

Equation of a Straight Line (H)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	
Total Marks:	

1. The line L_1 is shown in the diagram below.

The line L_2 , which is not shown, is perpendicular to L_1 .

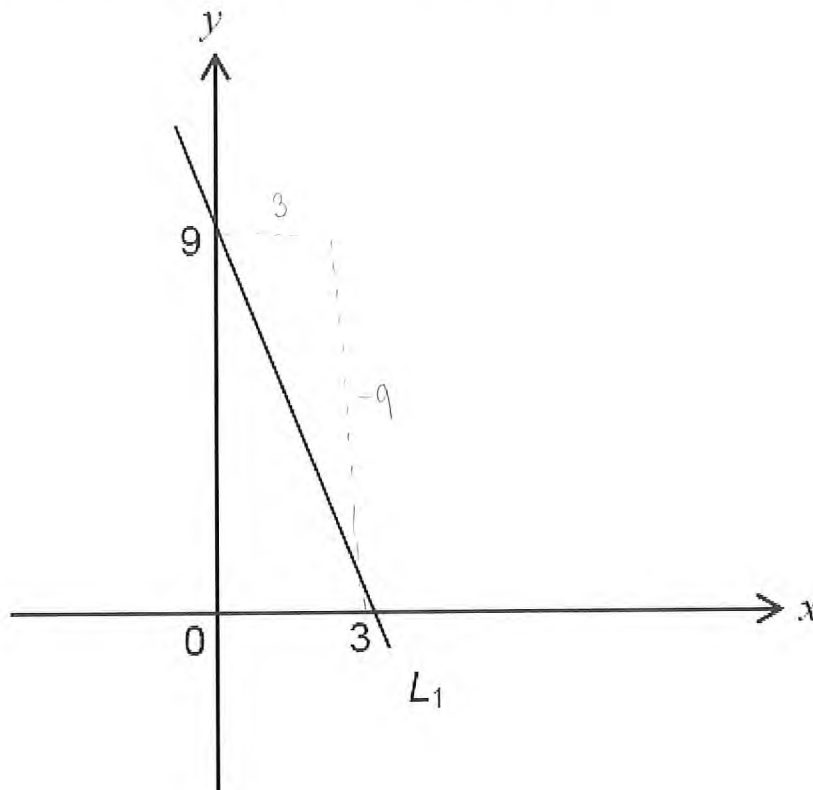


Diagram not drawn to scale

(i) Find the gradient of L_1 .

$$m = \frac{-9}{3} = \underline{\underline{-3}}$$

[2]

(ii) Write down the gradient of L_2 .

$$m = \frac{1}{3}$$

[1]

(b) The two straight lines L1 and L2 intersect at the point (1, 6).

Find the equation of L2 and write it in the form $ax + by + c = 0$.

$$\begin{aligned}
 y &= \frac{1}{3}x + c & 6 - \frac{1}{3} &= c & y &= \frac{1}{3}x + \frac{17}{3} \\
 6 &= \frac{1}{3}(1) + c & \frac{17}{3} &= c & 3y &= x + 17 \\
 16 &= \frac{1}{3} + c & & & \underline{\underline{3y - x - 17 = 0}}
 \end{aligned}$$

[4]

