

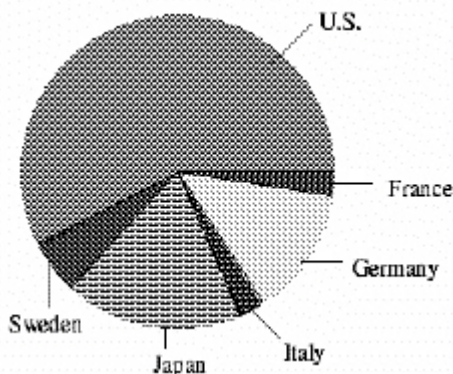
Name:

AP Statistics Chapter 1 Test Study Guide

Multiple Choice

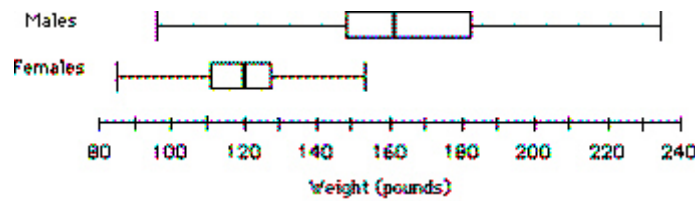
Identify the choice that best completes the statement or answers the question.

1. You measure the age, marital status and earned income of an SRS of 1463 women. The number and type of variables you have measured is
- 1463; all quantitative.
 - four; two categorical and two quantitative.
 - four; one categorical and three quantitative.
 - three; two categorical and one quantitative.
 - three; one categorical and two quantitative.
2. Consumers' Union measured the gas mileage in miles per gallon of 38 1978–1979 model automobiles on a special test track. The pie chart below provides information about the country of manufacture of the model cars used by Consumers Union. Based on the pie chart, we may conclude that:



- Japanese cars get significantly lower gas mileage than cars of other countries. This is because their slice of the pie is at the bottom of the chart.
 - U.S cars get significantly higher gas mileage than cars from other countries.
 - Swedish cars get gas mileages that are between those of Japanese and U.S. cars.
 - Mercedes, Audi, Porsche, and BMW represent approximately a quarter of the cars tested.
 - More than half of the cars in the study were from the United States.
3. “Normal” body temperature varies by time of day. A series of readings was taken of the body temperature of a subject. The mean reading was found to be 36.5°C with a standard deviation of 0.3°C (recall that $^{\circ}\text{F} = ^{\circ}\text{C}(1.8) + 32$). When converted to $^{\circ}\text{F}$, the mean and standard deviation are:
- 97.7, 32
 - 97.7, 0.30
 - 97.7, 0.54
 - 97.7, 0.97
 - 97.7, 1.80
4. Which of the following is likely to have a mean that is smaller than the median?
- The salaries of all National Football League players.
 - The scores of students (out of 100 points) on a very easy exam in which most get nearly perfect scores but a few do very poorly.
 - The prices of homes in a large city.
 - The scores of students (out of 100 points) on a very difficult exam in which most get poor scores but a few do very well.
 - Amounts awarded by civil court juries.

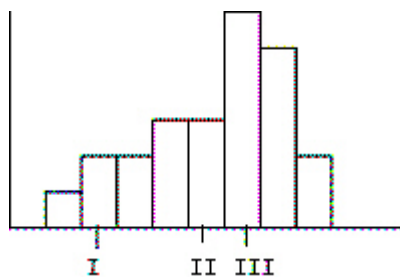
5. The weights of the male and female students in a class are summarized in the following boxplots:



Which of the following is NOT correct?

- About 50% of the male students have weights between 150 and 185 pounds.
- About 25% of female students have weights more than 130 pounds.
- The median weight of male students is about 162 pounds.
- The mean weight of female students is about 120 pounds because of symmetry.
- The male students have less variability than the female students.

6. For the following histogram, what is the proper ordering of the mean, median, and mode? Note that the graph is NOT numerically precise—only the relative positions are important.



- I = mean, II = median, III = mode
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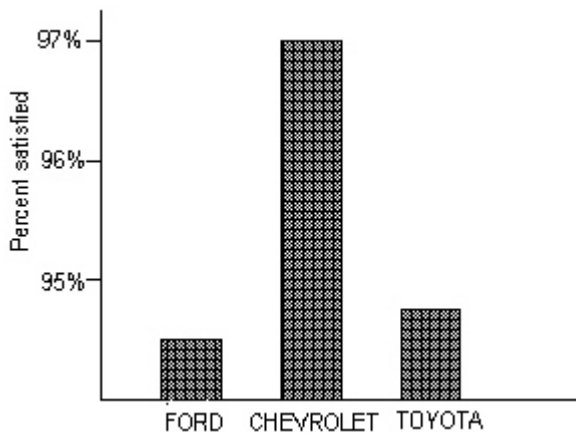
7. A medical researcher collects health data on many women in each of several countries. One of the variables measured for each woman in the study is her weight in pounds. The following list gives the five-number summary for the weights of women in one of the countries.

