{5}\cdots\frac{18}{20}\cdot\frac{19}{21}\cdot\frac{20}{22}?$$

$\textbf{(A) } \frac{1}{462} \qquad \textbf{(B) } \frac{1}{231} \qquad \textbf{(C) } \frac{1}{132} \qquad \textbf{(D) } \frac{2}{213} \qquad \textbf{(E) } \frac{1}{22}$

Solution

Problem 9

A cup of boiling water (212°F) is placed to cool in a room whose temperature remains constant at 68°F. Suppose the difference between the water temperature and the room temperature is halved every 5 minutes. What is the water temperature, in degrees Fahrenheit, after 15 minutes?

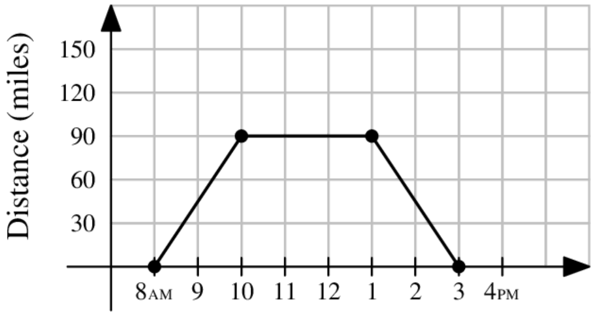
$\textbf{(A) } 77 \qquad \textbf{(B) } 86 \qquad \textbf{(C) } 92 \qquad \textbf{(D) } 98 \qquad \textbf{(E) } 104$

Solution

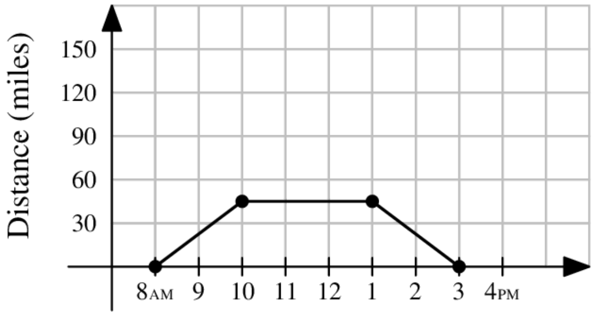
Problem 10

One sunny day, Ling decided to take a hike in the mountains. She left her house at $8 \, \text{AM}$, drove at a constant speed of 45 miles per hour, and arrived at the hiking trail at $10 \, \text{AM}$. After hiking for 3 hours, Ling drove home at a constant speed of 60 miles per hour. Which of the following graphs best illustrates the distance between Ling's car and her house over the course of her trip?

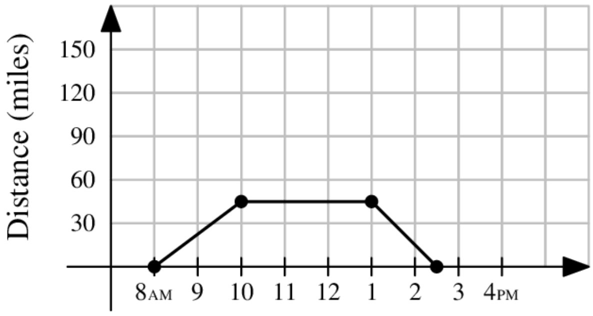
(A)



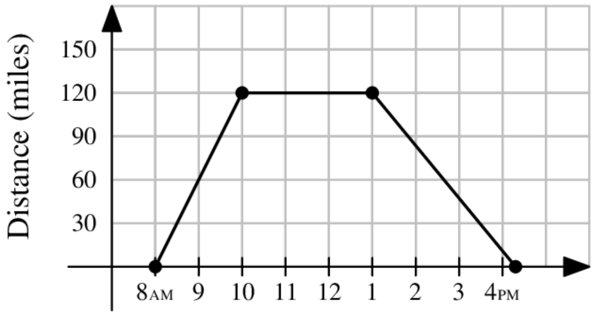
(B)



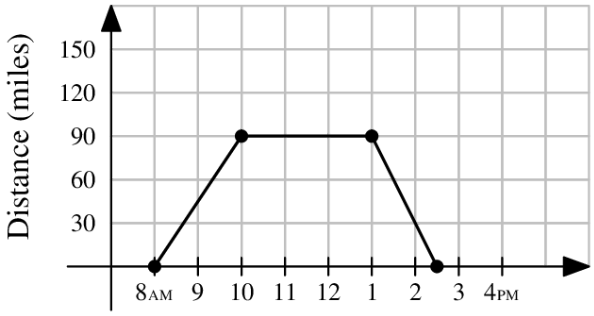
(C)



(D)



(E)



Solution

Problem 11

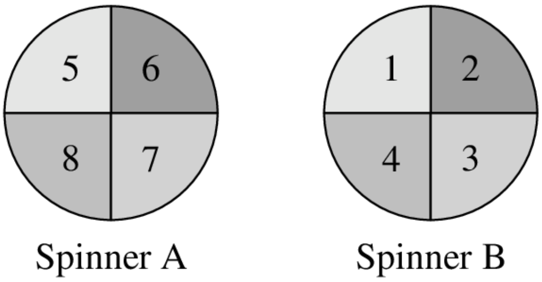
Henry the donkey has a very long piece of pasta. He takes a number of bites of pasta, each time eating 3 inches of pasta from the middle of one piece. In the end, he has 10 pieces of pasta whose total length is 17 inches. How long, in inches, was the piece of pasta he started with?

$\textbf{(A) } 34 \qquad \textbf{(B) } 38 \qquad \textbf{(C) } 41 \qquad \textbf{(D) } 44 \qquad \textbf{(E) } 47$

Solution

Problem 12

The arrows on the two spinners shown below are spun. Let the number N equal 10 times the number on Spinner A, added to the number on Spinner B. What is the probability that N is a perfect square number?



$\textbf{(A) } \frac{1}{16} \qquad \textbf{(B) } \frac{1}{8} \qquad \textbf{(C) } \frac{1}{4} \qquad \textbf{(D) } \frac{3}{8} \qquad \textbf{(E) } \frac{1}{2}$

Solution

Problem 13

How many positive integers can fill the blank in the sentence below?

"One positive integer is _____ more than twice another, and the sum of the two numbers is 28."

$\textbf{(A) } 6 \qquad \textbf{(B) } 7 \qquad \textbf{(C) } 8 \qquad \textbf{(D) } 9 \qquad \textbf{(E) } 10$

Solution

Problem 14

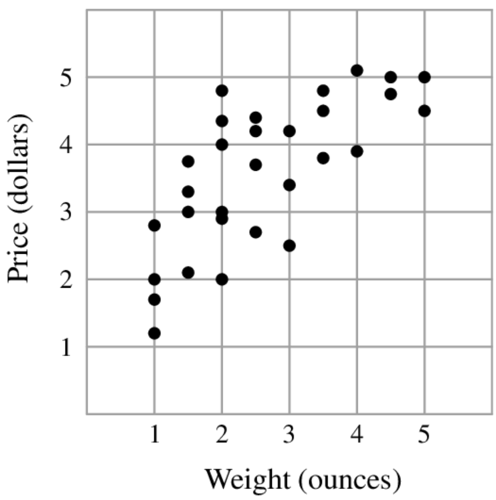
In how many ways can the letters in $\textbf{BEEKEEPER}$ be rearranged so that two or more $\textbf{E}$s do not appear together?

$\textbf{(A) } 1 \qquad \textbf{(B) } 4 \qquad \textbf{(C) } 12 \qquad \textbf{(D) } 24 \qquad \textbf{(E) } 120$

Solution

Problem 15

Laszlo went online to shop for black pepper and found thirty different black pepper options varying in weight and price, shown in the scatter plot below. In ounces, what is the weight of the pepper that offers the lowest price per ounce?



$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } 5$

Solution

Problem 16

Four numbers are written in a row. The average of the first two is $21,$ the average of the middle two is $26,$ and the average of the last two is $30.$ What is the average of the first and last of the numbers?

$\textbf{(A) } 24 \qquad \textbf{(B) } 25 \qquad \textbf{(C) } 26 \qquad \textbf{(D) } 27 \qquad \textbf{(E) } 28$

Solution

Problem 17

If n is an even positive integer, the $double\ factorial$ notation $n!!$ represents the product of all the even integers from 2 to n. For example, $8!! = 2 \cdot 4 \cdot 6 \cdot 8$. What is the units digit of the following sum?

$$2!! + 4!! + 6!! + \cdots + 2018!! + 2020!! + 2022!!$$

$\textbf{(A) } 0 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 4 \qquad \textbf{(D) } 6 \qquad \textbf{(E) } 8$

Solution

Problem 18

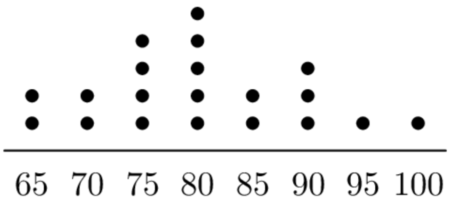
The midpoints of the four sides of a rectangle are $(-3,0), (2,0), (5,4),$ and $(0,4).$ What is the area of the rectangle?

$\textbf{(A) } 20 \qquad \textbf{(B) } 25 \qquad \textbf{(C) } 40 \qquad \textbf{(D) } 50 \qquad \textbf{(E) } 80$

Solution

Problem 19

Mr. Ramos gave a test to his class of 20 students. The dot plot below shows the distribution of test scores.