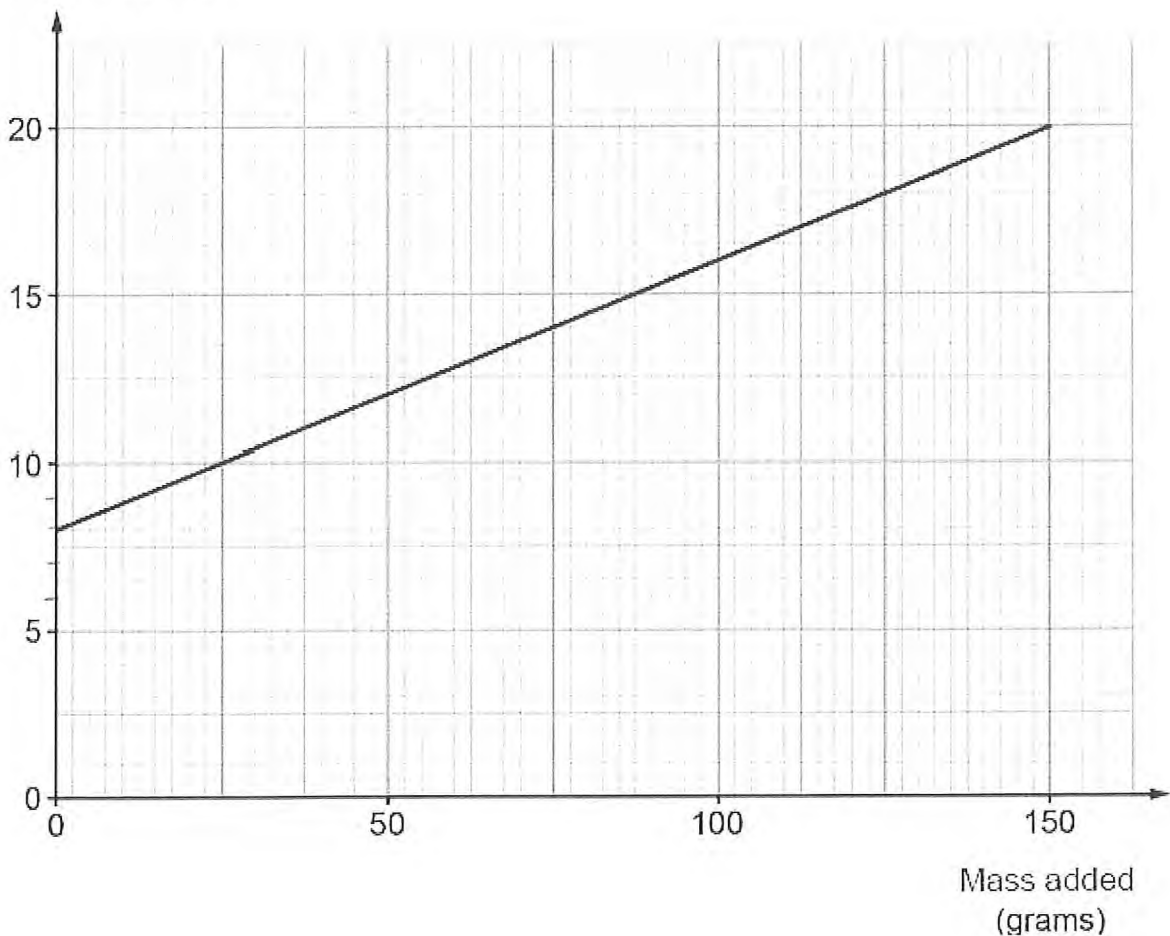
2. In an experiment, the mass added to the end of a vertical spring is gradually increased.



Diagram not drawn to scale

At the end of the experiment, a computer produced the graph shown below.

Length of spring (mm)



(a) Write down the length of the spring without any mass added.

8mm

[1]

(b) (i) Calculate the gradient of the straight line drawn on the graph.

$$m = \frac{12}{150} = \frac{6}{75} = \frac{1}{25}$$

[2]

(ii) Explain what the gradient of this graph tells you in relation to the experiment.

for every 25g of mass added, the length of spring expands by 1mm.

[1]

(c) The straight line stops before the right-hand edge of the graph paper.

Why do you think this might be?

- Experiment was stopped
- Spring broke etc.
- Spring could not expand beyond 150g

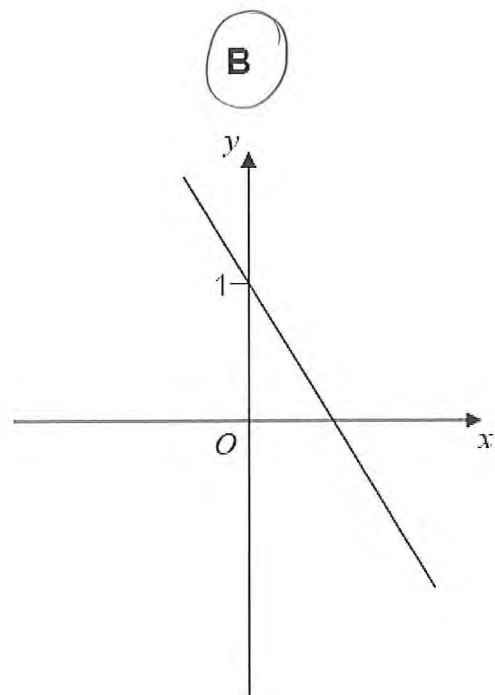
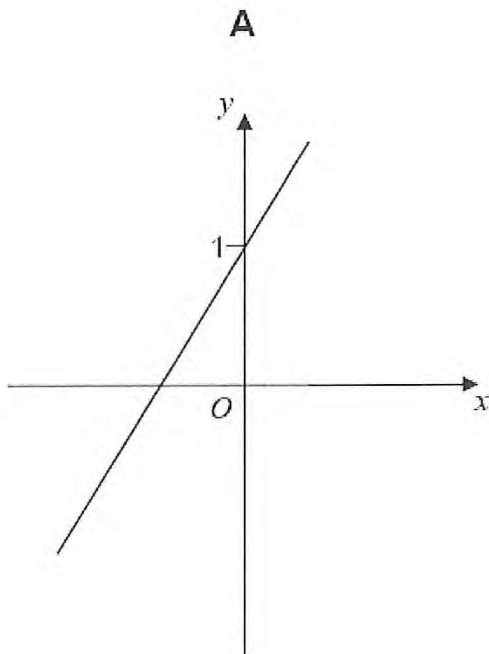
[1]