Country A: 100, 110, 120, 160, 200

About what percentage of Country A women weigh between 110 and 200 pounds?

- 50%
- 65%
- 75%
- 85%
- 95%

8. The following bar graph gives the percent of owners of three brands of trucks who are satisfied with their truck.



From this graph we may legitimately conclude that:

- Owners of other brands of trucks are less satisfied than the owners of these three brands.
- Chevrolet owners are substantially more satisfied than Ford or Toyota owners.
- There is very little difference in the satisfaction of owners for the three brands.
- Chevrolet probably sells more trucks than Ford or Toyota.
- A pie chart would have been a better choice for displaying this data.



9. A sample of 99 distances has a mean of 24 feet and a median of 24.5 feet. Unfortunately, it has just been discovered that an observation which was erroneously recorded as “30” actually had a value of “35”. If we make this correction to the data, then:

- The mean remains the same, but the median is increased.
- The mean and median remain the same.
- The median remains the same, but the mean is increased.
- The mean and median are both increased.
- We do not know how the mean and median are affected without further calculations, but the variance is increased.



10. The five-number summary for scores on a statistics exam is 11, 35, 61, 70, 79. In all, 380 students took the test. About how many had scores between 35 and 61?

- 26
- 76
- 95
- 190
- None of these

AP Statistics – Chapter 1 Free Response Practice Test

1. The test grades for a certain class were entered into a Minitab worksheet, and then “Descriptive Statistics” were requested. The results were

```
MTB > Describe 'Grades'.
```

Grades	N	MEAN	MEDIAN	TRMEAN	STDEV	SEMEAN
	28	74.71	76.00	75.50	12.61	2.38
Grades	MIN	MAX	Q1	Q3		
	35.00	94.00	68.00	84.00		

- (a) Determine the IQR for this data.
- (b) Using the answer from part (a), determine whether the lowest and highest values in the data are outliers.
2. The following data represent scores of 50 students on a calculus test.

72	72	93	70	59	78	74	65	73	80
57	67	72	57	83	76	74	56	68	67
74	76	79	72	61	72	73	76	67	49
71	53	67	65	99	83	69	61	72	68
65	51	75	68	75	66	77	61	64	74

- (a) Construct a *frequency* histogram for this data set.
- (b) Describe the shape, center, and spread of the distribution of test scores.
3. During the early part of the 1994 baseball season, many sports fans and baseball players noticed that the number of home runs being hit seemed to be unusually large. Here are the data on the number of home runs hit by American and National League teams:

American League	35, 40, 43, 49, 51, 54, 57, 58, 58, 64, 68, 68, 75, 77
National League	29, 31, 42, 46, 47, 48, 48, 53, 55, 55, 55, 63, 63, 67

- (a) Construct a back-to-back stemplot to compare the number of home runs hit in the two leagues.
- (b) Write a few sentences comparing the distributions of home runs in the two leagues. Be sure to include a comparison of the medians as part of your discussion.

Name:

Score: 0 / 10 points (0%)

AP Statistics Chapter 1 Test Study Guide

Multiple Choice

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ANSWER: E

A **quantitative variable** takes numerical values.

A **categorical variable** places individuals into one of several groups or categories.

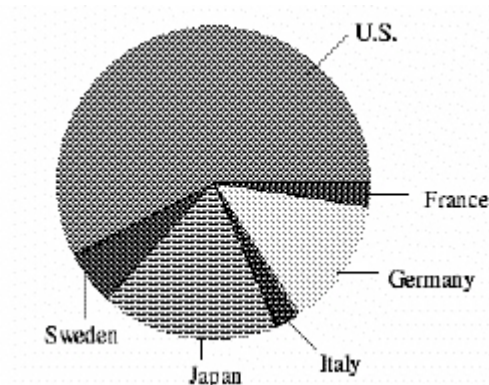
Age is a quantitative variable.

Marital status is a categorical variable (married, divorced, etc...).

Earned income is a quantitative variable.

POINTS: 0 / 1

2. Consumers' Union measured the gas mileage in miles per gallon of 38 1978–1979 model automobiles on a special test track. The pie chart below provides information about the country of manufacture of the model cars used by Consumers Union. Based on the pie chart, we may conclude that:



- Japanese cars get significantly lower gas mileage than cars of other countries. This is because their slice of the pie is at the bottom of the chart.
- U.S cars get significantly higher gas mileage than cars from other countries.
- Swedish cars get gas mileages that are between those of Japanese and U.S. cars.
- Mercedes, Audi, Porsche, and BMW represent approximately a quarter of the cars tested.
- More than half of the cars in the study were from the United States.

