

## Gradient (steepness) of a straight line

Year 7 About 70 minutes No calculator 46 marks



Hints online, answers free with an account:

[mathswariz.uk/worksheets/ks3-year-7-gradient-steepness-of-a-straight-line/](https://mathswariz.uk/worksheets/ks3-year-7-gradient-steepness-of-a-straight-line/)

Date \_\_\_\_\_

**A Do Now**

Quick questions to start.

**A1** Needed today

[1 mark]

Work out  $\frac{11 - 3}{6 - 2}$ .

Answer .....

**A2** Needed today

[1 mark]

For the line  $y = 4x - 7$ , work out  $y$  when  $x = 0$ .

Answer .....

**A3** Last lesson

[1 mark]

Where does the line  $y = 2x - 8$  cross the  $x$ -axis?

Answer .....

**A4** From chapter 4

[1 mark]

Increase 80 kg by 15%.

Answer .....

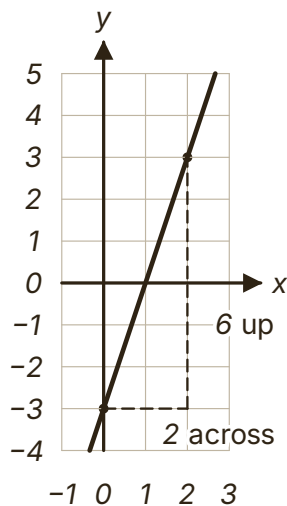
**B Example, then your turn**

Year 7

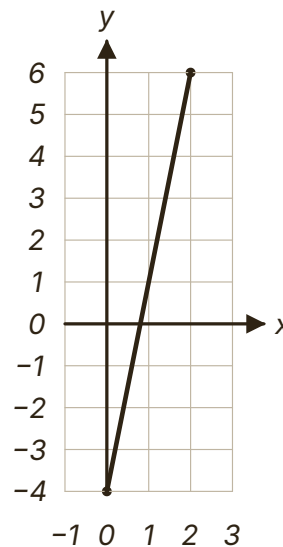
Your teacher works through each example with you. Then try the one beside it.

**EXAMPLE 1**

Work out the gradient of the line.



**Hint** Pick two points on the line where it crosses the grid exactly. Gradient = up  $\div$  across.

**B1** Work out the gradient of the line. [2 marks]

Answer .....

**EXAMPLE 2**

Write down the gradient and the  $y$ -intercept of  $y = 6x - 1$  and of  $y = 4 - 3x$ .

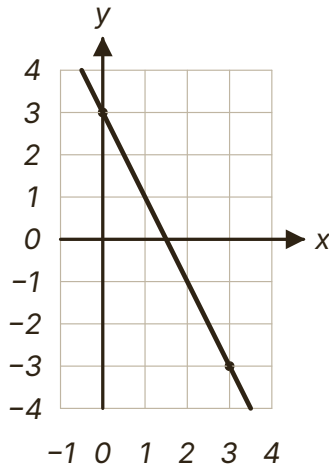
**Hint** In  $y = mx + c$  the gradient is the number multiplying  $x$ , sign and all.  $c$  is where the line cuts the  $y$ -axis.

- B2** Write down the gradient and the  $y$ -intercept of  $y = 2x - 9$  and of  $y = 8 - 5x$ . [2 marks]

Answer .....

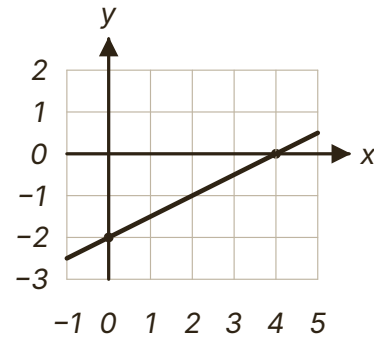
**EXAMPLE 3**

Find the equation of the line.



**Hint** Read  $c$  where the line cuts the  $y$ -axis. For the gradient, a line going down to the right has a negative gradient.

- B3** Find the equation of the line. [3 marks]



Answer .....

**EXAMPLE 4**

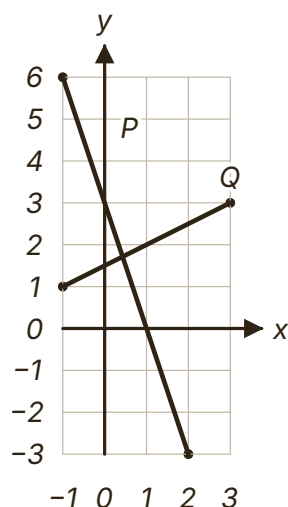
A line passes through  $(0, 6)$  and  $(2, 14)$ . Find its equation.

