

#1 Prime Factors

HCF $\rightarrow$ Multiply all numbers in the middle of venn diagram

LCM $\rightarrow$ Multiply all numbers in the whole venn diagram

#2 Fractions

Addition $\rightarrow$ Find a common denominator

Multiplication $\rightarrow$ Top $\times$ Top and Bottom $\times$ Bottom

Division $\rightarrow$ KFC $\rightarrow$ Keep, Flip, Change

#3 Probability

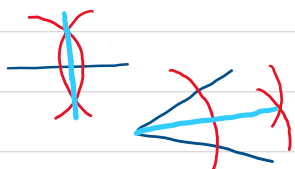
Sum of all outcomes $\rightarrow$ Equals 1

#4 Sequences

n^{th} term $\rightarrow$ Difference $\times n$ + zeroth term

#5 Constructions

Perpendicular Bisector $\rightarrow$



Bisecting an angle $\rightarrow$

#6 Transformations

Translation $\rightarrow$ By vector $\begin{pmatrix} a \\ b \end{pmatrix}$ $\begin{matrix} a \text{ right} & -a \text{ left} \\ b \text{ up} & -b \text{ down} \end{matrix}$

Reflection $\rightarrow$ In line $x=a$ (horizontal) $y=b$ (vertical)

Rotation $\rightarrow$ Centre, angle, direction (Cw or ACw)

Enlargement $\rightarrow$ Centre, Scale Factor

#7 Averages

Mean $\rightarrow \frac{\sum x}{n}$

Mode $\rightarrow$ The most frequent

Median $\rightarrow$ The middle value when data is ordered

Range $\rightarrow$ The largest minus the smallest

IQR $\rightarrow$ The upper quartile minus the lowest quartile

#8 Frequency Tables

Mean $\rightarrow \frac{\sum \text{Midpoints} \times \text{Frequency}}{\sum \text{Frequency}}$

Modal class $\rightarrow$ Most frequent class

#10 Standard Form

Required Form $\rightarrow a \times 10^n$ where $1 \leq a < 10$

#11 Percentages

Multiplier $\rightarrow$ Increase = $\frac{100+x}{100}$ Decrease = $\frac{100-x}{100}$

% Change $\rightarrow \frac{\text{Change}}{\text{Original}} \times 100$

Reverse % $\rightarrow$ Original = New $\div$ Multiplier

#12 Compound Interest

Formula $\rightarrow$ New = Original $\times$ Multiplier^{years}

#14 Expanding Brackets

FOIL $\rightarrow (a+b)(c+d)$

#15 Factorising

$x^2+bx+c \rightarrow$ Two numbers that add to b & times to c

$ax^2+bx+c \rightarrow$ ac Method

#17 Inequalities

$<, >$ $\rightarrow$ less than, greater than

$\leq, \geq$ $\rightarrow$ less than or equal, greater than or equal

Divide or Multiply by a negative $\rightarrow$ Flip the Sign

#18 Graph Inequalities

$y < mx+c \rightarrow$ Shade below the line

$y > mx+c \rightarrow$ Shade above the line.

#19 Simultaneous Equations

Same Sign $\rightarrow$ Subtract e.g. $3x - 2y = 7$ +

Different Sign $\rightarrow$ Add $7x + 2y = 33$

#20 Indices

$a^m \times a^n \rightarrow a^{m+n}$ $a^0 \rightarrow 1$

$a^m \div a^n \rightarrow a^{m-n}$ $a^1 \rightarrow a$

$(a^m)^n \rightarrow a^{m \times n}$ $a^{\frac{1}{n}} \rightarrow \sqrt[n]{a}$

$a^{-m} \rightarrow \frac{1}{a^m}$ $a^{\frac{m}{n}} \rightarrow \sqrt[n]{a^m}$

#21 Measures

Speed $\rightarrow$

Density $\rightarrow$

Pressure $\rightarrow$



Units $\rightarrow$ $\text{Km} = 1000\text{m}$, $\text{M} = 100\text{cm}$, $\text{cm} = 10\text{mm}$

$\text{Km}^2 = 1000^2\text{m}^2$, $\text{M}^2 = 100^2\text{cm}^2$, $\text{cm}^2 = 10^2\text{mm}^2$

$\text{Km}^3 = 1000^3\text{m}^3$, $\text{M}^3 = 100^3\text{cm}^3$, $\text{cm}^3 = 10^3\text{mm}^3$



#22 Angles

- Straight line $\rightarrow$ Adds to 180
 Around a point $\rightarrow$ Adds to 360
 Corresponding $\rightarrow$ Equal 
 Alternate $\rightarrow$ Equal 
 Vertically Opposite $\rightarrow$ Equal 
 Co-Interior $\rightarrow$ Add to 180 

