

Straight Line Graphs

GCSE Mathematics • Foundation Tier • Grades 4–5 • Non-calculator

WORKED SOLUTIONS

Name: _____ *worked example* _____

Class: _____

Total: _____ *48* _____ / 48

Show all your working. Marks are given for correct method as well as the final answer.

1. Write down the gradient of $y = 4x + 3$. [1 mark]

the number in front of x

Answer: _____ *4* _____

2. Write down the y -intercept of $y = 2x - 7$. [1 mark]

the constant, $c = -7$

Answer: _____ *(0, -7)* _____

3. Write down the gradient and intercept of $y = -3x + 5$. [2 marks]

gradient -3

intercept (0, 5)

keep the minus with the 3

Answer: _____ *$m = -3, c = 5$* _____

4. Rearrange $2y = 6x + 10$ into the form $y = mx + c$ and write down the gradient. [2 marks]

divide everything by 2

$y = 3x + 5$

Answer: _____ *$y = 3x + 5, m = 3$* _____

5. Rearrange $3x + y = 12$ into the form $y = mx + c$. [2 marks]

take 3x from both sides

gradient is -3, not 3

Answer: _____ *$y = -3x + 12$* _____

6. Rearrange $4x - 2y = 8$ into the form $y = mx + c$. [3 marks]

$-2y = -4x + 8$

divide by -2

$y = 2x - 4$

Answer: _____ *$y = 2x - 4$* _____

7. Work out the gradient of the line through (1, 3) and (5, 11). [3 marks]

gradient = $\frac{\text{change in } y}{\text{change in } x}$

$\frac{11-3}{5-1} = \frac{8}{4} = 2$

Answer: _____ *2* _____

8. Work out the gradient of the line through (2, 7) and (6, 1). [3 marks]

$\frac{1-7}{6-2} = \frac{-6}{4}$

$= -1.5$

going down means a negative gradient

Answer: _____ *-1.5* _____

9. A line has gradient 3 and passes through $(0, -2)$. Write its equation. [2 marks]

$$m = 3, c = -2$$

Answer: $y = 3x - 2$

10. A line has gradient 2 and passes through $(3, 10)$. Work out its equation. [3 marks]

$$\begin{aligned} y &= 2x + c \\ 10 &= 2(3) + c \\ c &= 4 \end{aligned}$$

Answer: $y = 2x + 4$

11. Work out the equation of the line through $(1, 5)$ and $(4, 14)$. [4 marks]

$$\begin{aligned} m &= \frac{14-5}{4-1} = 3 \\ 5 &= 3(1) + c \\ c &= 2 \end{aligned}$$

Answer: $y = 3x + 2$

12. Write down the gradient of any line parallel to $y = 5x - 1$. [1 mark]

parallel lines have equal gradients

Answer: 5

13. A line is parallel to $y = 4x + 1$ and passes through $(2, 3)$. Work out its equation. [3 marks]

$$\begin{aligned} m &= 4 \\ 3 &= 4(2) + c \\ c &= -5 \end{aligned}$$

Answer: $y = 4x - 5$

14. Write down the gradient of a line perpendicular to $y = 2x + 7$. [2 marks]

*flip it and change the sign
the two gradients multiply to -1*

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

15. A line is perpendicular to $y = -\frac{1}{3}x + 2$. Write down its gradient. [2 marks]

*negative reciprocal of $-\frac{1}{3}$
 $= 3$*

Answer: 3

16. Does the point $(3, 11)$ lie on the line $y = 3x + 2$? Show your working. [2 marks]

$$\begin{aligned} 3(3) + 2 &= 11 \\ \text{matches the } y\text{-value} \end{aligned}$$

Answer: yes

17. Does the point $(2, 9)$ lie on the line $y = 4x - 1$? [2 marks]

$$\begin{aligned} 4(2) - 1 &= 7 \\ 7 &\neq 9 \end{aligned}$$

Answer: no (gives 7)

18. Work out the midpoint of $(1, 4)$ and $(7, 10)$. [2 marks]

average the x: $(1 + 7) \div 2 = 4$
average the y: $(4 + 10) \div 2 = 7$

Answer: _____ $(4, 7)$ _____

19. The line L passes through $(0, 6)$ and $(4, 0)$.

(a) Work out the gradient of L .

[2 marks]

$$\frac{0-6}{4-0} = \frac{-6}{4}$$
$$= -1.5$$

(b) Write the equation of L in the form $y = mx + c$.

[2 marks]

$$c = 6 \text{ (it crosses at } (0, 6) \text{)}$$
$$y = -1.5x + 6$$

Answer: $m = -1.5$; $y = -1.5x + 6$

20. Line A is $y = 2x + 1$. Line B passes through $(0, 4)$ and is perpendicular to A .

(a) Write down the gradient of B .

[2 marks]

$$\text{perpendicular to gradient } 2$$
$$= -\frac{1}{2}$$

(b) Write the equation of B .

[2 marks]

$$\text{crosses at } (0, 4) \text{ so } c = 4$$
$$y = -\frac{1}{2}x + 4$$

Answer: — $m = -\frac{1}{2}$; $y = -\frac{1}{2}x + 4$ —