4.6) Stretching graphs

Worked example	Your turn
Describe the effect on the graph of $y = f(x)$ of:	Describe the effect on the graph of $y = f(x)$ of:
$f(9x)$	$f(2x)$
	Stretch, scale factor $\frac{1}{2}$, in the x-direction
$f(\frac{1}{8}x)$	$f(\frac{1}{3}x)$
	Stretch, scale factor 3, in the x-direction
$7f(x)$	$4f(x)$
	Stretch, scale factor 4, in the y-direction
$\frac{1}{6}f(x)$	$\frac{1}{5}f(x)$
	Stretch, scale factor $\frac{1}{5}$, in the y-direction

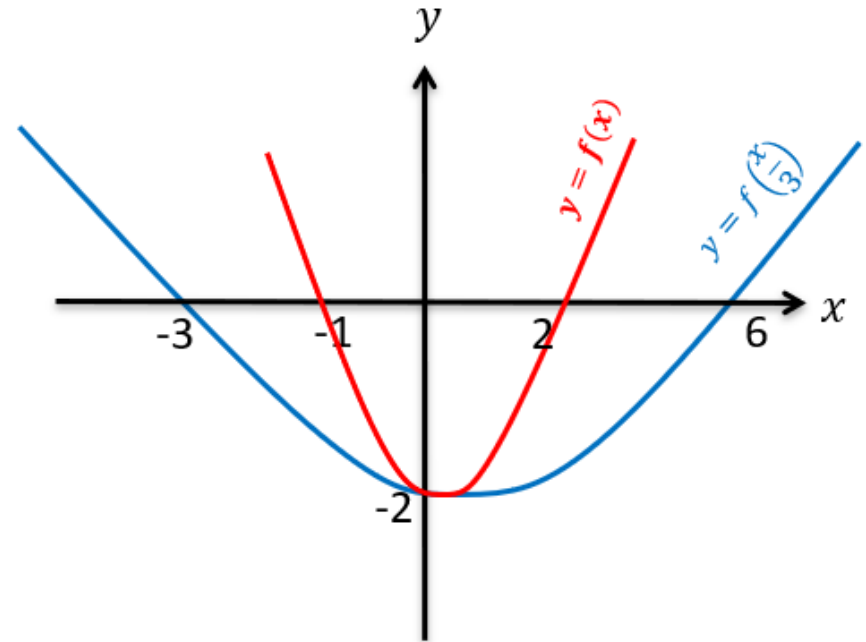| Worked example	Your turn
