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.