

Perpendicular Lines

ANSWERS

1

Find the line perpendicular to $y = 2x + 1$ that passes through (4, 3).

gradient of the line given

2

flip it and change the sign

$-\frac{1}{2}$

put the point in to find c

$$3 = -\frac{1}{2} \times 4 + c$$

Answer $y = -\frac{1}{2}x + 5$

2

Find the line perpendicular to $y = 3x - 2$ that passes through (6, 1).

gradient of the line given

3

flip it and change the sign

$-\frac{1}{3}$

put the point in to find c

$$1 = -\frac{1}{3} \times 6 + c$$

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

3

Find the line perpendicular to $y = -2x + 5$ that passes through (2, 4).

gradient of the line given

-2

flip it and change the sign

$\frac{1}{2}$

put the point in to find c

$$4 = \frac{1}{2} \times 2 + c$$

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

4

Find the line perpendicular to $y = 4x$ that passes through (8, 0).

gradient of the line given

4

flip it and change the sign

$-\frac{1}{4}$

put the point in to find c

$$0 = -\frac{1}{4} \times 8 + c$$

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

5

Find the line perpendicular to $y = \frac{1}{2}x + 3$ that passes through (1, 5).

$\frac{1}{2}$

-2

$$5 = -2 \times 1 + c$$

Answer $y = -2x + 7$

6

Find the line perpendicular to $y = -\frac{1}{3}x + 1$ that passes through (2, 2).

$-\frac{1}{3}$

3

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

Answer $y = 3x - 4$

7

A line passes through (0, 1) and (2, 5). Find the gradient of a line perpendicular to it.

$$\text{gradient } (5 - 1) \div (2 - 0) = 2$$

Answer $-\frac{1}{2}$

8

Are $y = 3x + 2$ and $3y + x = 6$ perpendicular? Show how you know.

$$3 \times -\frac{1}{3} = -1$$

Answer Yes

Perpendicular Lines further practice

ANSWERS

9

Find the equation of the line perpendicular to $2x + 3y = 6$ that passes through (4, 1).

$$y = -\frac{2}{3}x + 2, \text{ gradient } -\frac{2}{3}$$

$$\text{gradient } \frac{3}{2}, \text{ then } 1 = 6 + c$$

Answer $y = \frac{3}{2}x - 5$

10

Find the two pairs of lines that are perpendicular.

A $y = 4x - 1$ B $4y = x + 8$

C $y = 3 - 4x$ D $2x + 8y = 5$

$$\text{gradients: A } 4, \text{ B } \frac{1}{4}, \text{ C } -4, \text{ D } -\frac{1}{4}$$

$$4 \times -\frac{1}{4} = -1 \text{ and } \frac{1}{4} \times -4 = -1$$

Answer A and D, B and C

11

A is (1, 2) and B is (7, 6). Find the equation of the perpendicular bisector of AB.

$$\text{midpoint } (4, 4), \text{ gradient of AB } \frac{2}{3}$$

$$\text{gradient } -\frac{3}{2}, \text{ then } 4 = -6 + c$$

Answer $y = -\frac{3}{2}x + 10$

12

The line $y = 3x - 2$ is perpendicular to the line $6y = kx + 5$. Find the value of k .

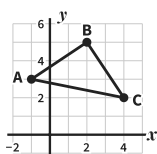
$$\text{the gradient of } 6y = kx + 5 \text{ is } \frac{k}{6}$$

$$\frac{k}{6} = -\frac{1}{3}$$

Answer $k = -2$

13

Triangle ABC has A (-1, 3), B (2, 5) and C (4, 2). Which angle is a right angle? Show how you know.



$$\text{gradients: AB } \frac{2}{3}, \text{ BC } -\frac{3}{2}, \text{ AC } -\frac{1}{5}$$

$$\frac{2}{3} \times -\frac{3}{2} = -1$$

Answer angle ABC

14

Line L is perpendicular to $y = 3x + 1$ and passes through (0, 6). Find the area of the triangle that L makes with the x axis and the y axis.

$$L: y = -\frac{1}{3}x + 6, \text{ crosses at } (18, 0)$$

$$\frac{1}{2} \times 18 \times 6 = 54$$

Answer 54 square units

15

On a map, a straight road follows the line $y = 2x + 1$. A house is at (8, 2). A straight path is built from the house to meet the road at right angles. Find the point where the path meets the road.

$$\text{path: } y = -\frac{1}{2}x + 6$$

$$2x + 1 = -\frac{1}{2}x + 6, \text{ so } x = 2$$

Answer (2, 5)

16

Two different lines are both perpendicular to $y = 3x + 1$. Tom says the two lines must be parallel. Is he right? Explain.

$$\text{perpendicular gradient } -\frac{1}{3}$$

$$\text{same gradient, so parallel}$$

Answer Yes, both have gradient $-\frac{1}{3}$