Later Mr. Ramos discovered that there was a scoring error on one of the questions. He regraded the tests, awarding some of the students 5 extra points, which increased the median test score to 85. What is the minimum number of students who received extra points?

(Note that the *median* test score equals the average of the 2 scores in the middle if the 20 test scores are arranged in increasing order.)

$\textbf{(A) } 2 \qquad \textbf{(B) } 3 \qquad \textbf{(C) } 4 \qquad \textbf{(D) } 5 \qquad \textbf{(E) } 6$

Solution

Problem 20

The grid below is to be filled with integers in such a way that the sum of the numbers in each row and the sum of the numbers in each column are the same. Four numbers are missing. The number x in the lower left corner is larger than the other three missing numbers. What is the smallest possible value of x?

-2	9	5
		-1
x		8

$\textbf{(A) } -1 \qquad \textbf{(B) } 5 \qquad \textbf{(C) } 6 \qquad \textbf{(D) } 8 \qquad \textbf{(E) } 9$

Solution

Problem 21

Steph scored 15 baskets out of 20 attempts in the first half of a game, and 10 baskets out of 10 attempts in the second half. Candace took 12 attempts in the first half and 18 attempts in the second. In each half, Steph scored a higher percentage of baskets than Candace. Surprisingly they ended with the same overall percentage of baskets scored. How many more baskets did Candace score in the second half than in the first?

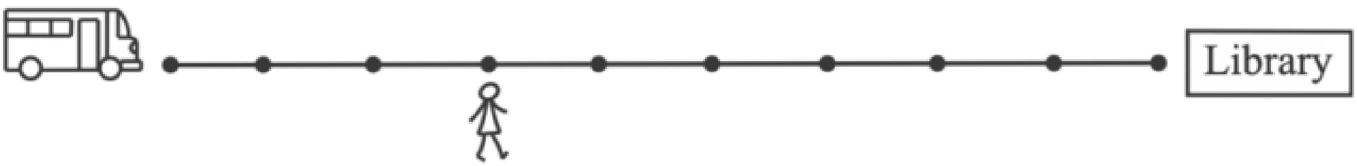
	First Half	Second Half
Steph	$\frac{15}{20}$	$\frac{10}{10}$
Candace	$\frac{\square}{12}$	$\frac{\square}{18}$

$\textbf{(A) } 7 \qquad \textbf{(B) } 8 \qquad \textbf{(C) } 9 \qquad \textbf{(D) } 10 \qquad \textbf{(E) } 11$

Solution

Problem 22

A bus takes 2 minutes to drive from one stop to the next, and waits 1 minute at each stop to let passengers board. Zia takes 5 minutes to walk from one bus stop to the next. As Zia reaches a bus stop, if the bus is at the previous stop or has already left the previous stop, then she will wait for the bus. Otherwise she will start walking toward the next stop. Suppose the bus and Zia start at the same time toward the library, with the bus 3 stops behind. After how many minutes will Zia board the bus?



$\textbf{(A) } 17 \qquad \textbf{(B) } 19 \qquad \textbf{(C) } 20 \qquad \textbf{(D) } 21 \qquad \textbf{(E) } 23$

Solution

Problem 23

A $\bigtriangleup$ or $\bigcirc$ is placed in each of the nine squares in a 3-by-3 grid. Shown below is a sample configuration with three $\bigtriangleup$s in a line.

$\bigtriangleup$	$\bigcirc$	$\bigtriangleup$
$\bigtriangleup$	$\bigcirc$	$\bigtriangleup$
$\bigtriangleup$	$\bigtriangleup$	$\bigcirc$

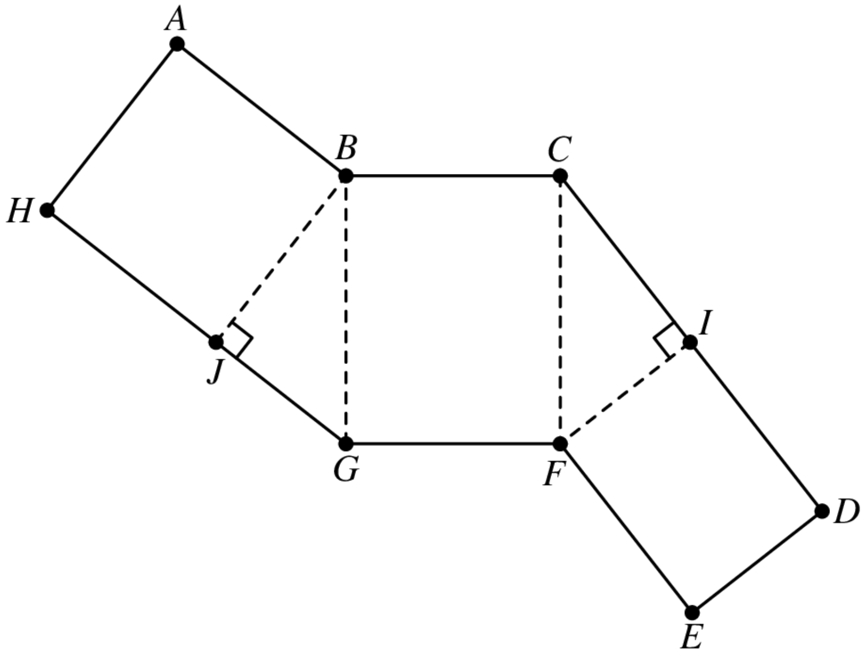
How many configurations will have three $\bigtriangleup$s in a line and three $\bigcirc$s in a line?

$\textbf{(A) } 39 \qquad \textbf{(B) } 42 \qquad \textbf{(C) } 78 \qquad \textbf{(D) } 84 \qquad \textbf{(E) } 96$

Solution

Problem 24

The figure below shows a polygon $ABCDEFGH$, consisting of rectangles and right triangles. When cut out and folded on the dotted lines, the polygon forms a triangular prism. Suppose that $AH = EF = 8$ and $GH = 14$. What is the volume of the prism?

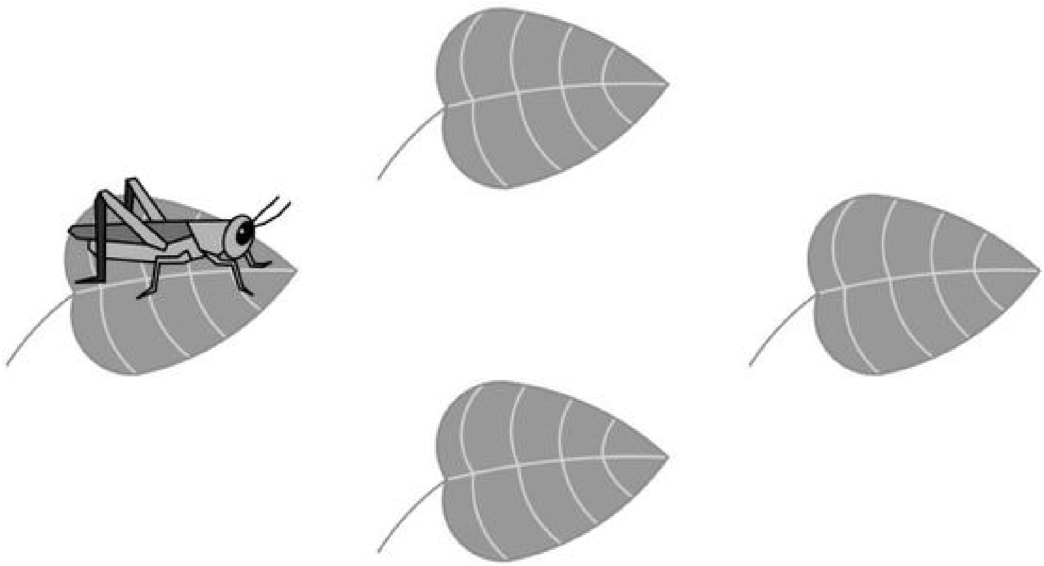


$\textbf{(A)}\ 112 \qquad \textbf{(B)}\ 128 \qquad \textbf{(C)}\ 192 \qquad \textbf{(D)}\ 240 \qquad \textbf{(E)}\ 288$

Solution

Problem 25

A cricket randomly hops between 4 leaves, on each turn hopping to one of the other 3 leaves with equal probability. After 4 hops, what is the probability that the cricket has returned to the leaf where it started?



$\textbf{(A)}\ \frac{2}{9} \qquad \textbf{(B)}\ \frac{19}{80} \qquad \textbf{(C)}\ \frac{20}{81} \qquad \textbf{(D)}\ \frac{1}{4} \qquad \textbf{(E)}\ \frac{7}{27}$

Solution

See Also

2022 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2022))	
Preceded by **2020 AMC 8**	Followed by **2023 AMC 8**
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- Mathematics Competition Resources

2023 AMC 8 Problems

2023 AMC 8 (**Answer Key**)
Printable versions: • AoPS Resources (https://artofproblemsolving.com/community/contest/collection/c3413_amc_8/2023) • PDF (https://artofproblemsolving.com/community/contest/download/c3413_amc_8/2023)

Instructions

1. This is a 25-question, multiple choice test. Each question is followed by answers marked A, B, C, D and E. Only one of these is correct.
2. You will receive 1 point for each correct answer. There is no penalty for wrong answers.
3. No aids are permitted other than plain scratch paper, writing utensils, ruler, and erasers. In particular, graph paper, compass, protractor, calculators, computers, smartwatches, and smartphones are not permitted. Rules (https://amc-reg.maa.org/manual/AMC8.pdf)
4. Figures are not necessarily drawn to scale.
5. You will have **40 minutes** working time to complete the test.