Sketch $y = x^2(x + 8)$. On the same axes, sketch the graph with equation $$y = (4x)^2(4x + 8)$$	Sketch $y = x^2(x - 4)$. On the same axes, sketch the graph with equation $$y = (2x)^2(2x - 4)$$
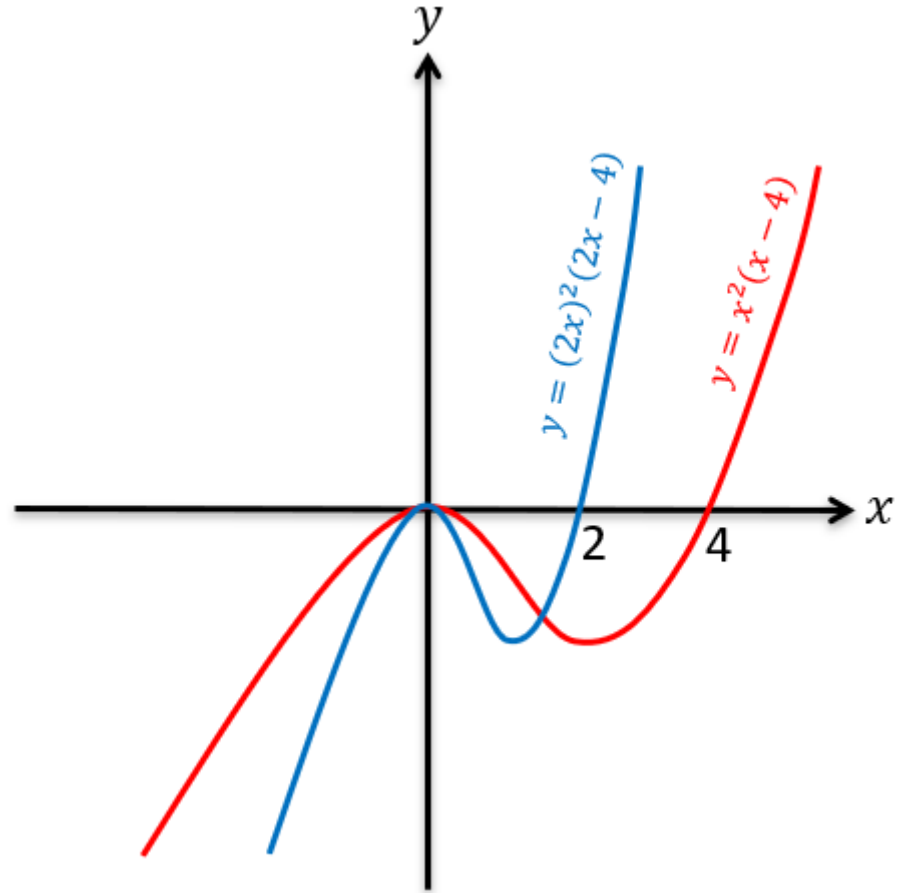
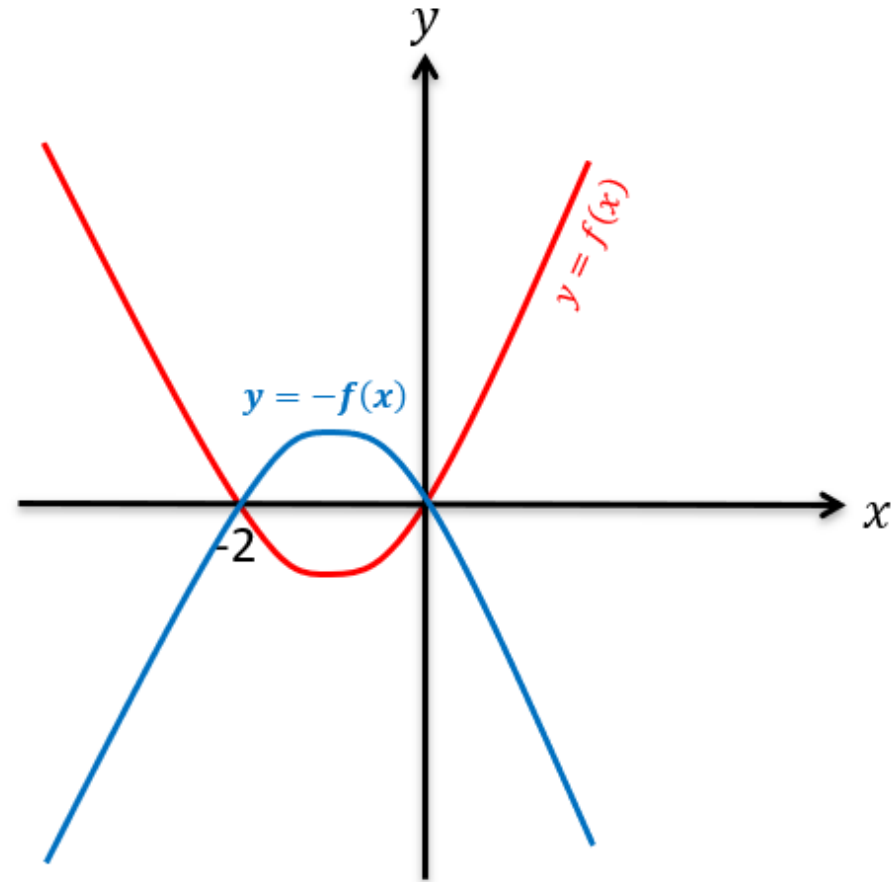| Worked example	Your turn
If $y = (x + 2)(x - 1)$, sketch $y = f(x)$ and $y = f\left(\frac{x}{4}\right)$ on the same axes.	If $y = (x + 1)(x - 2)$, sketch $y = f(x)$ and $y = f\left(\frac{x}{3}\right)$ on the same axes.

