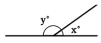
GCSE MATHS NEED TO KNOW - FOUNDATION

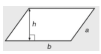
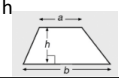
GEOMETRY

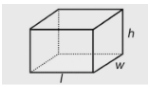
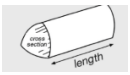
Angle facts - lines		
1	Vertically opposite angles	are equal
2	Angles on a straight line	add up to 180 
3	Angles at a point	add up to 360
4	Alternate angles	are equal
5	Corresponding angles	are equal
6	Co-interior angles	add up to 180

Angle facts – triangles and quadrilaterals		
7	Angles in a triangle	add up to 180
8	Two angles of an isosceles triangle	are equal, tow sides are equal
9	Angles in an equilateral triangle	are equal (all 60), all sides are equal
10	Angles in a quadrilateral	add up to 360

Angle facts - polygons		
11	Exterior angles of a polygon	add up to 360°
12	The interior and exterior angle of any polygon	add up to 180°
13	The sum of the interior angles of a polygon can be found by using the formula	**(number of sides-2) x 180º**
14	Regular polygons have all sides the same length and all angles the same size	

Congruence and similarity		
15	The four congruency tests are….	SSS ASA SAS RASH
16	Triangles are similar if…	All angles are the same (AAA They are an enlargement of each other
17	Area scale factor	Length scale factor ^{2}
18	Volume scale factor	Length scale factor ^{3}

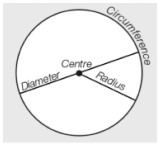
Area Formulas		
19	Area of a rectangle	= length x width
20	Area of a parallelogram	=base x perpendicular height 
21	Area of a triangle	$=\frac{1}{2}$base x perpendicular height
22	Area of a trapezium	= ½ (a + b) x h 

Volumes		
23	Volume of a cuboid	= l x w x h 
24	Volume of a prism	= area of cross section x l 
25	Volume of a cylinder	= πr^2 x h
Surface area		
26	Surface area of a prism	The sum of the area of all the 2D faces
27	Surface area of a cylinder	$2 \times \pi r^2 + \pi d \times h$

"Half the sum of the parallel sides, times the distance between them
That is how you calculate
The area of a trapezium"

"Factors come in two by two, hurrah, hurrah"

"Multiples are in the times tables…"

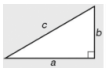
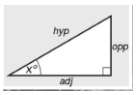
Circles		
28	Circumference = $\pi\ x\ d$	
29	Area = πr^2	
30	Area of a sector	$\frac{\theta}{360} \times \pi r^2$
31	Arc length	$\frac{\theta}{360} \times \pi d$

Describing Transformations		
34	Rotation	• Direction (clockwise or anticlockwise) • Degrees • Centre of rotation
35	Reflection	• Line of reflection
36	Translation	• Vector $\begin{pmatrix} x \\ y \end{pmatrix}$
37	Enlargement	• Scale factor • Centre of enlargement

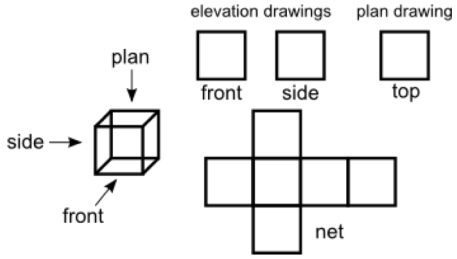
NUMBER

FDP		
38	To find a % of an amount…	Find 10% (by dividing by 10) Find 1% (by dividing by 100)
39	100%	1
40	50%	0.5 or $\frac{1}{2}$
41	25%	0.25 or $\frac{1}{4}$
42	12.5%	0.125 or $\frac{1}{8}$
43	10%	0.1 or $\frac{1}{10}$
44	% increase	Find the % and add it on
45	% decrease	Find the % and take it away
46	Compound interest	**original x % multiplier** number of years
47	Convert a fraction to a decimal	Make the denominator 10 or 100 OR Divide the numerator by the denominator
48	Convert a decimal to a %	X 100