ANSWER: E

A response to each of the answer choices:

- The graph says nothing about gas mileage - it represents country of automobile make
- See response to a)
- See response to a)
- These are all German cars but Germany doesn't make up a quarter of the pie - it

is much less than that.

e) The slice for the U.S. clearly makes up more than half of the pie. THIS IS CORRECT!

POINTS: 0 / 1

3. "Normal" body temperature varies by time of day. A series of readings was taken of the body temperature of a subject. The mean reading was found to be 36.5°C with a standard deviation of 0.3°C (recall that $^{\circ}\text{F} = ^{\circ}\text{C}(1.8) + 32$). When converted to $^{\circ}\text{F}$, the mean and standard deviation are:
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 - 97.7, 0.54
 - 97.7, 0.97
 - 97.7, 1.80

ANSWER: C

The effect of multiplying all of the numbers of a data set is that all summary statistics will change by that same multiplication. Adding to a data set affects all summary statistics except measures of spread (such as standard deviation).

So the **mean** of the Fahrenheit temperatures will be $1.8 * 36.5 + 32 = 97.7$.
The **standard deviation** will be $1.8 * 0.3 = .54$.

POINTS: 0 / 1

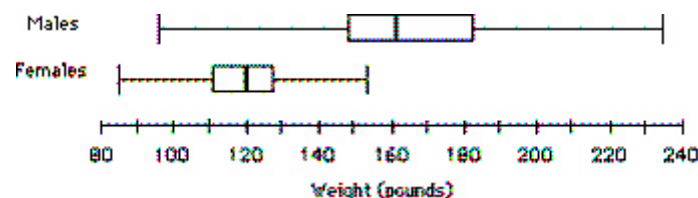
4. Which of the following is likely to have a mean that is smaller than the median?
- The salaries of all National Football League players.
 - The scores of students (out of 100 points) on a very easy exam in which most get nearly perfect scores but a few do very poorly.
 - The prices of homes in a large city.
 - The scores of students (out of 100 points) on a very difficult exam in which most get poor scores but a few do very well.
 - Amounts awarded by civil court juries.

ANSWER: B

If a few of the students do poorly, their scores will drag the mean down. That will make it lower than the median. Recall that the mean is not resistant to outliers.

POINTS: 0 / 1

5. The weights of the male and female students in a class are summarized in the following boxplots:



Which of the following is NOT correct?

- About 50% of the male students have weights between 150 and 185 pounds.
- About 25% of female students have weights more than 130 pounds.
- The median weight of male students is about 162 pounds.
- The mean weight of female students is about 120 pounds because of symmetry.
- The male students have less variability than the female students.

ANSWER: E

A response to each of the answer choices:

- 150 and 185 are the approximate values of Q_1 and Q_3 which represent the

range of the middle 50% of the data.

b) 130 is the approximate value of Q_3 which marks the 75th percentile. Thus 25% of the data will be greater than Q_3 .

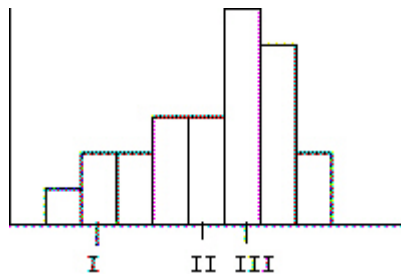
c) The line in the middle of the box in a boxplot represents the median, which for the males appears to be about 162.

d) The boxplot of the females data shows symmetry, so the mean and the median will be about the same. The median appears to be about 120, so the mean will also be about 120.

e) The spread of the box for the males is clearly much greater than that of the females boxplot. THIS IS CORRECT!

POINTS: 0 / 1

6. For the following histogram, what is the proper ordering of the mean, median, and mode? Note that the graph is NOT numerically precise—only the relative positions are important.



- I = mean, II = median, III = mode
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- I = median, II = mean, III = mode
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- I = mean, II = mode, III = median

ANSWER: A

The **mode** is the value which occurs most often. Since the bar over III is the highest, it is the mode.

Since this distribution is skewed to the left, the mean will be less than the median.

That makes the **mean** I and the **median** II (III is already the mode).

POINTS: 0 / 1

7. A medical researcher collects health data on many women in each of several countries. One of the variables measured for each woman in the study is her weight in pounds. The following list gives the five-number summary for the weights of women in one of the countries.

Country A: 100, 110, 120, 160, 200

About what percentage of Country A women weigh between 110 and 200 pounds?

