

Finding the equation of a line

About 50 minutes No calculator 43 marks



Hints online, answers free with an account:
mathswariz.uk/worksheets/gcse-finding-the-equation-of-a-line/

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** From chapter 7 [2 marks]
- Find the gradient and the y -intercept of the line $-x + 5y = 8$.
- Triangle ABC has $AB = 9$ cm, angle $A = 64^\circ$ and angle $B = 69^\circ$. Triangle PQR has $PQ = 9$ cm, angle $P = 64^\circ$ and angle $R = 47^\circ$. Are the triangles congruent? Give a reason.
- Answer

- A3** Key Stage 3 [2 marks] **A4** Key Stage 3 [2 marks]
- The angles of a triangle, in degrees, are $x - 25$, $3x - 30$ and $2x + 49$. Find the largest angle.
- 5 numbers have a mean of 12. 4 of the numbers are 4, 16, 10, 2. Find the other number.
- Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Work out the equation of the line through (1, 5) and (4, 17).

Hint Find the gradient, then put one point into $y = mx + c$ to find c .

- B1** Work out the equation of the line through $(-4, -5)$ and $(2, 7)$. [3 marks]

Answer

EXAMPLE 2

Work out the equation of the line perpendicular to $y = 2x + 7$ that passes through (4, 5).

Hint Perpendicular gradients multiply to -1 .

B2 Work out the equation of the line perpendicular to [3 marks]

$y = -4x + 1$ that passes through (12, 5).

Answer

c Practice

C1 Work out the equation of the line parallel to $y = 7 - 3x$ that passes through (2, 5). [2 marks]

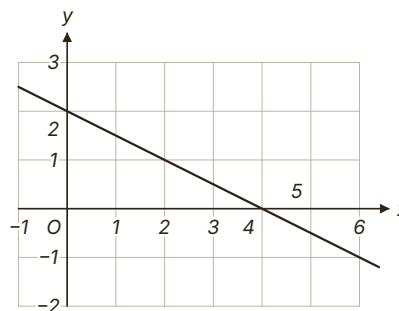
Answer

C2 Are the lines $y = 2x + 5$ and $2y = 4x - 1$ parallel? Give a reason. [2 marks]

C3 Line L has gradient $\frac{2}{5}$. Write down the gradient of a line perpendicular to L . [1 mark]

Answer

C4 Work out the equation of the line shown. [2 marks]



Answer

C5 A line has gradient $\frac{2}{3}$ and passes through $(-2, 3)$. Write its equation in the form $ax + by = c$, where a , b and c are integers. [3 marks]

Answer

C6 Show that the lines $5x + 2y = 9$ and $4x - 10y = 3$ are perpendicular. [3 marks]

D Exam-style questions

- D1** Raj says, "The lines $y = 3x + 1$ and $y = -3x + 4$ are perpendicular, because their gradients have opposite signs."

[2 marks]

Explain why Raj is wrong.

- D2** A is the point $(-1, 4)$ and B is the point $(4, 14)$.

- (a) Work out the equation of the line through A and B .

[3 marks]

Answer

- (b) Line M is perpendicular to AB and passes through B . Work out the coordinates of the point where M crosses the y -axis.

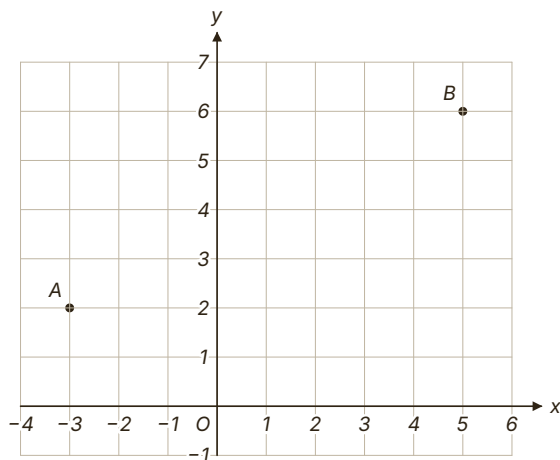
[3 marks]

Answer (.....,)

Total for D2: 6 marks

- D3** The points $A(-3, 2)$ and $B(5, 6)$ are shown on the grid. Work out the equation of the perpendicular bisector of AB . Give your answer in the form $y = mx + c$.

[4 marks]



Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

E1 A is $(1, 2)$, B is $(4, 3)$ and C is $(k, -6)$. Angle ABC is a right angle. Work out the value of k . [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** AB and BC are perpendicular, so their gradients multiply to -1 .
- Hint 2** The gradient of AB is $\frac{1}{3}$, so the gradient of BC is -3 .
- Hint 3** $\frac{-6-3}{k-4} = -3$, so $k-4 = 3$ and $k = 7$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

I can write the equation of a line from its graph or from two points. ☐ ☐ ☒

I can find the equation of a line parallel or perpendicular to a given line, including a perpendicular bisector. ☐ ☐ ☒