Special Numbers		
49	A factor is	A number that divides into another number without a remainder, factors always come in pairs
50	A multiple is	A number in a given numbers times table
51	A square number	Is a number multiplied by itself: 1, 4, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225
52	A prime number	Has only two factors, one and itself: 2, 3, 5, 7, 11, 13, 17……

Pythagoras and Trigonometry		
32	Pythagoras' Theorem For a right angled triangle is…..	$a^2 + b^2 = c^2$  c is always the hypotenuse!
33	The trigonometric ratios are 	$sin\theta = \frac{opp}{hyp}$ $cos\theta = \frac{adj}{hyp}$ $tan\theta = \frac{opp}{adj}$ SOHCAHTOA

Circumference is pi times diameter, pi times diameter, pi times diameter
Circumference is pi times diameter, pi times diameter, pi times diameter
Area is pi r squared

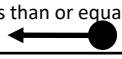
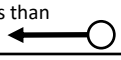
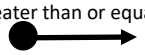
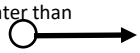


Indices		
53	$a^b \times a^c$ When multiplying terms with the same base….	a^{b+c} Add the powers
54	$\frac{a^b}{a^c}$ When dividing terms with the same base….	a^{b-c} Subtract the powers
55	$(a^b)^c$	a^{bc}
56	a^0	1

Standard form		
57	0.0004	4×10^{-4} (the number must be between 1 and 10)
58	40000	4×10^4 (the number must be between 1 and 10)

Conversions		
59	1 cm	10mm
60	1m	100cm
61	1km	1000m
62	cm → m	÷ 100
63	m → cm	×100
64	cm^2 → m^2	÷ 100^2
65	cm^3 → m^3	÷ 100^3
66	1kg	1000g
67	1l	1000ml

ALGEBRA

Equations		
68	Like terms have what…	Same letter, same index
Inequalities		
69	$\leq$	Less than or equal to 
70	$<$	Less than 
71	$\geq$	Greater than or equal to 
72	$>$	Greater than 

Graphs		
73	$y = mx + c$	$m = gradient$ $\frac{Difference\ in\ y}{Difference\ in\ x} = \frac{y_2 - y_1}{x_2 - x_1}$ $c = y\ intercept$ (where the line crosses y axis)
74	To find the mid-point	$(\frac{x1+x2}{2}, \frac{y1+y2}{2})$
75	Parallel lines	Have the same gradient
76	Perpendicular lines	Gradient = $-\frac{1}{gradient}$
77	Roots or solutions are	The points at which the graph passes through the x-axis

Compound measures			
78	Speed	$speed = \frac{distance}{time}$	
79	Density	$density = \frac{mass}{volume}$	
80	Pressure	$pressure = \frac{force}{area}$	

DATA, RATIO AND PROPORTION

Correlation		
81	Positive correlation means…	As one variable increases the other variable increases, this looks like:
82	Negative correlation means….	As one variable increases the other variable decreases, this looks like:
83	No correlation means….	There is no relationship between the two variables, this looks like:
84	Line of best fit	A straight line drawn with a ruler that goes through the data with roughly the same number of points on each side of the line
85	Interpolation	Estimating a value within a given data set
86	Extrapolation	Estimating a value outside the give date set by assuming a trend

Averages		
87	Mean	Add all the numbers and divide by how many there are
88	Median	Order the numbers from smallest to biggest and find the middle number
89	Mode	Most frequent
90	Range	Difference between the highest and lowest value
91	Mean from a frequency table	$\frac{Total\ Fx}{Total\ F}$
92	Mean from a grouped frequency table	1. Find the mid point of each group 2. $\frac{Total\ Fx}{Total\ F}$

Mean is average, mean is average
Mode is most, mode is most
Median's in the middle, median's in the middle
Range high take low, high take low

Probability		
93	Probabilities of mutually exclusive events	Add up to 1
94	$P(A \cap B)$	Probability of A AND B
95	$P(A \cup B)$	Probability of A OR B