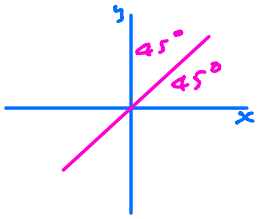
Straight Line Graphs

$$y = mx + c$$

$$\text{or} \quad ax + by + c = 0$$

These are the two standard representations of a straight line.

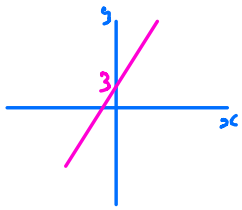
$y = x$



gradient $= 1$

y-intercept $= 0$

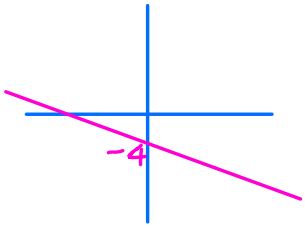
$y = 2x + 3$



gradient $= 2$ steeper than $45°$

y-intercept $= +3$

$y = -\frac{1}{2}x - 4$



gradient $= -\frac{1}{2}$

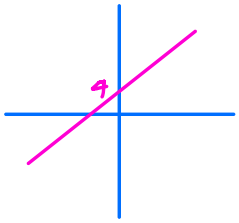
y-intercept $= -4$

more shallow than $45°$

slopes backwards

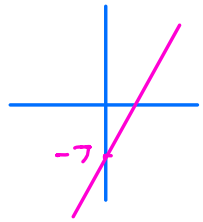
Exercise Sketch graphs for:

1) $y = x + 4$



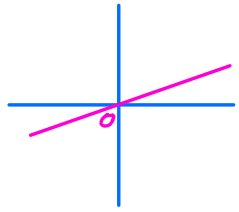
$45°$

2) $y = 3x - 7$



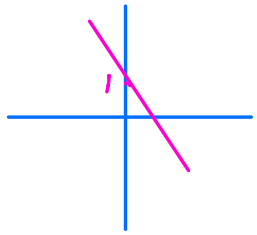
steep

3) $y = \frac{1}{4}x$



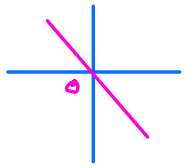
shallow

4) $y = -2x + 1$



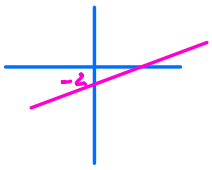
steep

5) $y = -x$



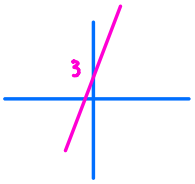
45°

6) $y = \frac{1}{3}x - 2$



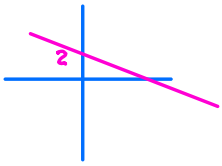
shallow

7) $y = 4x + 3$



steep

8) $y = -\frac{1}{2}x + 2$



shallow

Parallel Lines

Parallel lines have the same gradient

Examples

$$\begin{cases} y = 2x \\ y = 2x - 1 \\ y = 2x + 5 \end{cases} \qquad \begin{cases} y = -\frac{1}{3}x + 1 \\ y = -\frac{1}{3}x - 2 \\ y = -\frac{1}{3}x - 50 \end{cases}$$

$$y = \underset{\substack{\uparrow \\ \text{gradient}}}{m}x + c$$

Write down the equations of 3 lines parallel to $y = 4x + 1$

$y = 4x - 7$, $y = 4x + 25$, $y = 4x$

Now find the equation of a line parallel to $y = 4x + 1$ passing through the point $(5, 18)$

Line is of the form $y = 4x + c$

Sub $(5, 18)$ in this eqn

$$18 = 4(5) + c$$
$$18 = 20 + c$$
$$18 - 20 = c$$
$$-2 = c$$

Line is $\underline{y = 4x - 2}$

Exercise

1) Find line parallel to $y = 2x - 7$ passing through $(4, 7)$

$$y = 2x + c$$
$$7 = 2(4) + c$$
$$7 = 8 + c$$
$$7 - 8 = c$$
$$-1 = c$$

$$\underline{y = 2x - 1}$$

2) Find line parallel to $y = -\frac{1}{2}x + 4$ passing through $(4, 1)$

$$y = -\frac{1}{2}x + c$$
$$1 = -\frac{1}{2}(4) + c$$
$$1 = -2 + c$$
$$1 + 2 = c$$
$$3 = c$$

$$y = -\frac{1}{2}x + 3$$