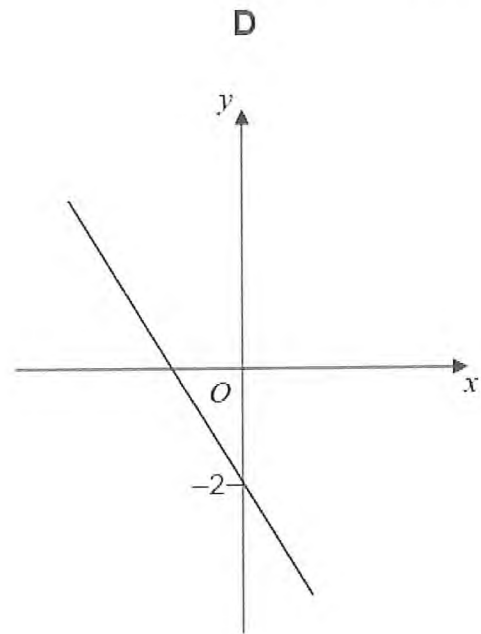
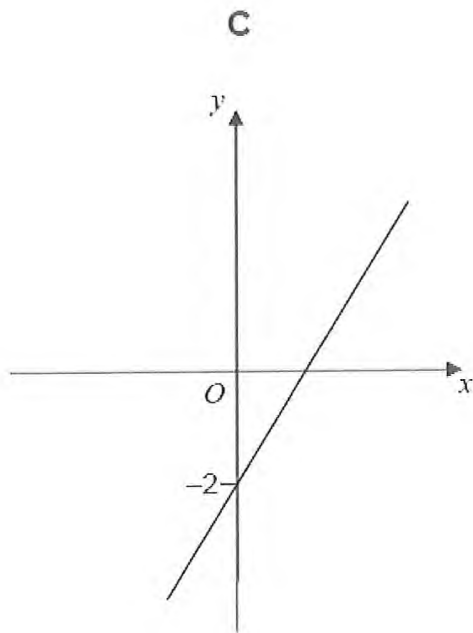
3. One of these graphs is a sketch of $y = 1 - 2x$

Which one?

Circle the correct letter.

[1]

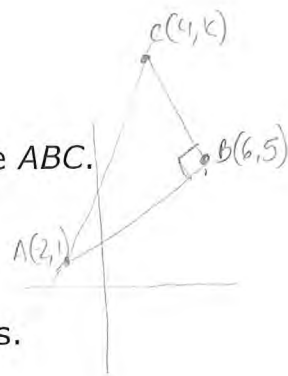




4. $A(-2, 1)$, $B(6, 5)$ and $C(4, k)$ are the vertices of a right-angled triangle ABC .
Angle ABC is the right angle.

Find an equation of the line that passes through A and C .