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Contents

Problem 1

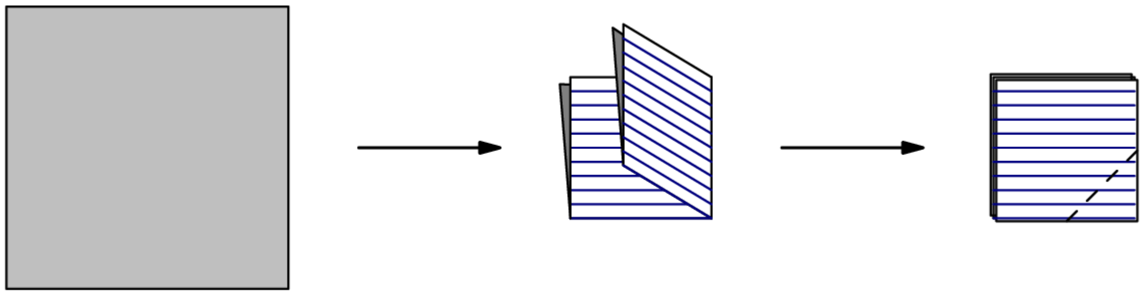
What is the value of $(8 \times 4 + 2) - (8 + 4 \times 2)$?

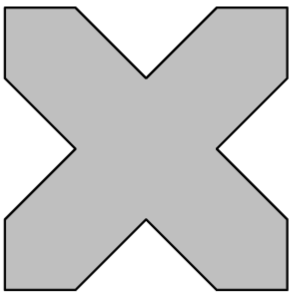
$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 6 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 18 \qquad \textbf{(E)}\ 24$

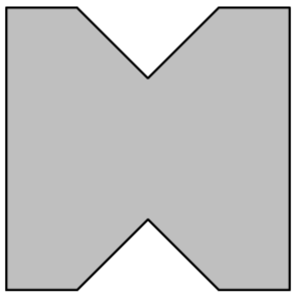
Solution

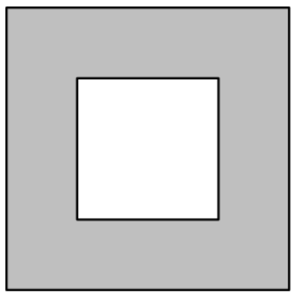
Problem 2

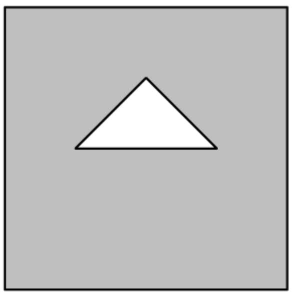
A square piece of paper is folded twice into four equal quarters, as shown below, then cut along the dashed line. When unfolded, the paper will match which of the following figures?

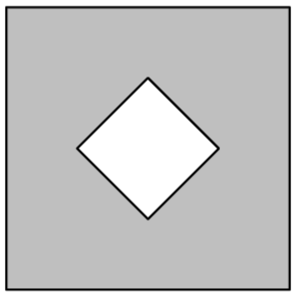


$\textbf{(A)}$ 

$\textbf{(B)}$ 

$\textbf{(C)}$ 

$\textbf{(D)}$ 

$\textbf{(E)}$ 

Solution

Problem 3

Wind chill is a measure of how cold people feel when exposed to wind outside. A good estimate for wind chill can be found using this calculation

$$(\text{wind chill}) = (\text{air temperature}) - 0.7 \times (\text{wind speed}),$$

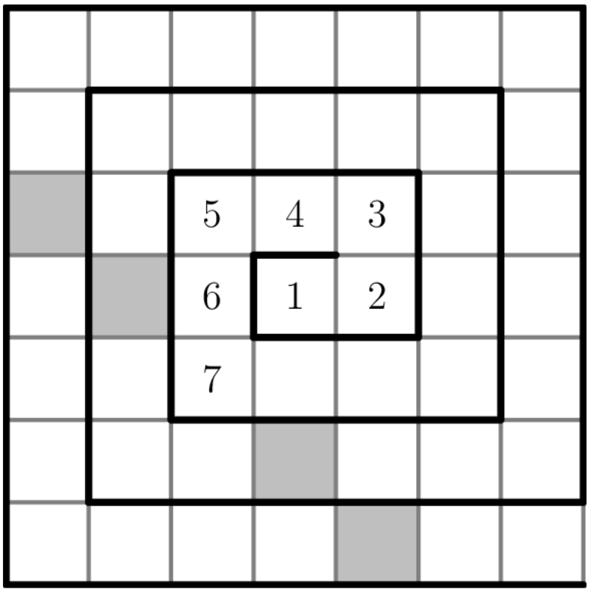
where temperature is measured in degrees Fahrenheit $(^{\circ}\text{F})$ and the wind speed is measured in miles per hour (mph). Suppose the air temperature is 36°F and the wind speed is 18 mph. Which of the following is closest to the approximate wind chill?

$\textbf{(A)}\ 18 \qquad \textbf{(B)}\ 23 \qquad \textbf{(C)}\ 28 \qquad \textbf{(D)}\ 32 \qquad \textbf{(E)}\ 35$

Solution

Problem 4

The numbers from 1 to 49 are arranged in a spiral pattern on a square grid, beginning at the center. The first few numbers have been entered into the grid below. Consider the four numbers that will appear in the shaded squares, on the same diagonal as the number $7.$ How many of these four numbers are prime?



$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 2 \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

Solution

Problem 5

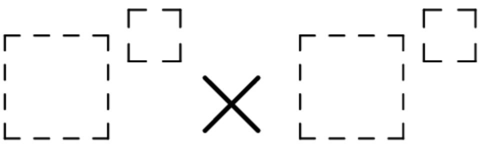
A lake contains 250 trout, along with a variety of other fish. When a marine biologist catches and releases a sample of 180 fish from the lake, 30 are identified as trout. Assume that the ratio of trout to the total number of fish is the same in both the sample and the lake. How many fish are there in the lake?

$\textbf{(A)}\ 1250 \qquad \textbf{(B)}\ 1500 \qquad \textbf{(C)}\ 1750 \qquad \textbf{(D)}\ 1800 \qquad \textbf{(E)}\ 2000$

Solution

Problem 6

The digits $2, 0, 2,$ and 3 are placed in the expression below, one digit per box. What is the maximum possible value of the expression?

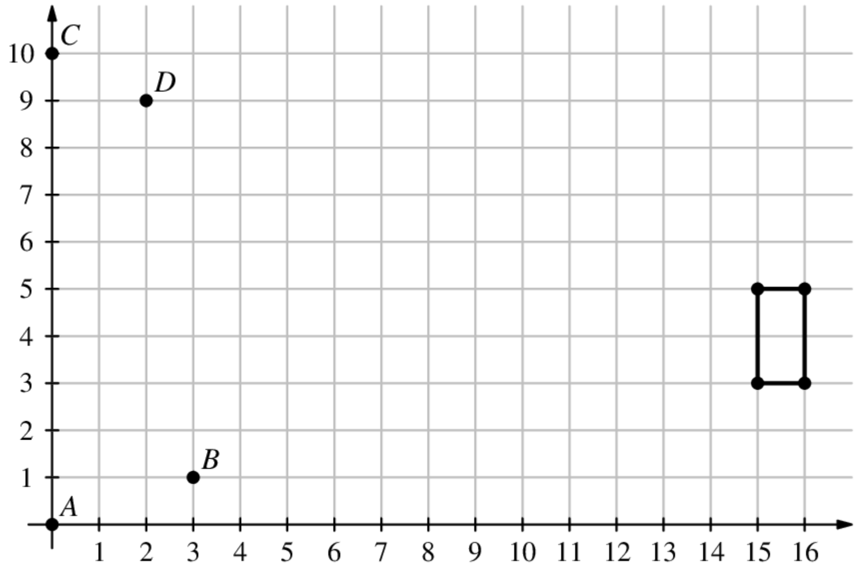


$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 8 \qquad \textbf{(C)}\ 9 \qquad \textbf{(D)}\ 16 \qquad \textbf{(E)}\ 18$

Solution

Problem 7

A rectangle, with sides parallel to the x-axis and y-axis, has opposite vertices located at $(15, 3)$ and $(16, 5)$. A line drawn through points $A(0, 0)$ and $B(3, 1)$. Another line is drawn through points $C(0, 10)$ and $D(2, 9)$. How many points on the rectangle lie on at least one of the two lines?



$\textbf{(A) } 0 \qquad \textbf{(B) } 1 \qquad \textbf{(C) } 2 \qquad \textbf{(D) } 3 \qquad \textbf{(E) } 4$

Solution

Problem 8

Lola, Lolo, Tiya, and Tiyo participated in a ping pong tournament. Each player competed against each of the other three players exactly twice. Shown below are the win-loss records for the players. The numbers 1 and 0 represent a win or loss, respectively. For example, Lola won five matches and lost the fourth match. What was Tiyo's win-loss record?

