Formulae for GCSE – Foundation tier

Percentages	
Compound interest / Growth and Decay	$\left(1 \pm \frac{\%}{100}\right)^{n} \times original$
Original amount (reverse percentage)	$\frac{new\ amount}{(1 \pm \frac{\%}{100})}$
Percentage change (percentage increase or decrease)	$\frac{difference}{original} \times 100$
Percentage score	$\frac{score}{total\ available} \times 100$

Angles in Polygons	
Sum of interior angles of a polygon	$180(n-2)$
Relationship between interior and exterior angles of a polygon	$interior + exterior = 180°$
Exterior angle of a polygon	$\frac{360°}{n}$
Number of sides of a polygon	$\frac{360°}{exterior\ angle}$

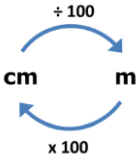
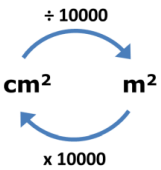
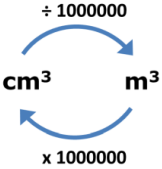
Pythagoras and Trigonometry	
Pythagoras' theorem: find the hypotenuse	$c = \sqrt{a^2+b^2}$
Pythagoras' theorem: find a non-hypotenuse	$a = \sqrt{c^2-b^2}$
Trigonometry: Mnemonic to help choose the correct ratio	**O A O** **S H C H T A**
Trigonometry: Sine ratio	$Sin\ \theta = \frac{opp}{hyp}$ $\quad \theta = sin^{-1}\left(\frac{opp}{hyp}\right)$
Trigonometry: Cosine ratio	$Cos\ \theta = \frac{adj}{hyp}$ $\quad \theta = cos^{-1}\left(\frac{adj}{hyp}\right)$
Trigonometry: Tangent ratio	$Tan\ \theta = \frac{opp}{adj}$ $\quad \theta = tan^{-1}\left(\frac{opp}{adj}\right)$

Statistics	
The angle for 1 person or thing	$\frac{360°}{\sum frequency}$
Position of the median value	**Odd** $\frac{n+1}{2}$ $\quad$ **Even** $\frac{n}{2}, \frac{n}{2}+1$
Interquartile range	$upper\ quartile - lower\ quartile$ $UQ-LQ$

Compound Measures	
Speed	$\frac{distance}{time}$ 
Pressure	$\frac{force}{area}$ 
Density	$\frac{mass}{volume}$ 

Rules of Indices	
Multiplying	$a^m \times a^n = a^{m+n}$
Dividing	$\frac{a^m}{a^n} = a^{m-n}$
Raising to another power	$(a^m)^n = a^{mn}$
Anything to the power of zero	$n^0 = 1$
Negative index	$a^{-m} = \frac{1}{a^m}$

Sequences	
Nth term: Linear (arithmetic) sequence	$U_n = dn + (a-d)$ $\quad a = first\ term$ $\quad d = difference$
Nth term: Geometric sequence	$U_n = ar^{n-1}$ $\quad a = first\ term$ $\quad r = common\ ratio$

Unit Conversion	
Converting between lengths: cm and m	
Converting between areas: cm^2 and m^2	
Converting between volumes: cm^3 and m^3	

Equations and Graphs	
Equation of a straight line	$y = mx + c$
Gradient	$\frac{diff.\ in\ y}{diff.\ in\ x}$ 
Midpoint of a line (between 2 points)	$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

How to learn the formulae

You need to know all of these formulae for your maths exams. To learn them effectively try these ideas:

1. Look, Cover, Write, Check, Correct
    a. Look at the formulae then cover it
    b. Try to say or write the formulae
    c. Check to see if you were tight
    d. Correct those you get wrong
2. Get someone else to test you
3. Flashcards
    a. Write the name on one side and the formula on the other
    b. Go through the cards looking at one side and trying to remember the other

Electronic flashcards of the formulae are at:
mathsduck.co.uk/formulae

Remember:
- You will learn the formulae best by testing yourself
- Little and often is better than fewer longer sessions

Area and Volume	
Area of a square/rectangle	$A = bh$
Area of a triangle	$A = \frac{bh}{2}$
Area of a parallelogram	$A = bh$
Area of a trapezium	$A = \frac{1}{2}(a+b)h$
Circumference of a circle	$C = \pi D \text{ or } C = 2\pi r$
Area of a circle	$Area = \pi r^2$
Surface area of a cylinder	$2\pi r^2 + \pi dh$
Surface area of a cone	$\pi r^2 + \pi rl$
Volume of a cube/cuboid	$V = bhl$
Volume of a triangular prism	$V = \frac{bh}{2}l$
Volume of a cylinder	$V = \pi r^2 h$
Volume of a pyramid	$V = \frac{1}{3}(base\ area \times height)$
Enlarged perimeter	$original\ perimeter \times S.F$
Enlarged area	$original\ area \times (S.F)^2$
Enlarged volume	$original\ volume \times (S.F.)^3$