

# Straight line graphs

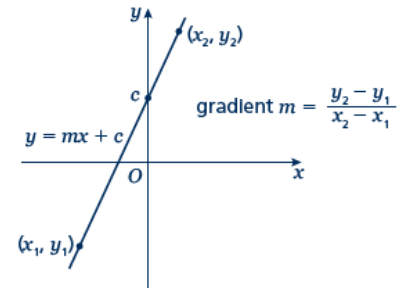
## A LEVEL LINKS

Scheme of work: 2a. Straight-line graphs, parallel/perpendicular, length and area problems

## Key points

- A straight line has the equation  $y = mx + c$ , where  $m$  is the gradient and  $c$  is the  $y$ -intercept (where  $x = 0$ ).
- The equation of a straight line can be written in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers.
- When given the coordinates  $(x_1, y_1)$  and  $(x_2, y_2)$  of two points on a line the gradient is calculated using the

$$\text{formula } m = \frac{y_2 - y_1}{x_2 - x_1}$$



**Example 1** Find the gradient and the  $y$ -intercept of the line with the equation  $3y - 2x + 4 = 0$ .

$$3y - 2x + 4 = 0$$

$$3y = 2x - 4$$

$$y = \frac{2}{3}x - \frac{4}{3}$$

$$\text{Gradient} = m = \frac{2}{3}$$

$$\text{y-intercept} = c = -\frac{4}{3}$$

**1** Make  $y$  the subject of the equation.

**2** Divide all the terms by three to get the equation in the form  $y = \dots$

**3** In the form  $y = mx + c$ , the gradient is  $m$  and the  $y$ -intercept is  $c$ .

## Practice questions

**1** Find the gradient and the  $y$ -intercept of the following equations.

**a**  $y = 3x + 5$

**b**  $y = -\frac{1}{2}x - 7$

**c**  $2y = 4x - 3$

**d**  $x + y = 5$

**e**  $2x - 3y - 7 = 0$

**f**  $5x + y - 4 = 0$

### Hint

Rearrange the equations to the form  $y = mx + c$

**2** The equation of a line is  $2y + 3x - 6 = 0$ .  
Write as much information as possible about this line.

## Answers

1 a  $m = 3, c = 5$

b  $m = -\frac{1}{2}, c = -7$

c  $m = 2, c = -\frac{3}{2}$

d  $m = -1, c = 5$

e  $m = \frac{2}{3}, c = -\frac{7}{3}$  or  $-2\frac{1}{3}$

f  $m = -5, c = 4$

2  $y = -\frac{3}{2}x + 3$ , the gradient is  $-\frac{3}{2}$  and the  $y$ -intercept is 3.

The line intercepts the axes at  $(0, 3)$  and  $(2, 0)$ .

Students may sketch the line or give coordinates that lie on the line such as  $\left(1, \frac{3}{2}\right)$  or  $(4, -3)$ .