## Subject: Maths

## **Topic: Functions**

Topic/Skill	Definition/Tips	Example
1. Function Machine	Takes an <b>input</b> value, performs some <b>operations</b> and produces an <b>output</b> value.	INPUT X 3 + 4 OUTPUT
2. Function	A <b>relationship</b> between two sets of values.	$f(x) = 3x^2 - 5$ 'For any input value, square the term, then multiply by 3, then subtract 5'.
3. Function notation	f(x) x is the <b>input</b> value f(x) is the <b>output</b> value.	f(x) = 3x + 11 Suppose the input value is $x = 5$ The output value is $f(5) = 3 \times 5 + 11 = 26$
4. Inverse function	<ul> <li>f<sup>-1</sup>(x) A function that performs the opposite process of the original function.</li> <li>1. Write the function as y = f(x)</li> <li>2. Rearrange to make x the subject.</li> <li>3. Replace the y with x and the x with f<sup>-1</sup>(x)</li> </ul>	$f(x) = (1 - 2x)^{5}.$ Find the inverse. $y = (1 - 2x)^{5}$ $\sqrt[5]{y} = 1 - 2x$ $1 - \sqrt[5]{y} = 2x$ $\frac{1 - \sqrt[5]{y}}{2} = x$ $f^{-1}(x) = \frac{1 - \sqrt[5]{x}}{2}$
5. Composite function	A combination of two or more functions to create a new function. fg(x) is the composite function that substitutes the function $g(x)$ into the function $f(x)$ . fg(x) means 'do g first, then f' gf(x) means 'do f first, then g'	$f(x) = 5x - 3, g(x) = \frac{1}{2}x + 1$ What is $fg(4)$ ? $g(4) = \frac{1}{2} \times 4 + 1 = 3$ $f(3) = 5 \times 3 - 3 = 12 = fg(4)$ What is $fg(x)$ ? $fg(x) = 5\left(\frac{1}{2}x + 1\right) - 3 = \frac{5}{2}x + 2$