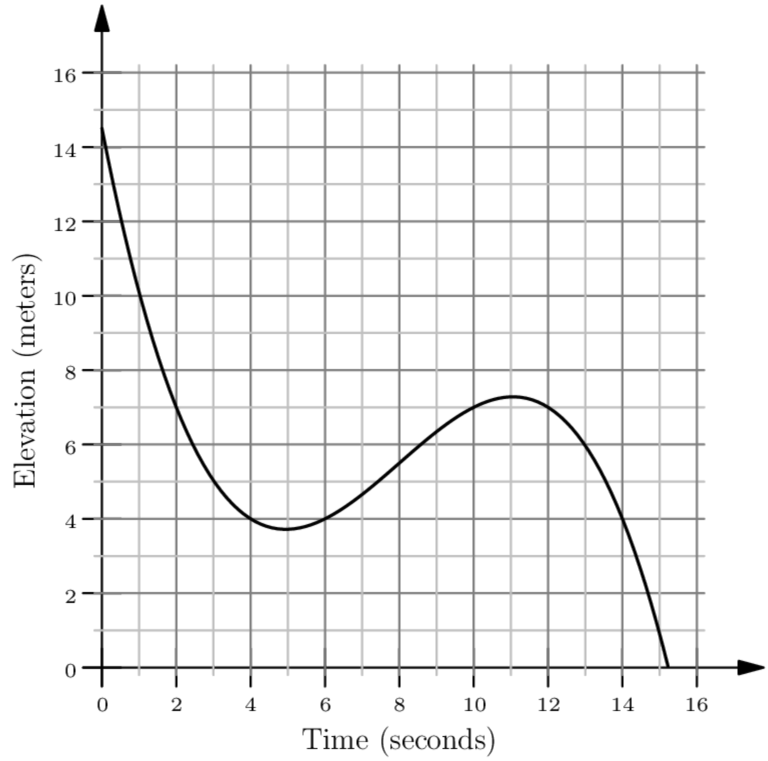
Player	Result
Lola	111011
Lolo	101010
Tiya	010100
Tiyo	??????

$\textbf{(A) }$ 000101 $\qquad \textbf{(B) }$ 001001 $\qquad \textbf{(C) }$ 010000 $\qquad \textbf{(D) }$ 010101 $\qquad \textbf{(E) }$ 011000

Solution

Problem 9

Malaika is skiing on a mountain. The graph below shows her elevation, in meters, above the base of the mountain as she skis along a trail. In total, how many seconds does she spend at an elevation between 4 and 7 meters?



$\textbf{(A) } 6 \qquad \textbf{(B) } 8 \qquad \textbf{(C) } 10 \qquad \textbf{(D) } 12 \qquad \textbf{(E) } 14$

Solution

Problem 10

Harold made a plum pie to take on a picnic. He was able to eat only $\frac{1}{4}$ of the pie, and he left the rest for his friends. A moose came by and ate $\frac{1}{3}$ of what Harold left behind. After that, a porcupine ate $\frac{1}{3}$ of what the moose left behind. How much of the original pie still remained after the porcupine left?

$\textbf{(A) } \frac{1}{12} \qquad \textbf{(B) } \frac{1}{6} \qquad \textbf{(C) } \frac{1}{4} \qquad \textbf{(D) } \frac{1}{3} \qquad \textbf{(E) } \frac{5}{12}$

Solution

Problem 11

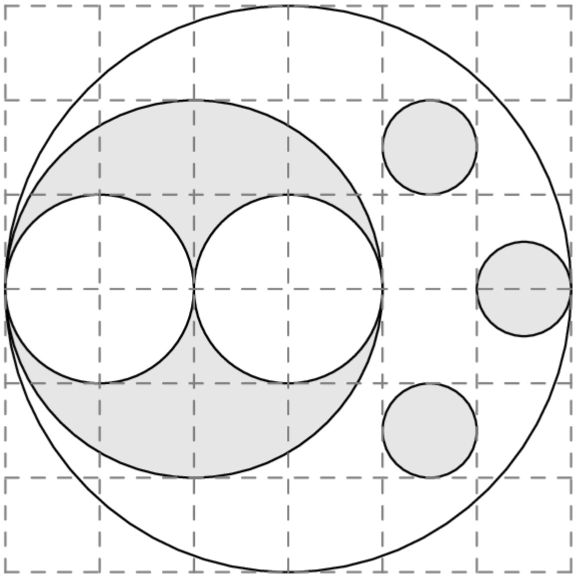
NASA's Perseverance Rover was launched on July $30, 2020.$ After traveling $292{,}526{,}838$ miles, it landed on Mars in Jezero Crater about 6.5 months later. Which of the following is closest to the Rover's average interplanetary speed in miles per hour?

$\textbf{(A) } 6{,}000 \qquad \textbf{(B) } 12{,}000 \qquad \textbf{(C) } 60{,}000 \qquad \textbf{(D) } 120{,}000 \qquad \textbf{(E) } 600{,}000$

Solution

Problem 12

The figure below shows a large white circle with a number of smaller white and shaded circles in its interior. What fraction of the interior of the large white circle is shaded?

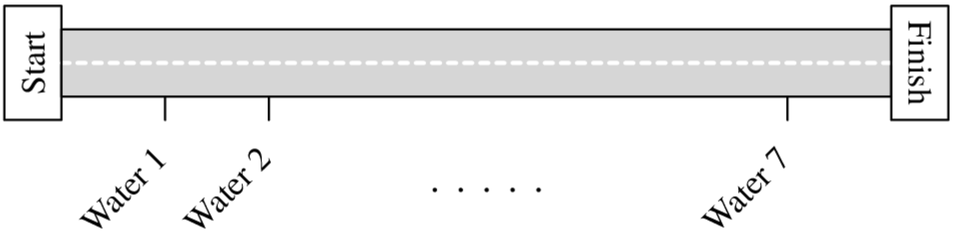


$\textbf{(A) } \frac{1}{4} \qquad \textbf{(B) } \frac{11}{36} \qquad \textbf{(C) } \frac{1}{3} \qquad \textbf{(D) } \frac{19}{36} \qquad \textbf{(E) } \frac{5}{9}$

Solution

Problem 13

Along the route of a bicycle race, 7 water stations are evenly spaced between the start and finish lines, as shown in the figure below. There are also 2 repair stations evenly spaced between the start and finish lines. The 3rd water station is located 2 miles after the 1st repair station. How long is the race in miles?



$\textbf{(A) } 8 \qquad \textbf{(B) } 16 \qquad \textbf{(C) } 24 \qquad \textbf{(D) } 48 \qquad \textbf{(E) } 96$

Solution

Problem 14

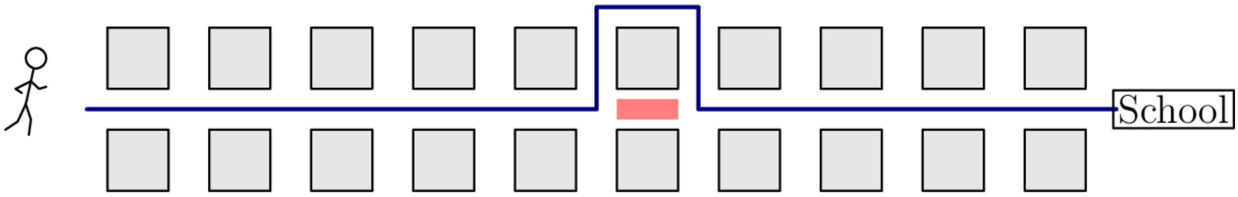
Nicolas is planning to send a package to his friend Anton, who is a stamp collector. To pay for the postage, Nicolas would like to cover the package with a large number of stamps. Suppose he has a collection of 5-cent, 10-cent, and 25-cent stamps, with exactly 20 of each type. What is the greatest number of stamps Nicolas can use to make exactly $\$7.10$ in postage? (Note: The amount $\$7.10$ corresponds to 7 dollars and 10 cents. One dollar is worth 100 cents.)

$\textbf{(A) } 45 \qquad \textbf{(B) } 46 \qquad \textbf{(C) } 51 \qquad \textbf{(D) } 54 \qquad \textbf{(E) } 55$

Solution

Problem 15

Viswam walks half a mile to get to school each day. His route consists of 10 city blocks of equal length and he takes 1 minute to walk each block. Today, after walking 5 blocks, Viswam discovers he has to make a detour, walking 3 blocks of equal length instead of 1 block to reach the next corner. From the time he starts his detour, at what speed, in mph, must he walk, in order to get to school at his usual time?



$\textbf{(A) } 4 \qquad \textbf{(B) } 4.2 \qquad \textbf{(C) } 4.5 \qquad \textbf{(D) } 4.8 \qquad \textbf{(E) } 5$

Solution

Problem 16

The letters P, Q, and R are entered into a 20×20 table according to the pattern shown below. How many Ps, Qs, and Rs will appear in the completed table?

