

STP Maths 8

The equation of a line

- It is possible to give an instruction for finding the y -coordinate from the x -coordinate of any point on a line.
- This instruction can be given as a formula in the form $y = \dots$

The formula that gives the y -coordinate of a point on the line in terms of the x -coordinate is called the **equation of a straight line.**

Worked example

→ Find the y -coordinate of the point on the line $y = -5x$ whose x -coordinate is 4.

When $x = 4$, $y = -5x$ gives

$$y = -5 \times 4 = -20$$



The equation $y = -5x$ is a formula for finding the y -coordinate from the x -coordinate.

→ Find the y -coordinate of the point on the line $y = -5x$ whose x -coordinate is -3 .

When $x = -3$, $y = -5x$ gives

$$y = (-5) \times (-3) = 15$$



This means that the points $(4, -20)$ and $(-3, 15)$ are points on the line $y = -5x$.

- 1 Find the y -coordinates of points on the line $y = x$ which have x -coordinates of
 - a 2
 - b 3
 - c 7
 - d 12
 - e -1
 - f -6
 - g -8
 - h -20
- 2 Find the y -coordinates of points on the line $y = -x$ which have x -coordinates of
 - a 4
 - b -2
 - c $3\frac{1}{2}$
 - d $-4\frac{1}{2}$
 - e 6.1
 - f -8.3

Worked example

→ Find the x -coordinate of the point on the line $y = -5x$ whose y -coordinate is 15.

When $y = 15$, $y = -5x$ gives

$$15 = -5x$$

$$-3 = x$$

i.e.

$$x = -3$$



This is an equation which we can solve.
Remember: $(+15) \div (-5)$ gives a negative answer.

- 3** Find the x -coordinates of points on the line $y = -x$ which have y -coordinates of
a 7 **b** -2 **c** $5\frac{1}{2}$ **d** -4.2
- 4** Find the y -coordinates of points on the line $y = 2x$ which have x -coordinates of
a 5 **b** -4 **c** $3\frac{1}{2}$ **d** -2.6
- 5** Find the x -coordinates of points on the line $y = -3x$ which have y -coordinates of
a 3 **b** -9 **c** 6 **d** -4
- 6** Find the y -coordinates of points on the line $y = \frac{1}{2}x$ which have x -coordinates of
a 6 **b** -12 **c** $\frac{1}{2}$ **d** -8.2
- 7** If the points $(-1, a)$, $(b, 15)$ and $(c, -20)$ lie on the straight line with equation $y = 5x$, find the values of a , b and c .
- 8** If the points $(3, a)$, $(-12, b)$ and $(c, -12)$ lie on the straight line with equation $y = -\frac{2x}{3}$, find the values of a , b and c .
- 9** Using squared paper and 1 square to 1 unit on each axis, plot the points $(-2, -6)$, $(1, 3)$, $(3, 9)$ and $(4, 12)$. What is the equation of the straight line which passes through these points?
- 10** Using squared paper and 1 square to 1 unit on each axis, plot the points $(-3, 6)$, $(-2, 4)$, $(1, -2)$ and $(3, -6)$. What is the equation of the straight line which passes through these points?
- 11** Using the same scale on each axis, plot the points $(-6, -4)$, $(-3, -2)$, $(6, 4)$ and $(12, 8)$. What is the equation of the straight line which passes through these points?
- 12** Which of the points $(-2, -4)$, $(2.5, 4)$, $(6, 12)$ and $(7.5, 10)$ lie on the line $y = 2x$?
- 13** Which of the points $(-5, -15)$, $(-2, 6)$, $(1, -3)$ and $(8, -24)$ lie on the line $y = -3x$?
- 14** Which of the points $(2, 2)$, $(-2, 1)$, $(3, 0)$, $(-4.2, -2)$, $(-6.4, -3.2)$ lie
a above the line $y = -\frac{1}{2}x$
b below the line $y = -\frac{1}{2}x$?