#23 Angles in Polygons

- Σ Interior angles $\rightarrow (n-2) \times 180$
 Σ Exterior angles $\rightarrow 360$
 Interior + Exterior $\rightarrow 180$

#24 Bearings

- Measured $\rightarrow$ From North and clockwise
 Back bearings $\rightarrow$ Differ by 180

#25 Pythagoras

- Finding the long side $\rightarrow c = \sqrt{a^2 + b^2}$
 Finding a short side $\rightarrow a = \sqrt{c^2 - b^2}$

#26 Trigonometry

- Sine $\rightarrow \sin \theta = \frac{O}{H}$
 Cosine $\rightarrow \cos \theta = \frac{A}{H}$
 Tangent $\rightarrow \tan \theta = \frac{O}{A}$

#27 Area

- Parallelograms $\rightarrow b \times h$
 Triangle $\rightarrow \frac{1}{2} b \times h$
 Trapezium $\rightarrow \frac{1}{2} (a+b) \times h$
 Circle $\rightarrow \pi r^2$ Circumference $\rightarrow 2\pi r$

#28 Volume

- Volume of Prism $\rightarrow$ Cross-Sectional Area $\times$ Height
 Surface Area $\rightarrow$ Sum the areas of all the faces
 Volume of Cylinder $\rightarrow \pi r^2 h$
 Curved Surface Area $\rightarrow 2\pi r h$
 Total Surface Area $\rightarrow 2\pi r h + 2\pi r^2$



#30 Straight lines

- $y = mx + c \rightarrow m = \text{gradient } c = y\text{-intercept}$
 Gradient $\rightarrow \frac{y_2 - y_1}{x_2 - x_1}$
 Length of line $\rightarrow \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
 Midpoint $\rightarrow (\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$
 Parallel $\rightarrow$ Same gradient

#31 Sketching Graphs

- Quadratic $\rightarrow x^2$  $-x^2$ 
 Cubic $\rightarrow x^3$  $-x^3$ 
 Reciprocal $\rightarrow \frac{1}{x}$  $-\frac{1}{x}$ 
 Trigonometric $\rightarrow \sin$  $\cos$  $\tan$ 

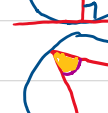
#32 Quadratics

- Solve $\rightarrow$ Factorisation, Formula, Completing Square
 Formula $\rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

#34 Probability 2

- And $\rightarrow$ Multiply
 Or $\rightarrow$ Add
 At least one $\rightarrow 1 - \text{none}$

#36 Circle Theorems

-  $\rightarrow$ Angles from same segment are equal
 Angle at centre twice circumference angle
 $\rightarrow$ Opposites in cyclic quad add to 180
 Angle in a semi-circle is 90
 $\rightarrow$ Tangent and radius 90
 Tangents that meet are equal
 $\rightarrow$ Alternate Segment Theorem
 2 radii make isosceles triangle

#37 Chord Theorems

-  $\rightarrow AP \times BP = CP \times DP$ 



#38 Set Theory

$A \cap B \rightarrow$ Intersection $\rightarrow$ Both

$A \cup B \rightarrow$ Union $\rightarrow$ Either

$A' \rightarrow$ Not A $\emptyset \rightarrow$ Empty $\mathcal{U} \rightarrow$ Universal Set

$n(A) \rightarrow$ Number of elements in A $A \subset B \rightarrow$ A is subset of B

#41 Proof

Even $\rightarrow 2n \begin{cases} \rightarrow 2m \\ \rightarrow 2n+2 \end{cases}$ Odd $\rightarrow 2n+1 \begin{cases} \rightarrow 2m+1 \\ \rightarrow 2n+3 \end{cases}$

Consecutive Integers $\rightarrow n-1, n, n+1$

#44 Proportion

Direct $\rightarrow y \propto x \rightarrow y = kx$

Inverse $\rightarrow y \propto \frac{1}{x} \rightarrow y = \frac{k}{x}$

#45 Histograms

Formula $\rightarrow$ Frequency Density = $\frac{\text{Frequency}}{\text{Class width}}$

#46 Similar Shapes

Linear Scale Factor $\rightarrow k$

Area Scale Factor $\rightarrow k^2$

Volume Scale Factor $\rightarrow k^3$

#48 Graph Transformations

$f(x)+a \rightarrow$ Translation Up $f(x)-a \rightarrow$ Translation Down

$f(x-a) \rightarrow$ Translation Right $f(x+a) \rightarrow$ Translation Left

$af(x) \rightarrow$ Stretch in y axis by scale factor a

$f(ax) \rightarrow$ Stretch in x axis by scale factor $\frac{1}{a}$

$-f(x) \rightarrow$ Reflection in x axis

$f(-x) \rightarrow$ Reflection in y axis

#49 Surds

$\sqrt{a} \times \sqrt{b} \rightarrow \sqrt{ab}$ $\sqrt{\frac{a}{b}} \rightarrow \frac{\sqrt{a}}{\sqrt{b}}$