**Hint**  $(0, 6)$  is on the  $y$ -axis, so it gives  $c$ . Then the gradient is  $\text{up} \div \text{across}$  between the two points.

- B4** A line passes through  $(0, -5)$  and  $(3, 1)$ . Find its equation. [2 marks]

Answer .....

- C1** Work out the gradient of line  $P$  [4 marks] and the gradient of line  $Q$ .



- C2** Write down the equation of the line with (i) gradient  $-3$  that crosses the  $y$ -axis at  $(0, 8)$ , (ii) gradient  $\frac{1}{2}$  that crosses the  $y$ -axis at  $(0, -6)$ . [2 marks]

Answer .....

Answer .....

- C3** Which two of these lines are parallel? Give a reason. [2 marks]  
 $y = 4x + 5$     $y = x + 4$     $y = 5 - 4x$     $y = 4x - 9$

- C4** Write  $2y = 8x + 6$  in the form  $y = mx + c$ . Then write down its gradient. [2 marks]

Answer .....

Answer .....

**D Exam-style questions**

GCSE Foundation

- D1** Ben says, "The line  $y = 7 - 2x$  has gradient 7." [3 marks]  
 Ben is wrong. Explain why, and write down the gradient and the  $y$ -intercept of the line.

Answer .....

**D2** The line  $L$  is drawn on the grid.

(a) Work out the gradient of  $L$ .

[2 marks]

Answer .....

(b) Write down the equation of  $L$ .

[1 mark]

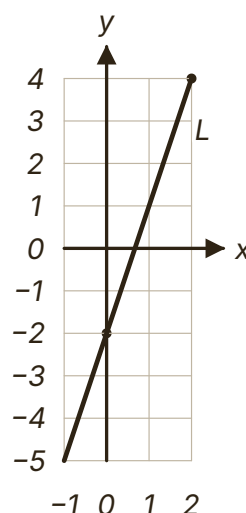
Answer .....

(c) Line  $M$  is parallel to  $L$  and passes through  $(0, 6)$ . Write down the equation of  $M$ .

[1 mark]

Answer .....

Total for D2: 4 marks



**D3** A straight line passes through the points  $(1, 7)$  and  $(4, 16)$ .

(a) Work out the gradient of the line.

[2 marks]

Answer .....

(b) Find the equation of the line.

[2 marks]

Answer .....

(c) Does the point  $(10, 35)$  lie on the line? Show how you know.

[1 mark]

Answer .....

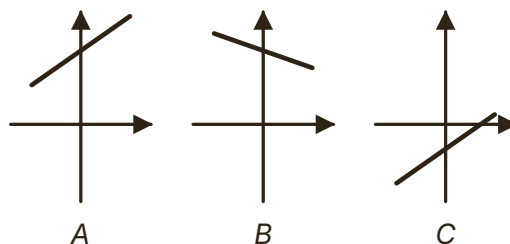
Total for D3: 5 marks

**D4** Here are sketches of three lines. Match each sketch to its equation.

[3 marks]

$$y = 2x - 1 \quad y = 2x + 4 \quad y = 3 - x$$

Answer .....



- D5** A line passes through  $(0, 8)$  and  $(3, 2)$ . Find the equation of the line, and the point where it crosses the  $x$ -axis. [4 marks]

Answer  $y = \dots\dots$  and  $(\dots\dots, \dots\dots)$

## **E** Extension

Stretch

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

- E1** Line  $P$  has gradient 2 and passes through  $(3, 11)$ . Line  $Q$  is parallel to  $y = 5 - x$  and passes through  $(0, 11)$ . Find the point where  $P$  and  $Q$  cross. [4 marks]

Answer  $(\dots\dots, \dots\dots)$

### Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Find the equation of each line in the form  $y = mx + c$ .  
**Hint 2**  $P$ :  $11 = 2 \times 3 + c$ , so  $y = 2x + 5$ .  $Q$  has gradient  $-1$ , so  $y = 11 - x$ .  
**Hint 3** Where they cross,  $2x + 5 = 11 - x$ , so  $3x = 6$ .

### How did it go?

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

- |                                                                    |                                                                   |
|--------------------------------------------------------------------|-------------------------------------------------------------------|
| I can work out the gradient of a line from a graph.                | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| I can read the gradient and the $y$ -intercept from $y = mx + c$ . | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| I can find the equation of a line from a graph or from two points. | <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| I know that parallel lines have the same gradient.                 | <input type="radio"/> <input type="radio"/> <input type="radio"/> |