Give your answer in the form $ay + bx = c$ where a , b and c are integers.



$$M_{AB} = \frac{5-1}{6-2} = \frac{4}{8} = \frac{1}{2}$$

$$M_{BC} = -2$$

$$y = -2x + c$$

$$\text{Sub}(6,5) \quad 5 = -2(6) + c$$

$$5 = -12 + c$$

$$5 + 12 = c$$

$$17 = c$$

$$\text{Line BC } \therefore y = -2x + 17$$

Find 'c'

$$\text{Sub}(4,k) \quad y = -2x + 17$$

$$y = -2(4) + 17$$

$$y = -8 + 17$$

$$y = 9$$

$$\therefore \underline{C(4,9)}$$

$$M_{AC} = \frac{9-1}{4-2} = \frac{8}{2} = \frac{4}{3}$$

$$y = \frac{4}{3}x + c$$

$$\text{Sub}(-2,1) \quad y = \frac{4}{3}x + c$$

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

$$1 = -\frac{8}{3} + c$$

$$1 + \frac{8}{3} = c$$

$$\frac{11}{3} = c$$

$$\therefore y = \frac{4}{3}x + \frac{11}{3}$$

$$\therefore \underline{\underline{3y = 4x + 11}}$$

Line AC

$$\underline{\underline{3y - 4x = 11}}$$

[5]

5. Circle the equation of a line that is parallel to $y = 5x - 2$

$$y = 2x - 5$$

$$\textcircled{y = 5x + 2}$$

$$y = 3x - 2$$

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

[1]

6. Show that line $3y = 4x - 14$ is perpendicular to line $4y = -3x + 48$.

$$3y = 4x - 14$$

$$y = \frac{4}{3}x - \frac{14}{3}$$

$$m_1 \times m_2 = -1$$

$$4y = -3x + 48$$

$$y = -\frac{3}{4}x + \frac{48}{4}$$

$$\frac{4}{3} \times -\frac{3}{4} = -1 \quad \therefore \text{perpendicular}$$

[4]

7. A straight line goes through the points (p, q) and (r, s), where

• $p + 2 = r$

• $q + 4 = s$.

$(x_1, y_1) \quad (x_2, y_2)$
 $(p, q) \quad (p+2, q+4)$

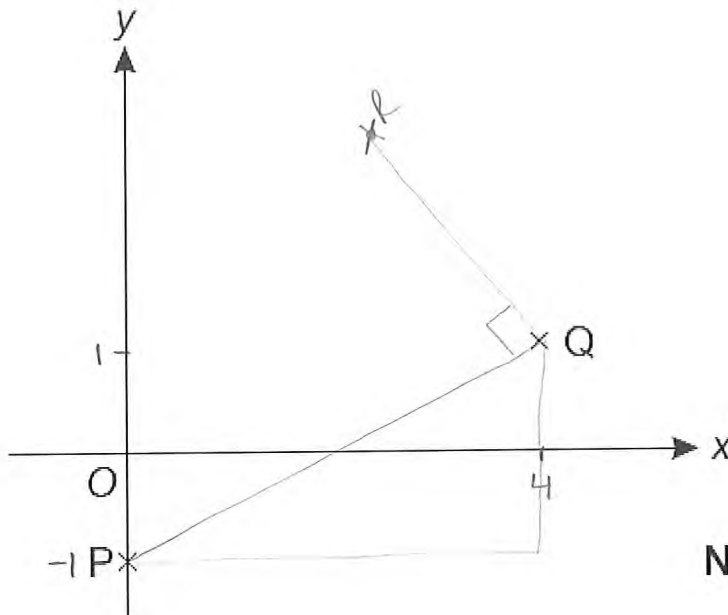
Find the gradient of the line.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{q+4 - q}{p+2 - p} = \frac{4}{2} = \underline{\underline{2}}$$

..... 2 [3]

8. (10) P has coordinates (0, -1) and Q has coordinates (4, 1).



a) Find the equation of line PQ.

$$m = \frac{2}{4} = \frac{1}{2}$$

a) $\frac{1}{2}$ [3]

b) P and Q are two vertices of rectangle PQRS.

Find the equation of line QR.