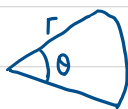
$\frac{x}{\sqrt{a}} \rightarrow$ Multiply top and bottom by $\sqrt{a}$

$\frac{x}{\sqrt{a}+b} \rightarrow$ Multiply top and bottom by $\sqrt{a}-b$

#50 Sectors

Arc Length $\rightarrow \frac{\theta}{360} \times 2\pi r$

Area $\rightarrow \frac{\theta}{360} \times \pi r^2$



#51 Cones and Spheres

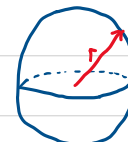
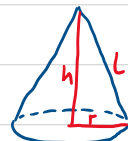
Volume of Cone $\rightarrow \frac{1}{3} \pi r^2 h$

Curved Surface Area $\rightarrow \pi r l$

Total Surface Area $\rightarrow \pi r^2 + \pi r l$

Volume of Sphere $\rightarrow \frac{4}{3} \pi r^3$

Surface Area $\rightarrow 4\pi r^2$



#52 Sine and Cosine Rules

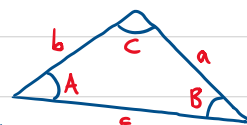
Sine for Sides $\rightarrow \frac{a}{\sin A} = \frac{b}{\sin B}$

Sine for Angles $\rightarrow \frac{\sin A}{a} = \frac{\sin B}{b}$

Cosine for Sides $\rightarrow a^2 = b^2 + c^2 - 2bc \cos A$

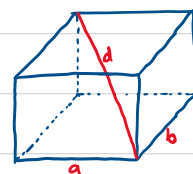
Cosine for Angles $\rightarrow \cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of Triangle $\rightarrow A = \frac{1}{2} ab \sin C$



#53 3D Pythagoras

Long diagonal of a Cuboid $\rightarrow d = \sqrt{a^2 + b^2 + c^2}$



#54 Completing the Square

Formula for $x^2 + bx + c \rightarrow (x + \frac{b}{2})^2 - (\frac{b}{2})^2 + c$

Formula for $ax^2 + bx + c \rightarrow a(x + \frac{b}{2a})^2 - a(\frac{b}{2a})^2 + c$

Minimum Point $(x+p)^2 + q \rightarrow (-p, q)$ Symmetry line $\rightarrow x = -p$

#55 Perpendicular Lines

Perpendicular Gradients $\rightarrow$ Negative reciprocal, $m_2 = \frac{-1}{m_1}$

Alternate Equation of line $\rightarrow y - y_1 = m(x - x_1)$

#56 Functions

Domain $\rightarrow$ Set of all inputs, x Range $\rightarrow$ Set of all outputs, y

Excluding values from domain $\rightarrow$ Cont: $\sqrt{\text{negative}}$ or divide by 0

Composite Functions $\rightarrow fg(x)$ Means do g then f.

Inverse Functions $\rightarrow y = f(x) \leftrightarrow x = f^{-1}(y)$

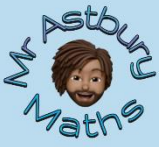
#57 Differentiation

Differentiating $y = ax^n \rightarrow \frac{dy}{dx} = nax^{n-1}$

Stationary Points $\rightarrow \frac{dy}{dx} = 0$

#58 Kinematics

Differentiate $\rightarrow$ Displacement $\rightarrow$ Velocity $\rightarrow$ Acceleration



#59 Sequences

Notation $\rightarrow a = \text{first term}$ $d = \text{difference}$ $n = \text{position}$

Summation $\rightarrow S_n = \frac{n}{2} [2a + (n-1)d]$

N^{th} term $\rightarrow a_n = a + (n-1)d$

#60 Vectors

$\vec{AB} \rightarrow \vec{AB} = \vec{OB} - \vec{OA}$

Magnitude of $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \left| \begin{pmatrix} x \\ y \end{pmatrix} \right| = \sqrt{x^2 + y^2}$

Parallel vectors $\rightarrow$ Multiples of one another $\vec{AB} = 2 \times \vec{CD}$

Collinear $\rightarrow A, B, C$ lie on a straight line

$\hookrightarrow$ Any two of $\vec{AB}$, $\vec{AC}$ and $\vec{BC}$ are parallel.