



- 1 Here are the equations of four straight lines.

A: $y = 2x - 5$

B: $y = x + 1$

C: $y = 3 - 2x$

D: $2y = x + 4$

Write down the letter of the line that is parallel to $y = 2x + 1$

(1 mark)

Parallel lines have the same gradient

The line $y = 2x + 1$ has gradient 2

Line A has gradient 2, line B has gradient 1, line C has gradient -2, and line D rearranges to $y = \frac{x}{2} + 2$ with gradient $\frac{1}{2}$

So line A is parallel to $y = 2x + 1$

A

- 2 Show that the straight lines with equations $y = 3x + 2$ and $6x - 2y = 5$ are parallel.

(2 marks)

Rearrange $6x - 2y = 5$ into the form $y = mx + c$

$$2y = 6x - 5, \text{ so } y = 3x - \frac{5}{2}$$

Both lines have gradient 3, and parallel lines have equal gradients, so the lines are parallel

- 3 Sam says that the straight lines with equations $y = 5x - 1$ and $5y = x + 10$ are parallel.

Is Sam correct? You must explain your answer.

(2 marks)

Rearrange $5y = x + 10$ into the form $y = mx + c$: $y = \frac{x}{5} + 2$

The gradients are 5 and $\frac{1}{5}$

The gradients are not equal, so the lines are not parallel and Sam is wrong. In fact $5 \times \frac{1}{5} = 1$, not -1, so they are not perpendicular either

4

The straight line L has equation $y = 4x + 1$

Find the equation of the straight line that is parallel to L and passes through the point (2, 3).

(2 marks)

parallel lines have the same gradient

$$y = 4x + c$$

Substitute (2, 3)

$$3 = 4 \times 2 + c$$

$$3 = 8 + c$$

$$c = -5$$

$$y = 4x - 5$$

5

A straight line has equation $y = -2x + 5$

Find the equation of the straight line that is parallel to this line and passes through the point (3, -2).

(3 marks)

gradient = -2

$$y = -2x + c$$

Substitute (3, -2)

$$-2 = -2 \times 3 + c$$

$$-2 = -6 + c$$

$$c = 4$$

$$y = -2x + 4$$

6

The line with equation $y = 3x + 5$ is parallel to the line with equation $y = (2k - 1)x + 2$

Work out the value of k .

(2 marks)

parallel lines have equal gradients

$$\begin{array}{rcl} 2k - 1 & = & 3 \\ +1 & & \\ 2k & = & 4 \\ \div 2 & & \\ k & = & 2 \end{array}$$

$$k = 2$$

7

The straight line L has equation $y = 5x - 3$

a. Write down the gradient of L.

b. Find the equation of the straight line that is parallel to L and passes through the point (2, 11).

(4 marks)

The gradient of L is the coefficient of x , which is 5

Parallel lines have equal gradients, so the new line has the

form $y = 5x + c$

Substitute (2, 11)

$$11 = 10 + c, \text{ so } c = 1$$

The equation is $y = 5x + 1$

8

The straight line L has equation $3x + 4y = 8$

Find the equation of the straight line that is parallel to L and passes through the point (8, 1).

(4 marks)

Rearrange $3x + 4y = 8$: $4y = -3x + 8$, so $y = -\frac{3x}{4} + 2$. The

gradient of L is $-\frac{3}{4}$

Parallel lines have equal gradients, so the new line has the

form $y = -\frac{3x}{4} + c$

Substitute (8, 1)

$$1 = -6 + c, \text{ so } c = 7$$

The equation is $y = -\frac{3x}{4} + 7$

$$\boxed{y = -\frac{3x}{4} + 7}$$

9

The line with equation $4x + 2y = 7$ is parallel to the line with equation $y = kx - 1$

Work out the value of k .

(3 marks)

$$\begin{array}{rcl}
 4x + 2y & = & 7 \\
 -4x & & \\
 \hline
 2y & = & -4x + 7 \\
 \div 2 & & \\
 y & = & -2x + \frac{7}{2}
 \end{array}$$

gradient = -2

parallel lines have equal gradients

$$k = -2$$

10

A straight line has equation $6x - 3y = 5$

Find the equation of the straight line that is parallel to this line and passes through the point (1, 4).

(3 marks)

$$\begin{array}{rcl}
 6x - 3y & = & 5 \\
 -6x & & \\
 \hline
 -3y & = & -6x + 5 \\
 \div (-3) & & \\
 y & = & 2x - \frac{5}{3}
 \end{array}$$

gradient = 2

$$y = 2x + c$$

Substitute (1, 4)

$$4 = 2 \times 1 + c$$

$$c = 2$$

$$y = 2x + 2$$

11 Line A passes through the points (0, 5) and (4, 13).

Line B is parallel to line A and passes through the point (3, -1).

a. Find the equation of line B.

b. Show that the point (5, 3) lies on line B.

(4 marks)

a)

$$\text{gradient of A} = \{13 - 5\} / \{4 - 0\} = 2$$

$$\text{B has gradient 2: } y = 2x + c$$

Substitute (3, -1)

$$-1 = 2 \times 3 + c$$

$$-1 = 6 + c$$

$$c = -7$$

$$\boxed{y = 2x - 7}$$

b)

$$\text{put } x = 5 \text{ into } y = 2x - 7$$

$$y = 2 \times 5 - 7 = 3$$

$$\boxed{(5, 3) \text{ is on Line B}}$$

12 A is the point (1, 2), B is (5, 4), C is (6, 7) and D is (2, 5).

Show that ABCD has two pairs of parallel sides.

(4 marks)

$$AB: \{4 - 2\} / \{5 - 1\} = \frac{1}{2}$$

$$DC: \{7 - 5\} / \{6 - 2\} = \frac{1}{2}$$

same gradient so AB is parallel to DC

$$AD: \{5 - 2\} / \{2 - 1\} = 3$$

$$BC: \{7 - 4\} / \{6 - 5\} = 3$$

same gradient so AD is parallel to BC

$\boxed{\text{two pairs of parallel sides}}$