$m_{QR} = -2$

Sub(4,1) in $y = -2x + c$

$\therefore y = -2x + 9$

$1 = -2(4) + c$

$1 = -8 + c$

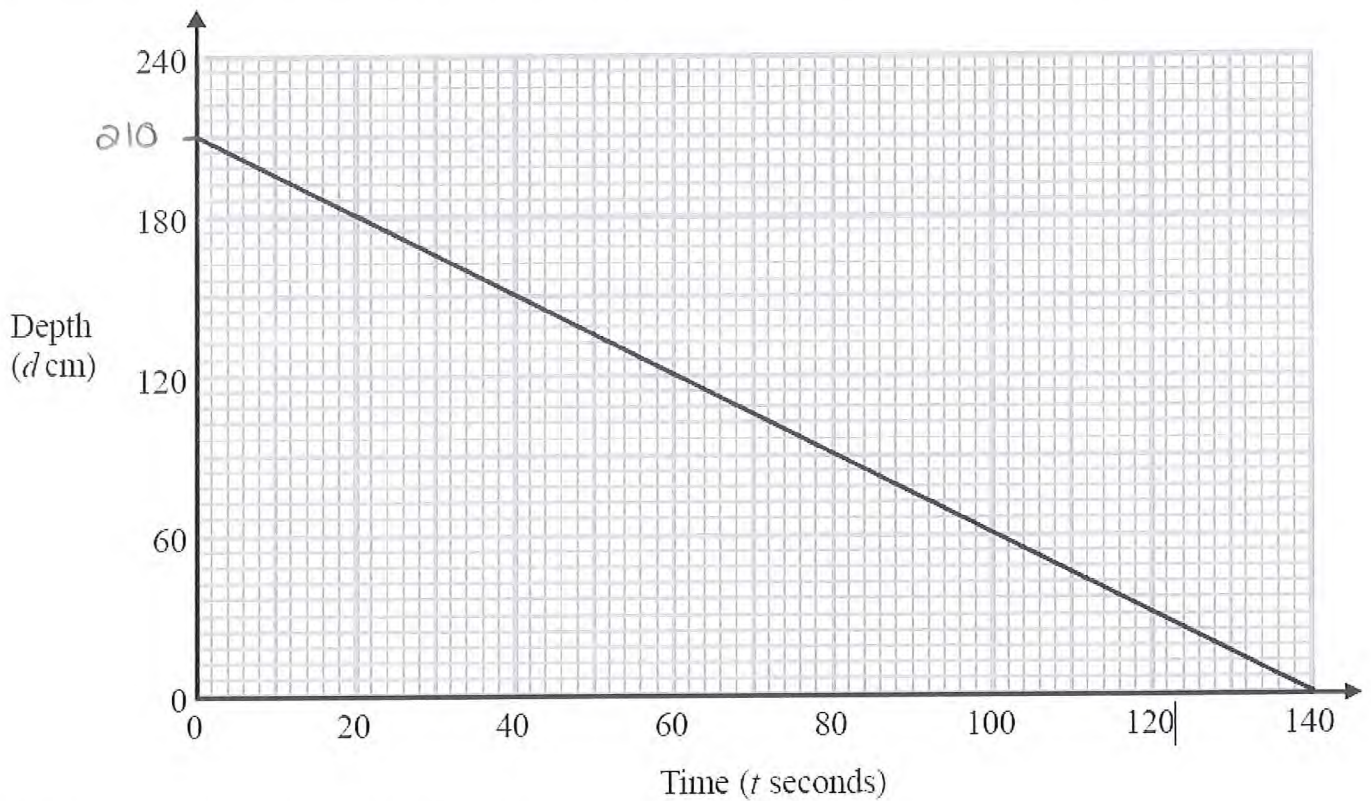
$1 + 8 = c$

$9 = c$

$\therefore y = -2x + c$

b) $y = -2x + 9$ [3]

9. The graph shows the depth, d cm, of water in a tank after t seconds.



a) Find the gradient of this graph.

