

# GCSE (9–1) MATHEMATICS

## Topic Check In - 7.02 Straight line graphs

**Hint:** You may wish to draw graphs in some questions.

Use the graph in Figure 1 to answer questions 1–3:

1. Write down the  $y$ -intercept for line A.
2. Write down the gradient of line B.
3. Write down the coordinates of the point where lines A and B intersect.

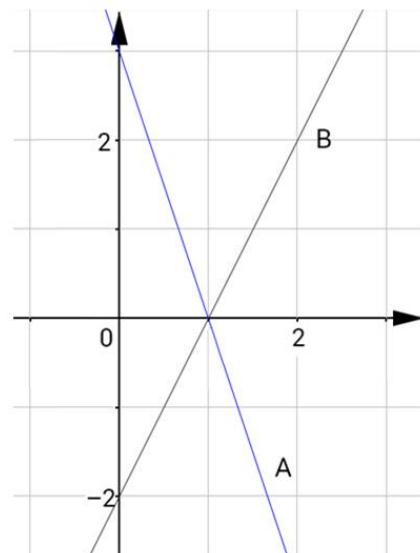
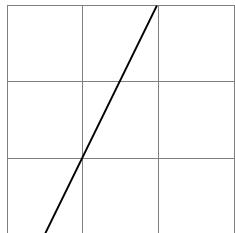


Figure 1

4. Write down the gradient of the graph of  $y = 7x - 2$ .
5.  $y = ax + b$  passes through  $(0, 4)$ .  
The line has a gradient of 3.  
Write down the value of  $a$  and the value of  $b$ .
6. The equation of line L is  $y = 5x - 2$ .  
Show that line L will pass through the point  $(20, 98)$ .
7. Line G passes through the points  $(1, 7)$  and  $(3, 11)$ .  
Show that the  $y$ -intercept is 5.
8. Show that the line connecting  $(1, 9)$  with  $(3, 13)$  and the line connecting  $(2, 3)$  with  $(5, 9)$  make up two sides of a trapezium.
9. This diagram shows part of the graph of a straight line.  
Each square has side length 1 unit.



The line crosses the  $y$ -axis at -14  
Find the  $x$ -coordinate when  $y = 1$ .

10. A right-angled triangle has coordinates  $(0, 3)$ ,  $(5, 3)$  and  $(5, 23)$ . Find the equations of the three lines that pass through the vertices.



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## Extension

A set of straight lines pass through  $(0, 0)$  and  $(t, t + 2)$ .

- Investigate the gradient for different values of  $t$ .
- Find, in terms of  $t$ , the equation of all possible lines in the form  $y = mx + c$ .

Other sets of straight lines will pass through the points  $(0, a)$  and  $(t, t + 2)$ .

- Investigate the equation of these lines for different values of  $a$  and  $t$ .
- Find, in terms of  $a$  and  $t$ , the equation of all possible lines in the form  $y = mx + c$ .



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## Answers

1. 3
2. 2
3. (1, 0)
4. 7
5. Equation is  $y = 3x + 4$  so  $a = 3$ ,  $b = 4$ .
6. Using  $x = 20$  gives  $y = 5 \times 20 - 2 = 98$  oe.
7. Gradient is  $\frac{(11-7)}{(3-1)} = 2$ , so  $y = 2x + c$ . Substituting one of the coordinates and solving gives  $c = 5$ .
8. Show that each pair of points gives a line with gradient 2. Lines with the same gradient are parallel lines which could form the opposite sides of a trapezium.
9.  $m = 2$  and  $c = -14$  therefore  $y = 2x - 14$ . When  $y = 1$ ,  $x = 7.5$ .
10.  $y = 3$ ,  $x = 5$  and  $y = 4x + 3$

## Extension

Gradient =  $\frac{t+2}{t}$ ,  $y$ -intercept is 0 so equation is  $y = \frac{t+2}{t}x$ .

Gradient =  $\frac{t+2-a}{t}$ ,  $y$ -intercept is  $a$  so equation is  $y = \frac{t+2-a}{t}x + a$ .



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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Find the $y$ -intercept of a line from a graph.			
AO1	2	Find the gradient of a line from a graph.			
AO1	3	Find the coordinates of the point where lines cross.			
AO1	4	Find the gradient from the equation of a line in the form $y = mx + c$ .			
AO1	5	Interpret the gradient and $y$ -intercept of an equation in the form $y = mx + c$ .			
AO2	6	Show that a point satisfies an equation.			
AO2	7	Understand that the $y$ -intercept is where $x = 0$ .			
AO2	8	Calculate gradient.			
AO3	9	Interpret the gradient and $y$ -intercept to determine coordinates on a line.			
AO3	10	Find equations of lines.			

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