⋮	⋮	⋮	⋮	⋮	⋰
Q	R	P	Q	R	⋯
P	Q	R	P	Q	⋯
R	P	Q	R	P	⋯
Q	R	P	Q	R	⋯
P	Q	R	P	Q	⋯

$\textbf{(A) } 132\text{ Ps}, 134\text{ Qs}, 134\text{ Rs}$

$\textbf{(B) } 133\text{ Ps}, 133\text{ Qs}, 134\text{ Rs}$

$\textbf{(C) } 133\text{ Ps}, 134\text{ Qs}, 133\text{ Rs}$

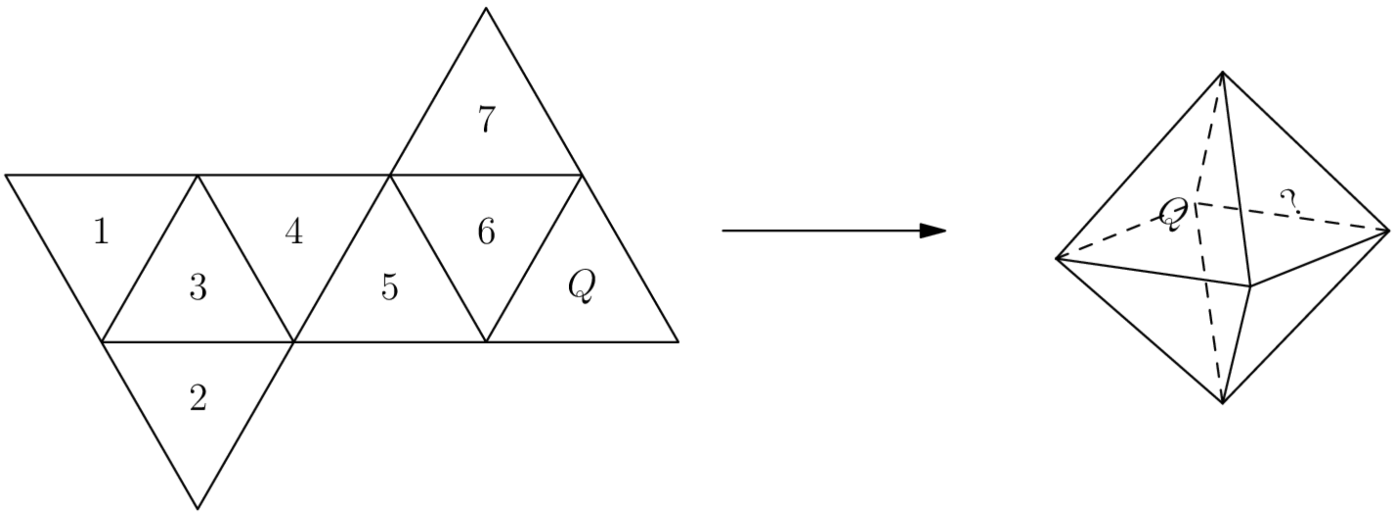
$\textbf{(D) } 134\text{ Ps}, 132\text{ Qs}, 134\text{ Rs}$

$\textbf{(E) } 134\text{ Ps}, 133\text{ Qs}, 133\text{ Rs}$

Solution

Problem 17

A *regular octahedron* has eight equilateral triangle faces with four faces meeting at each vertex. Jun will make the regular octahedron shown on the right by folding the piece of paper shown on the left. Which numbered face will end up to the right of Q?



$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 3 \qquad \textbf{(D)}\ 4 \qquad \textbf{(E)}\ 5$

Solution

Problem 18

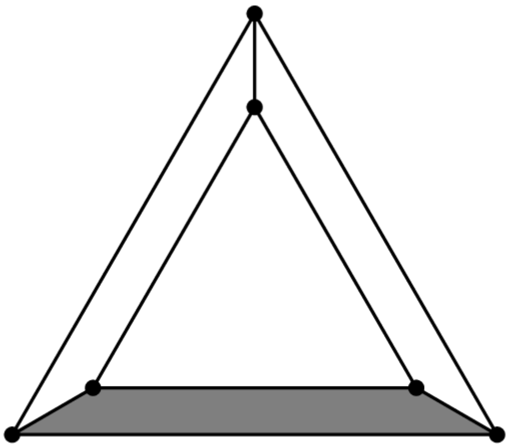
Greta Grasshopper sits on a long line of lily pads in a pond. From any lily pad, Greta can jump 5 pads to the right or 3 pads to the left. What is the fewest number of jumps Greta must make to reach the lily pad located 2023 pads to the right of her starting point?

$\textbf{(A)}\ 405 \qquad \textbf{(B)}\ 407 \qquad \textbf{(C)}\ 409 \qquad \textbf{(D)}\ 411 \qquad \textbf{(E)}\ 413$

Solution

Problem 19

An equilateral triangle is placed inside a larger equilateral triangle so that the region between them can be divided into three congruent trapezoids, as shown below. The side length of the inner triangle is $\frac{2}{3}$ the side length of the larger triangle. What is the ratio of the area of one trapezoid to the area of the inner triangle?



$\textbf{(A)}\ 1:3 \qquad \textbf{(B)}\ 3:8 \qquad \textbf{(C)}\ 5:12 \qquad \textbf{(D)}\ 7:16 \qquad \textbf{(E)}\ 4:9$

Solution

Problem 20

Two integers are inserted into the list $3, 3, 8, 11, 28$ to double its range. The mode and median remain unchanged. What is the maximum possible sum of two additional numbers?

$\textbf{(A)}\ 56 \qquad \textbf{(B)}\ 57 \qquad \textbf{(C)}\ 58 \qquad \textbf{(D)}\ 60 \qquad \textbf{(E)}\ 61$

Solution

Problem 21

Alina writes the numbers $1, 2, \dots, 9$ on separate cards, one number per card. She wishes to divide the cards into 3 groups of 3 cards so that the sum of the numbers in each group will be the same. In how many ways can this be done?

$\textbf{(A)}\ 0 \qquad \textbf{(B)}\ 1 \qquad \textbf{(C)}\ 2 \qquad \textbf{(D)}\ 3 \qquad \textbf{(E)}\ 4$

Solution

Problem 22

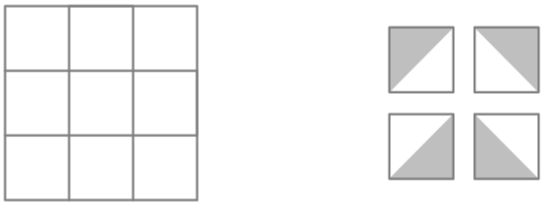
In a sequence of positive integers, each term after the second is the product of the previous two terms. The sixth term is 4000. What is the first term?

$\textbf{(A)}\ 1 \qquad \textbf{(B)}\ 2 \qquad \textbf{(C)}\ 4 \qquad \textbf{(D)}\ 5 \qquad \textbf{(E)}\ 10$

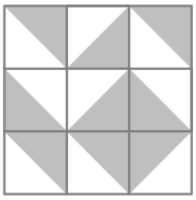
Solution

Problem 23

Each square in a 3×3 grid is randomly filled with one of the 4 gray and white tiles shown below on the right.



What is the probability that the tiling will contain a large gray diamond in one of the smaller 2×2 grids? Below is an example of such tiling.

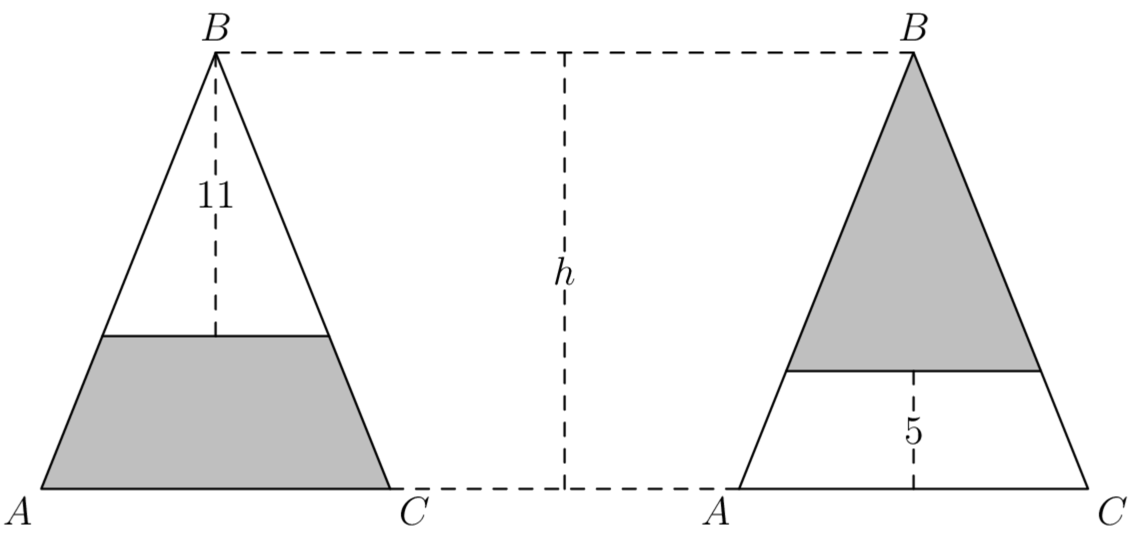


$\textbf{(A) } \frac{1}{1024} \qquad \textbf{(B) } \frac{1}{256} \qquad \textbf{(C) } \frac{1}{64} \qquad \textbf{(D) } \frac{1}{16} \qquad \textbf{(E) } \frac{1}{4}$

Solution

Problem 24

Isosceles triangle ABC has equal side lengths AB and BC. In the figures below, segments are drawn parallel to $\overline{AC}$ so that the shaded portions of $\triangle ABC$ have the same area. The heights of the two unshaded portions are 11 and 5 units, respectively. What is the height h of $\triangle ABC$?



$\textbf{(A) } 14.6 \qquad \textbf{(B) } 14.8 \qquad \textbf{(C) } 15 \qquad \textbf{(D) } 15.2 \qquad \textbf{(E) } 15.4$

Solution

Problem 25

Fifteen integers $a_1, a_2, a_3, \dots, a_{15}$ are arranged in order on a number line. The integers are equally spaced and have the property that

$$1 \le a_1 \le 10, \ 13 \le a_2 \le 20, \quad \text{and} \quad 241 \le a_{15} \le 250.$$

What is the sum of digits of a_{14}?