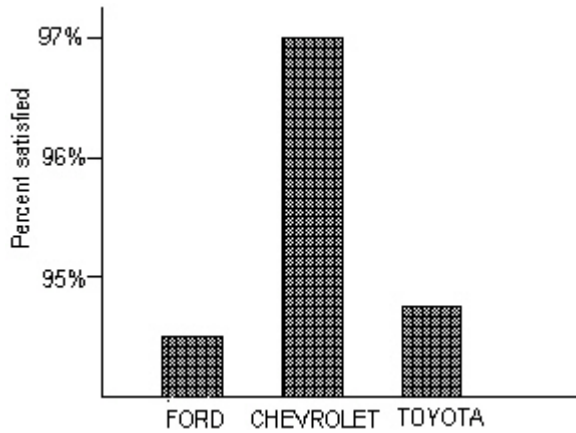
- 50%
- 65%
- 75%
- 85%
- 95%

ANSWER: C

Since 110 is the **first quartile** (Q_1), it represents the 25th percentile. So 25 percent of the data is below 110 and 75% of the data is greater than 110. That makes the percentage of data between 110 and 200 75% since 200 is the **max** or highest value in the data set.

POINTS: 0 / 1

8. The following bar graph gives the percent of owners of three brands of trucks who are satisfied with their truck.



From this graph we may legitimately conclude that:

- Owners of other brands of trucks are less satisfied than the owners of these three brands.
- Chevrolet owners are substantially more satisfied than Ford or Toyota owners.
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- Chevrolet probably sells more trucks than Ford or Toyota.
- A pie chart would have been a better choice for displaying this data.

ANSWER: C

The graph in this problem is deceptive. Note that the bottom of the vertical scale is not 0, but approximately 94%. This magnifies the differences between the heights of the bars and makes it appear as though Chevrolet is much higher than the other two car makers. The reality is that they are only separated by 2 to 3 percentage points. If the graph had been made correctly, the difference between the lengths of the bars would be quite small.

POINTS: 0 / 1

9. A sample of 99 distances has a mean of 24 feet and a median of 24.5 feet. Unfortunately, it has just been discovered that an observation which was erroneously recorded as “30” actually had a value of “35”. If we make this correction to the data, then:
- The mean remains the same, but the median is increased.
 - The mean and median remain the same.
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 - The mean and median are both increased.
 - We do not know how the mean and median are affected without further calculations, but the variance is increased.

ANSWER: C

changing a value of 30 to 35 increases the total of the data and thus the mean. The median will be unaffected since the value changed is already higher than the median. The median is the middle value, which will not change if a value that is already higher than it is made even higher.

POINTS: 0 / 1

10. The five-number summary for scores on a statistics exam is 11, 35, 61, 70, 79. In all, 380 students took the test. About how many had scores between 35 and 61?
- 26
 - 76
 - 95
 - 190
 - None of these

ANSWER: C

35 is the first quartile and 61 is the median (or the second quartile). Roughly twenty-five percent or one-fourth of the data lies between these values. So one-fourth of 380 (the number of students taking the test) is 95.

POINTS: 0 / 1

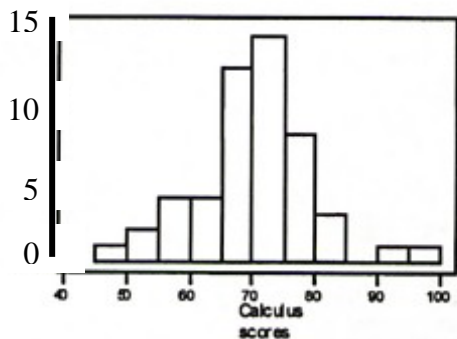
AP Statistics – Chapter 1 Free Response Practice Test – ANSWERS

1. Data: Minitab printout of summary statistics for 28 test scores

- a) $IQR = Q_3 - Q_1 = 84 - 68 = 16$
- b) Low Outlier: $Q_1 - 1.5 * IQR = 68 - 1.5 * 16 = 68 - 24 = 44$. Since the lowest value (35) is less than 44, it is an outlier.
- High Outlier: $Q_3 + 1.5 * IQR = 84 + 1.5 * 16 = 84 + 24 = 108$. Since the highest value (94) is not greater than 108, it is not an outlier.

2. Data: 50 Calculus test scores

- a) Using class/bar widths of 5, we get:



- b) Description of Data

SHAPE – Roughly symmetric,

CENTER – about 73

SPREAD – 45 to 100

It would also be OK to use class widths of 10, but bars will be fewer and higher.

3. Data: Homeruns hit in 1994 AL vs NL

- a) American League (AL) National League (NL)
- | | |
|-------|-------|
| 2 | 9 |
| 5 | 3 |
| 930 | 4 |
| 88741 | 5 |
| 884 | 6 |
| 75 | 7 |
| | 26788 |
| | 3555 |
| | 337 |

- b) Overall, the American League teams hit more home runs than National League teams in 1994. To illustrate this, the median for the AL was 57.5 while the median for the NL was only 50.5. Additionally, the low value for the NL is much lower than in the AL (29 versus 35) and the high value in the AL is much higher than that in the NL (77 versus 67).