

# Chapter 5 – Straight line graphs

## ? Example 1 – Work out gradient given two points

Work out the gradient of the line joining  $(-2, 7)$  and  $(4, 5)$

## ? Example 2 – Calculations with gradients

The line joining  $(2, -5)$  to  $(4, a)$  has gradient  $-1$ . Work out the value of  $a$ .

## ? Example 3 – Alternative forms of straight-line equations

Write down the gradient and y-intercept of these lines:

a.  $y = -3x + 2$       b.  $4x - 3y + 5 = 0$

## ? Example 4 – Alternative forms of straight-line equations

Write these lines in the form  $ax + by + c = 0$

a.  $y = 4x + 3$       b.  $y = -\frac{1}{2}x + 5$

## ? Example 5 – Intersections with axes

The line  $y = 4x - 8$  meets the  $x$ -axis at the point  $P$ .

Work out the coordinates of  $P$ .

## ? Example 6 – Finding the equation of a straight line

Find the equation of the line with gradient 5 that passes through the point  $(3, 2)$ .

## ? Example 7 – Finding the equation of a straight line

Find the equation of the line that passes through the points  $(5, 7)$  and  $(3, -1)$ .

## ? Example 8 – Finding the equation of a straight line

The line  $y = 3x - 9$  meets the  $x$ -axis at the point  $A$ . Find the equation of the line with gradient  $\frac{2}{3}$  that passes through point  $A$ . Write your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers.

## ? Example 9 – Finding the equation of a straight line

The lines  $y = 4x - 7$  and  $2x + 3y - 21 = 0$  intersect at the point  $A$ . The point  $B$  has coordinates  $(-2, 8)$ . Find the equation of the line that passes through the points  $A$  and  $B$ . Write your answer in the form  $ax + by + c = 0$ , where  $a$ ,  $b$  and  $c$  are integers.

## ? Example 10 – Equations of perpendicular lines

A line is parallel to the line  $6x + 3y - 2 = 0$  and it passes through the point  $(0, 3)$ . Work out the equation of the line.

## ? Example 11 – Testing for perpendicularity or parallelism

Work out whether these pairs of lines are parallel, perpendicular or neither:

a.  $3x - y - 2 = 0$       b.  $y = \frac{1}{2}x$   
 $x + 3y - 6 = 0$        $2x - y + 4 = 0$

## ? Example 12 – Finding the equations of perpendicular lines

A line is perpendicular to the line  $2y - x - 8 = 0$  and passes through the point  $(5, -7)$ .

Find the equation of the line.

## ? Example 13 – Working out the distance between two points

Find the distance between  $(2, 3)$  and  $(5, 7)$ .

## ? Example 14 – Working out distances and areas

The straight line  $l_1$  with equation  $4x - y = 0$  and the straight line  $l_2$  with equation  $2x + 3y - 21 = 0$  intersect at point  $A$ .

- Work out the coordinates of  $A$ .
- Work out the area of triangle  $AOB$  where  $B$  is the point where  $l_2$  meets the  $x$ -axis.

## ? Example 15 – Modelling using straight line graphs

The graph shows the extension,  $E$ , of a spring when different masses,  $m$ , are attached to the end of the spring.

- Calculate the gradient,  $k$ , of the line.
- Write an equation linking  $E$  and  $m$ .
- Explain what the value of  $k$  represents in this situation.