$\textbf{(A)}\ 8 \qquad \textbf{(B)}\ 9 \qquad \textbf{(C)}\ 10 \qquad \textbf{(D)}\ 11 \qquad \textbf{(E)}\ 12$

Solution

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2024 AMC 8 Problems

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Contents

Problem 1

What is the ones digit of

$$222,222-22,222-2,222-222-22-2?$$

$\textbf{(A) } 0\qquad\textbf{(B) } 2\qquad\textbf{(C) } 4\qquad\textbf{(D) } 6\qquad\textbf{(E) } 8$

Solution

Problem 2

What is the value of this expression in decimal form?

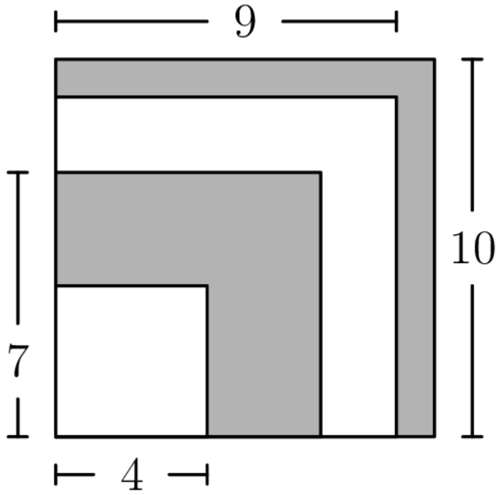
$$\frac{44}{11}+\frac{110}{44}+\frac{44}{1100}$$

$\textbf{(A) } 6.4 \qquad \textbf{(B) } 6.504 \qquad \textbf{(C) } 6.54 \qquad \textbf{(D) } 6.9 \qquad \textbf{(E) } 6.94$

Solution

Problem 3

Four squares of side lengths $4, 7, 9,$ and 10 units are arranged in increasing size order so that their left edges and bottom edges align. The squares alternate in the color pattern white-gray-white-gray, respectively, as shown in the figure. What is the area of the visible gray region in square units?



$\textbf{(A) } 42 \qquad \textbf{(B) } 45 \qquad \textbf{(C) } 49 \qquad \textbf{(D) } 50 \qquad \textbf{(E) } 52$

Solution

Problem 4

When Yunji added all the integers from 1 to 9, she mistakenly left out a number. Her incorrect sum turned out to be a square number. What number did Yunji leave out?

$\textbf{(A) } 5 \qquad \textbf{(B) } 6 \qquad \textbf{(C) } 7 \qquad \textbf{(D) } 8 \qquad \textbf{(E) } 9$

Solution

Problem 5

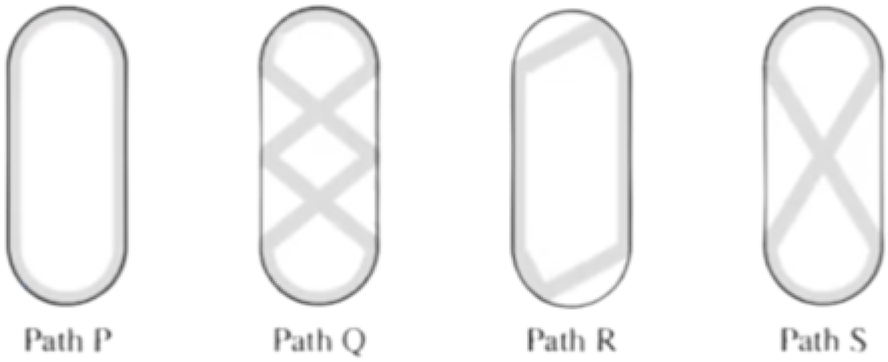
Aaliyah rolls two standard 6-sided dice. She notices that the product of the two numbers rolled is a multiple of 6. Which of the following integers cannot be the sum of the two numbers?

$\textbf{(A) } 5 \qquad \textbf{(B) } 6 \qquad \textbf{(C) } 7 \qquad \textbf{(D) } 8 \qquad \textbf{(E) } 9$

Solution

Problem 6

Sergei skated around an ice rink, gliding along different paths. The gray lines in the figures below show four of the paths labeled P, Q, R, and S. What is the sorted order of the four paths from shortest to longest?

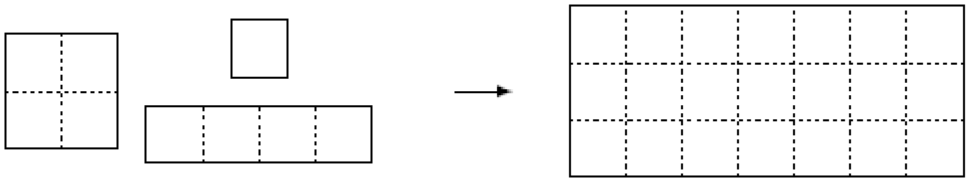


$\textbf{(A) } P, Q, R, S \qquad \textbf{(B) } P, R, S, Q \qquad \textbf{(C) } Q, S, P, R \qquad \textbf{(D) } R, P, S, Q \qquad \textbf{(E) } R, S, P, Q$

Solution

Problem 7

A 3×7 rectangle is covered without overlap by 3 shapes of tiles: 2×2, 1×4, and 1×1, shown below. What is the minimum possible number of 1×1 tiles used?



$\textbf{(A) } 1 \qquad \textbf{(B) } 2 \qquad \textbf{(C) } 3 \qquad \textbf{(D) } 4 \qquad \textbf{(E) } 5$

Solution

Problem 8

On Monday Taye has \$2. Every day, he either gains \$3 or doubles the amount of money he had on the previous day. How many different dollar amounts could Taye have on Thursday, 3 days later?

$\textbf{(A) } 3 \qquad \textbf{(B) } 4 \qquad \textbf{(C) } 5 \qquad \textbf{(D) } 6 \qquad \textbf{(E) } 7$

Solution

Problem 9

All the marbles in Maria's collection are red, green, or blue. Maria has half as many red marbles as green marbles and twice as many blue marbles as green marbles. Which of the following could be the total number of marbles in Maria's collection?

$\textbf{(A) } 24 \qquad \textbf{(B) } 25 \qquad \textbf{(C) } 26 \qquad \textbf{(D) } 27 \qquad \textbf{(E) } 28$

Solution

Problem 10

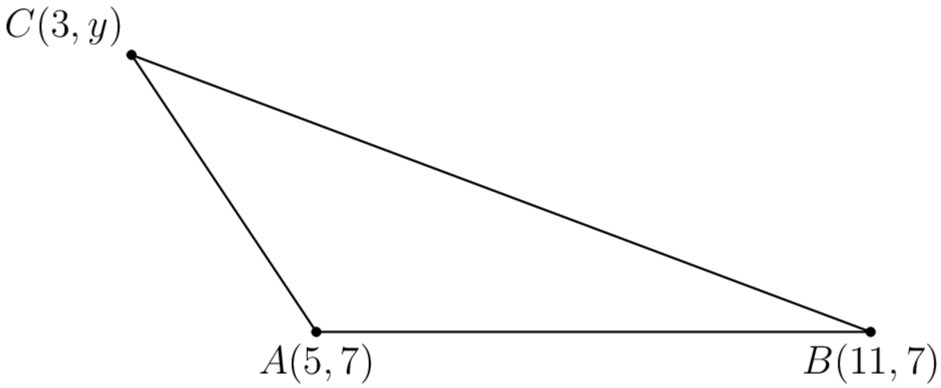
In January 1980 the Moana Loa Observation recorded carbon dioxide (CO_2) levels of 338 ppm (parts per million). Over the years the average CO_2 reading has increased by about 1.515 ppm each year. What is the expected CO_2 level in ppm in January 2030? Round your answer to the nearest integer.

$\textbf{(A) } 399 \qquad \textbf{(B) } 414 \qquad \textbf{(C) } 420 \qquad \textbf{(D) } 444 \qquad \textbf{(E) } 459$

Solution

Problem 11

The coordinates of $\triangle ABC$ are $A(5,7)$, $B(11,7)$, and $C(3,y)$, with $y > 7$. The area of $\triangle ABC$ is 12. What is the value of y?



$\textbf{(A) } 8 \qquad \textbf{(B) } 9 \qquad \textbf{(C) } 10 \qquad \textbf{(D) } 11 \qquad \textbf{(E) } 12$

Solution

Problem 12

Rohan keeps a total of 90 guppies in 4 fish tanks.

- There is 1 more guppy in the 2nd tank than the 1st tank.
- There are 2 more guppies in the 3rd tank than the 2nd tank.
- There are 3 more guppies in the 4th tank than the 3rd tank.

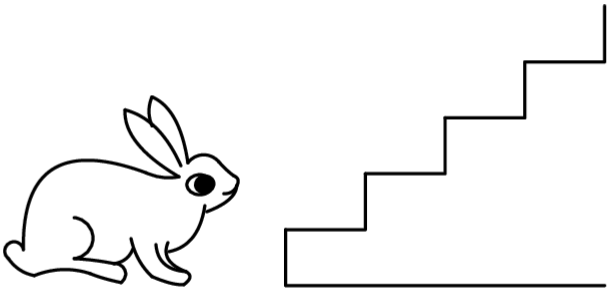
How many guppies are in the 4th tank?

$\textbf{(A) } 20 \qquad \textbf{(B) } 21 \qquad \textbf{(C) } 23 \qquad \textbf{(D) } 24 \qquad \textbf{(E) } 26$

Solution

Problem 13

Buzz Bunny is hopping up and down a set of stairs, one step at a time. In how many ways can Buzz start on the ground, make a sequence of 6 hops, and end up back on the ground? (For example, one sequence of hops is up-up-down-down-up-down.)

