Transformations of Graphs

It is important to understand the effects of simple transformations on the graph $y = f(x)$.

For $y = f(x)$:

Function	Effect
$f(x + a)$	
$f(x - a)$	
$f(x) + a$	
$f(x) - a$	
$f(ax)$	
$af(x)$	
$f(-x)$	
$-f(x)$	

We can think of it like this:

	Affects which axis?	What we expect or opposite?
Change **inside** $f()$		
Change **outside** $f()$		

Examples: Describe the transformation

1. $y = f(x - 3)$

2. $y = f(x) + 4$

3. $y = f(5x)$

4. $y = 2f(x)$

Example

1. Sketch $y = x^2 + 3$

2. Sketch $y = \frac{2}{x+1}$

3. Sketch $y = x(x + 2)$. On the same axes, sketch $y = (x - a)(x - a + 2)$, where $a > 2$.

4. Sketch $y = x^2(x - 4)$. On the same axes, sketch the graph with equation $y = (2x)^2(2x - 4)$.

Reflections

Example

If $y = x(x + 2)$, sketch $y = f(x)$ and $y = -f(x)$ on the same axes.

Test your understanding

1. If $y = (x + 1)(x - 2)$, sketch $y = f(x)$ and $y = f(\frac{x}{3})$ on the same axes.

2. Sketch the graph of $y = \frac{2}{x} + 1$, ensuring you indicate any intercepts with the axes.