Worked example	Your turn
If $y = x(x - 3)$, sketch $y = f(x)$ and $y = -f(x)$ on the same axes.	If $y = x(x + 2)$, sketch $y = f(x)$ and $y = -f(x)$ on the same axes.

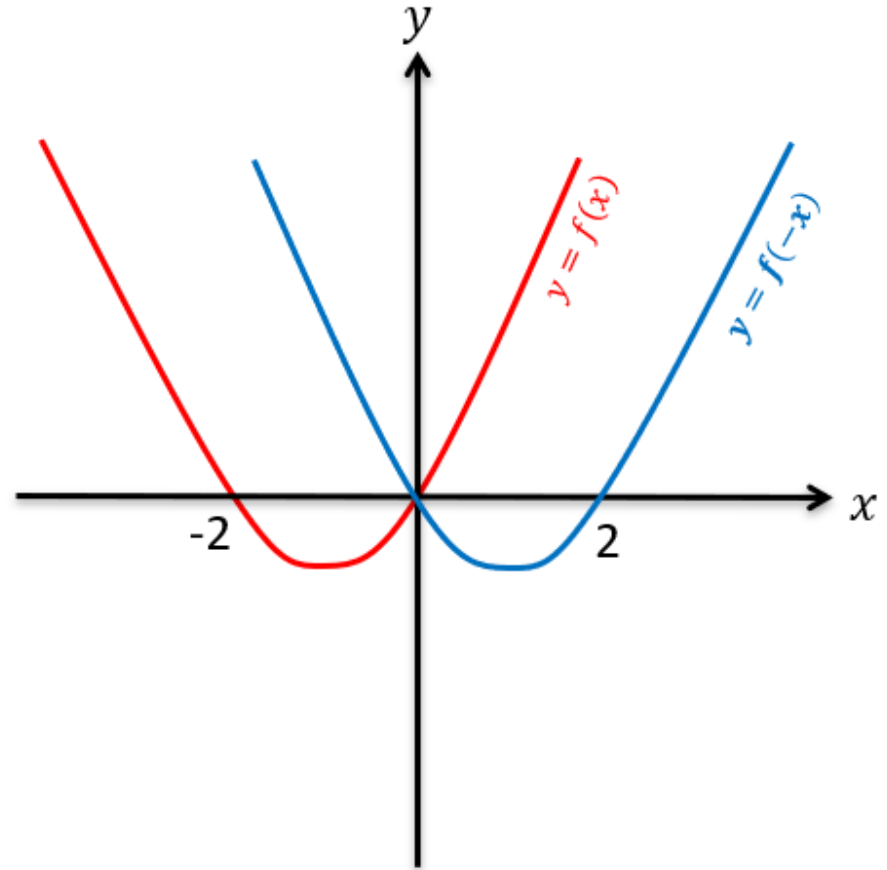| Worked example	Your turn
If $y = x(x - 3)$, sketch $y = f(x)$ and $y = f(-x)$ on the same axes.	If $y = x(x + 2)$, sketch $y = f(x)$ and $y = f(-x)$ on the same axes.

Worked example	Your turn
On the same axes, sketch:	On the same axes, sketch:

Worked example:
On the same axes, sketch:
$$y = x(x + 2)(x - 1)$$
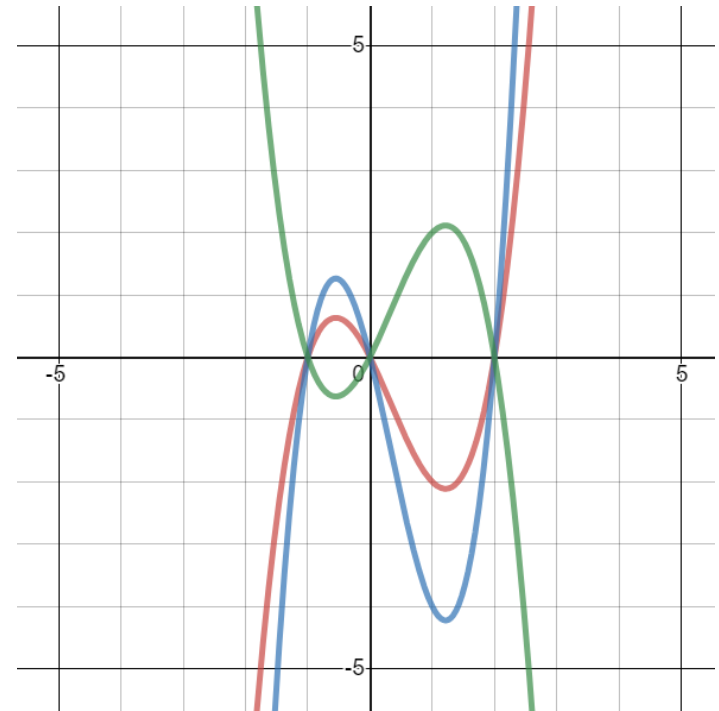$$y = 4x(4x + 2)(4x - 1)$$
$$y = -x(x + 2)(x - 1)$$

Your turn:
On the same axes, sketch:
$$y = x(x - 2)(x + 1)$$
$$y = 2x(2x - 2)(2x + 1)$$
$$y = -x(x - 2)(x + 1)$$

1. $x(x - 2)(x + 1)$

2. $2x(x - 2)(x + 1)$

3. $-x(x - 2)(x + 1)$