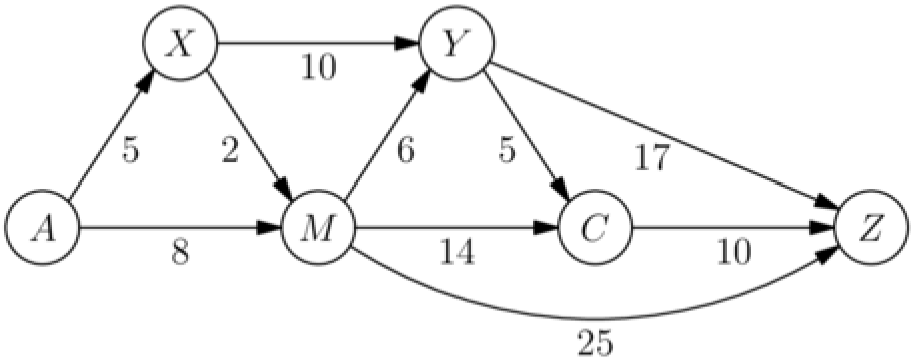


$\textbf{(A) } 4 \qquad \textbf{(B) } 5 \qquad \textbf{(C) } 6 \qquad \textbf{(D) } 8 \qquad \textbf{(E) } 12$

Solution

Problem 14

The one-way routes connecting towns $A, M, C, X, Y,$ and Z are shown in the figure below (not drawn to scale).The distances in kilometers along each route are marked. Traveling along these routes, what is the shortest distance from A to Z in kilometers?



$\textbf{(A) } 28 \qquad \textbf{(B) } 29 \qquad \textbf{(C) } 30 \qquad \textbf{(D) } 31 \qquad \textbf{(E) } 32$

Solution

Problem 15

Let the letters F,L,Y,B,U,G represent distinct digits. Suppose $\underline{F}~\underline{L}~\underline{Y}~\underline{F}~\underline{L}~\underline{Y}$ is the greatest number that satisfies the equation

$$8\cdot\underline{F}~\underline{L}~\underline{Y}~\underline{F}~\underline{L}~\underline{Y}=\underline{B}~\underline{U}~\underline{G}~\underline{B}~\underline{U}~\underline{G}.$$

What is the value of $\underline{F}~\underline{L}~\underline{Y}+\underline{B}~\underline{U}~\underline{G}$?

$\textbf{(A) } 1089 \qquad \textbf{(B) } 1098 \qquad \textbf{(C) } 1107 \qquad \textbf{(D) } 1116 \qquad \textbf{(E) } 1125$

Solution

Problem 16

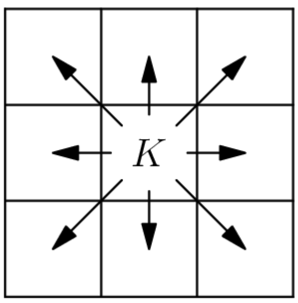
Minh enters the numbers 1 through 81 into the cells of a 9×9 grid in some order. She calculates the product of the numbers in each row and column. What is the least number of rows and columns that could have a product divisible by 3?

$\textbf{(A) } 8 \qquad \textbf{(B) } 9 \qquad \textbf{(C) } 10 \qquad \textbf{(D) } 11 \qquad \textbf{(E) } 12$

Solution

Problem 17

A chess king is said to *attack* all squares one step away from it, horizontally, vertically, or diagonally. For instance, a king on the center square of a 3 x 3 grid attacks all 8 other squares, as shown below. Suppose a white king and a black king are placed on different squares of 3 x 3 grid so that they do not attack each other. In how many ways can this be done?

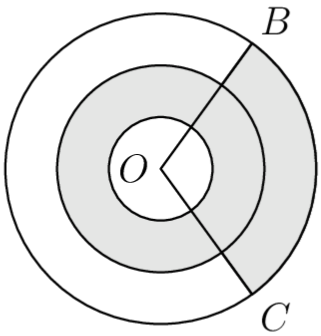


$\textbf{(A) } 20 \qquad \textbf{(B) } 24 \qquad \textbf{(C) } 27 \qquad \textbf{(D) } 28 \qquad \textbf{(E) } 32$

Solution

Problem 18

Three concentric circles centered at O have radii of 1, 2, and 3. Points B and C lie on the largest circle. The region between the two smaller circles is shaded, as is the portion of the region between the two larger circles bounded by central angle BOC, as shown in the figure below. Suppose the shaded and unshaded regions are equal in area. What is the measure of $\angle BOC$ in degrees?

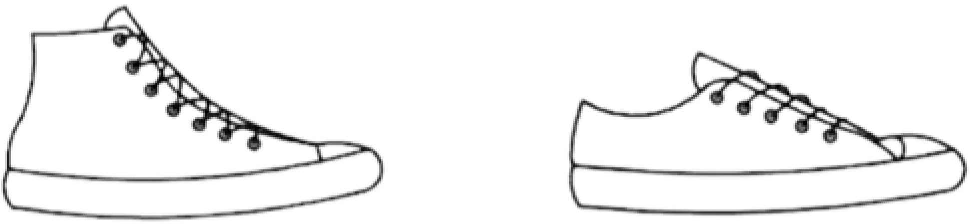


$\textbf{(A) } 108 \qquad \textbf{(B) } 120 \qquad \textbf{(C) } 135 \qquad \textbf{(D) } 144 \qquad \textbf{(E) } 150$

Solution

Problem 19

Jordan owns 15 pairs of sneakers. Three fifths of the pairs are red and the rest are white. Two thirds of the pairs are high-top and the rest are low-top. The red high-top sneakers make up a fraction of the collection. What is the least possible value of this fraction?

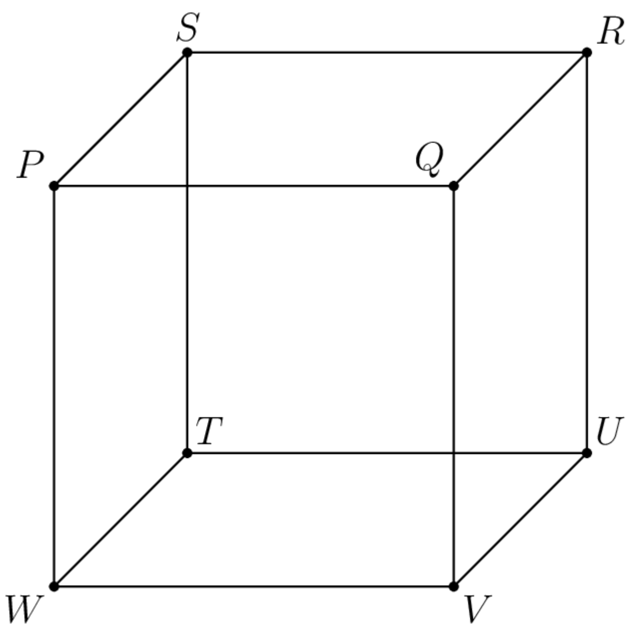


$\textbf{(A) } 0 \qquad \textbf{(B) } \frac{1}{5} \qquad \textbf{(C) } \frac{4}{15} \qquad \textbf{(D) } \frac{1}{3} \qquad \textbf{(E) } \frac{2}{5}$

Solution

Problem 20

Any three vertices of the cube $PQRSTUVW$, shown in the figure below, can be connected to form a triangle. $($For example, vertices P, Q, and R can be connected to form $\triangle PQR.)$ How many of these triangles are equilateral and contain P as a vertex?



$\textbf{(A) } 0 \qquad \textbf{(B) } 1 \qquad \textbf{(C) } 2 \qquad \textbf{(D) } 3 \qquad \textbf{(E) } 6$

Solution

Problem 21

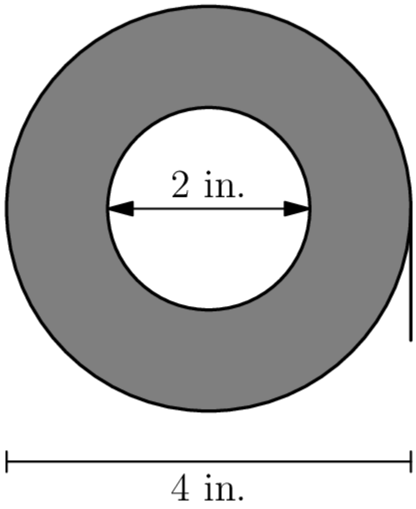
A group of frogs (called an *army*) is living in a tree. A frog turns green when in the shade and turns yellow when in the sun. Initially, the ratio of green to yellow frogs was $3 : 1$. Then 3 green frogs moved to the sunny side and 5 yellow frogs moved to the shady side. Now the ratio is $4 : 1$. What is the difference between the number of green frogs and the number of yellow frogs now?

$\textbf{(A) } 10 \qquad \textbf{(B) } 12 \qquad \textbf{(C) } 16 \qquad \textbf{(D) } 20 \qquad \textbf{(E) } 24$

Solution

Problem 22

A roll of tape is 4 inches in diameter and is wrapped around a ring that is 2 inches in diameter. A cross section of the tape is shown in the figure below. The tape is 0.015 inches thick. If the tape is completely unrolled, approximately how long would it be? Round your answer to the nearest 100 inches.

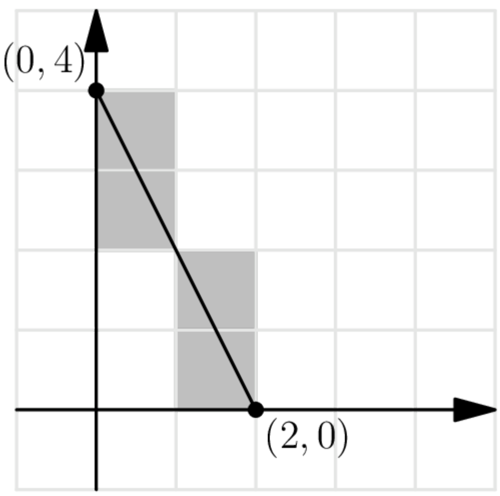


$\textbf{(A) } 300 \qquad \textbf{(B)} 600 \qquad \textbf{(C) } 1200 \qquad \textbf{(D) } 1500 \qquad \textbf{(E) } 1800$

Solution

Problem 23

Rodrigo has a very large sheet of graph paper. First he draws a line segment connecting point $(0,4)$ to point $(2,0)$ and colors the 4 cells whose interiors intersect the segment, as shown below. Next Rodrigo draws a line segment connecting point $(2000,3000)$ to point $(5000,8000)$. How many cells will he color this time?

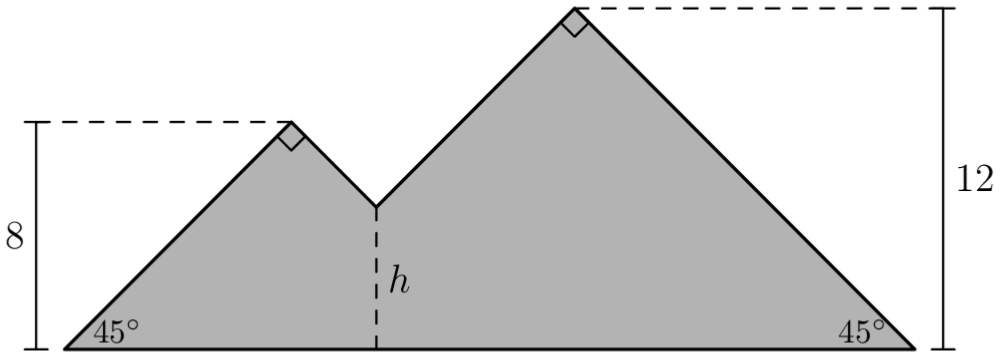


$\textbf{(A) } 6000 \qquad \textbf{(B) } 6500 \qquad \textbf{(C) } 7000 \qquad \textbf{(D) } 7500 \qquad \textbf{(E) } 8000$

Solution

Problem 24

Jean has made a piece of stained glass art in the shape of two mountains, as shown in the figure below. One mountain peak is 8 feet high while the other peak is 12 feet high. Each peak forms a 90° angle, and the straight sides form a 45° angle with the ground. The artwork has an area of 183 square feet. The sides of the mountain meet at an intersection point near the center of the artwork, h feet above the ground. What is the value of $h?$

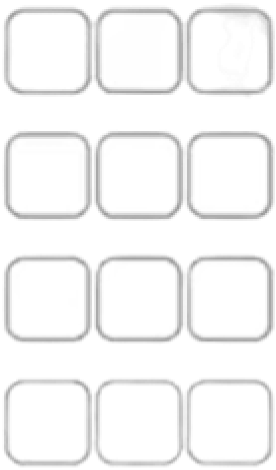


$\textbf{(A) } 4 \qquad \textbf{(B) } 5 \qquad \textbf{(C) } 4\sqrt{2} \qquad \textbf{(D) } 6 \qquad \textbf{(E) } 5\sqrt{2}$

Solution

Problem 25

A small airplane has 4 rows of seats with 3 seats in each row. Eight passengers have boarded the plane and are distributed randomly among the seats. A married couple is next to board. What is the probability there will be 2 adjacent seats in the same row for the couple?



$\textbf{(A) } \frac{8}{15} \qquad \textbf{(B) } \frac{32}{55} \qquad \textbf{(C) } \frac{20}{33} \qquad \textbf{(D) } \frac{34}{55} \qquad \textbf{(E) } \frac{8}{11}$

Solution

See Also

2024 AMC 8 (**Problems** • **Answer Key** • Resources (http://www.artofproblemsolving.com/Forum/resources.php?c=182&cid=42&year=2024))	
Preceded by **2023 AMC 8**	Followed by **2025 AMC 8**
1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • 10 • 11 • 12 • 13 • 14 • 15 • 16 • 17 • 18 • 19 • 20 • 21 • 22 • 23 • 24 • 25	
All AJHSME/AMC 8 Problems and Solutions	

- AMC 8
- AMC 8 Problems and Solutions
- Mathematics Competition Resources

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Soluciones

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	A	A	E	B	E	C	B	B	C	D	D	B	C	B	A	B	D	D	E	B	B	D	D	B	E	C
2	B	A	B	E	D	A	C	D	C	D	C	C	D	E	C	A	D	A	C	B	C	C	E	A	D	D
3	D	C	E	B	A	E	E	D	B	C	E	A	B	B	D	D	E	C	D	A	D	A	C	A	C	C
4	C	C	C	E	E	E	E	E	E	B	C	B	E	E	A	E	E	B	C	B	C	B	D	C	B	C
5	C	D	A	B	D	B	B	E	C	B	C	A	A	B	D	C	C	C	B	D	B	D	B	E	D	B
6	D	E	B	B	C	D	C	D	B	A	C	C	C	B	E	A	B	A	B	C	C	C	E	D	A	E
7	C	B	C	D	D	C	D	A	A	B	B	B	D	D	E	B	A	E	A	B	B	B	D	E	C	B
8	A	E	B	C	E	D	D	C	D	C	D	B	B	C	A	D	E	D	A	B	E	E	B	D	B	D
9	A	E	C	C	C	D	B	B	D	A	C	D	C	C	C	D	D	B	C	D	D	C	B	D	B	D
10	C	B	B	E	D	A	B	B	B	A	A	D	C	E	E	E	A	E	E	E	D	A	D	D	D	B
11	E	A	B	C	B	E	B	B	C	B	D	D	A	C	D	C	C	C	B	C	C	C	D	A	D	B
12	B	D	C	A	E	B	D	C	E	A	E	B	D	A	B	D	A	B	E	B	D	D	A	C	D	D
13	B	C	E	C	A	C	C	B	D	C	E	E	A	C	C	C	D	E	B	E	C	D	C	C	B	E
14	B	C	B	E	C	B	D	D	C	E	B	B	D	E	D	D	C	B	D	C	B	B	C	C	B	C
15	C	B	D	D	D	E	C	C	A	A	B	E	B	D	D	C	A	E	B	C	C	C	A	B	D	C
16	D	A	E	B	A	D	B	B	C	E	C	C	E	B	B	C	E	E	D	C	D	E	A	D	D	B
17	D	E	D	C	B	A	C	B	B	D	D	C	E	C	C	A	B	C	E	D	E	B	C	D	B	D
18	E	B	C	B	B	C	C	A	A	B	C	A	B	B	E	E	D	E	D	A	C	D	D	E	C	C
19	B	D	A	A	B	B	C	C	A	E	D	C	D	A	B	C	D	D	C	B	A	D	C	B	D	C
20	C	D	A	D	D	A	A	D	D	D	B	A	A	D	B	A	A	D	D	D	A	C	A	B	D	A
21	E	E	C	B	D	B	A	B	D	C	B	D	D	B	B	B	D	E	B	D	C	A	D	C	D	C
22	B	C	D	D	C	B	D	C	D	D	A	B	E	D	D	C	E	C	C	B	E	D	C	A	D	E
23	E	B	D	C	C	B	A	B	C	D	B	E	C	C	C	B	D	B	A	D	B	A	B	C	B	B
24	D	B	D	E	E	C	E	A	C	B	C	C	C	E	B	D	B	B	B	C	B	A	C	C	E	A
25	A	D	A	D	C	C	C	D	E	A	D	A	D	D	A	B	D	B	C	D	A	B	B	A	E	E

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2022	2023	2024
1	E	E	A	A	A	C	A	A	D	E	A	D	B
2	E	B	D	E	D	A	E	D	E	C	D	E	C
3	D	B	E	B	D	A	C	D	E	D	E	B	E
4	C	C	C	E	E	B	D	C	D	B	E	D	E
5	D	E	E	C	A	E	B	E	B	C	C	B	B
6	D	E	C	D	B	B	D	C	C	A	C	C	D
7	C	B	C	B	E	B	A	B	A	C	B	B	E
8	B	D	C	D	D	C	D	C	E	C	B	A	D
9	E	C	C	D	D	B	D	B	B	D	B	B	E
10	C	D	C	A	B	D	C	C	B	C	E	D	B
11	A	D	D	A	B	B	C	C	D	E	D	C	D
12	B	A	B	B	C	B	D	B	A	A	B	B	E
13	C	C	A	D	D	D	B	A	A	B	D	D	B
14	C	B	C	B	D	A	C	D	C	D	D	E	A
15	D	D	B	C	D	C	D	D	B	C	C	B	C
16	C	C	E	B	B	D	D	C	D	E	B	C	D
17	A	B	B	B	D	D	C	A	B	B	B	A	E
18	D	A	B	D	B	C	B	E	C	A	C	D	A
19	D	C	D	A	A	E	D	C	C	B	C	C	C
20	D	B	C	B	D	A	B	A	D	B	D	D	D
21	C	D	E	A	C	B	A	E	E	A	C	C	E
22	D	D	E	E	C	C	D	B	E	E	A	D	B
23	D	C	B	A	D	C	C	D	B	B	D	C	C
24	A	A	C	C	B	A	D	C	B	A	C	A	B
25	A	C	A	B	C	B	B	E	C	A	E	A	C