$$m = \frac{-210}{140} = -\frac{3}{2}$$

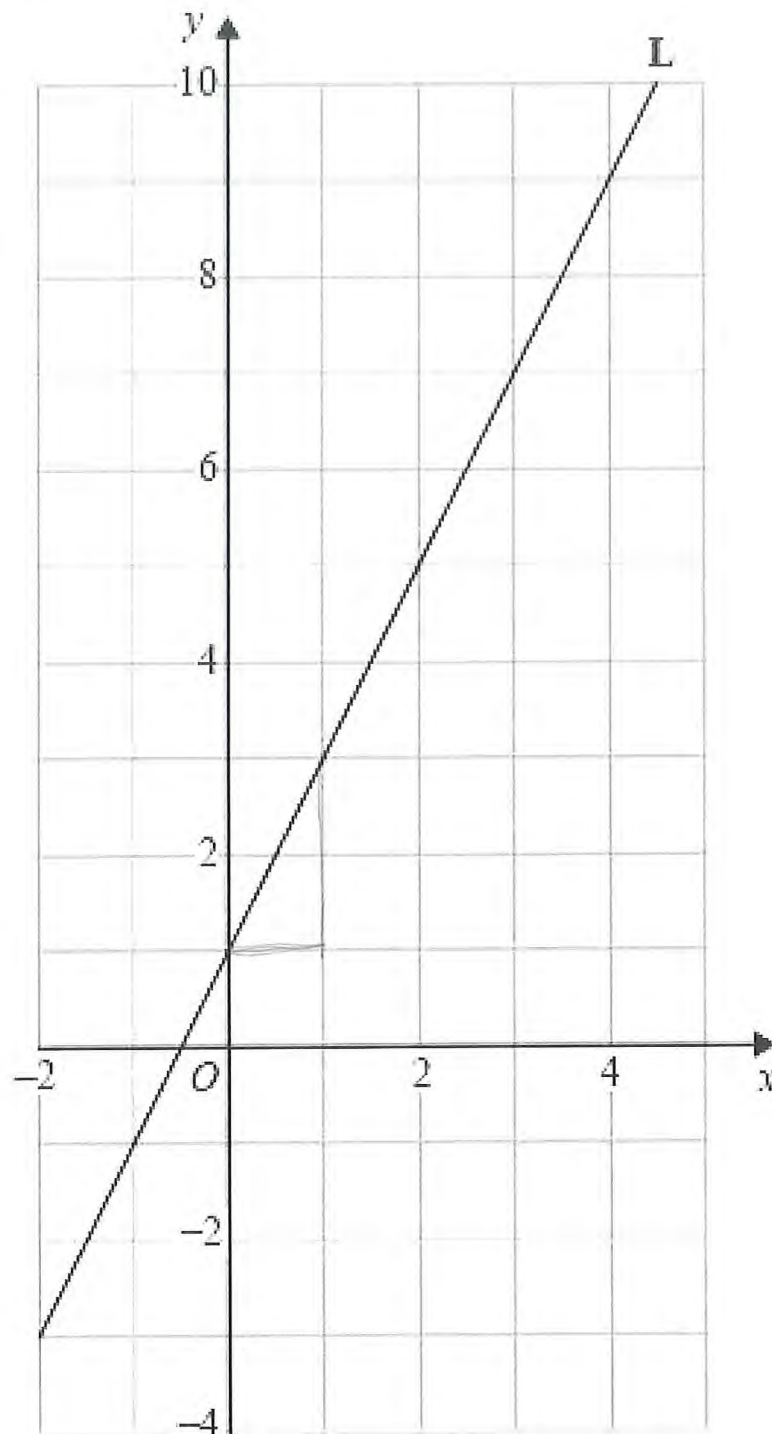
..... $-\frac{3}{2}$ [2]

b) Explain what this gradient represents.

for every 2 seconds, the water in the tank drops by 3cm

[1]

10. Line **L** is drawn on the grid below.



Find an equation for the straight line **L**.

Give your answer in the form $y = mx + c$

$$m = \frac{2}{1} = 2 \quad \underline{\underline{y = 2x + 1}}$$

$$c = 1$$

[3]

11. Here are the equations of four straight lines.

Line A $y = 2x + 4$

Line B $2y = x + 4 \Rightarrow y = \frac{x}{2} + \frac{4}{2}$

Line C $2x + 2y = 4 \Rightarrow 2y = 4 - 2x \Rightarrow y = \frac{4}{2} - \frac{2}{2}x \Rightarrow y = 2 - x$

Line D $2x - y = 4 \Rightarrow 2x - 4 = y \Rightarrow y = 2x - 4$

Two of these lines are parallel.

Write down the two parallel lines.

Line A and line D [1]

12. Circle the equation of the x-axis.

$x + y = 0$

$x - y = 0$

$x = 0$

$y = 0$

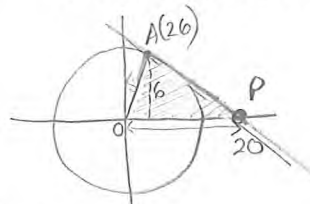
[1]

13. The line l is a tangent to the circle $x^2 + y^2 = 40$ at the point A.

A is the point (2, 6).

The line l crosses the x-axis at the point P.

Work out the area of triangle OAP.



$m_{OA} = \frac{6-0}{2-0} = \frac{6}{2} = 3$

Sub $P(x, 0)$ $3y = 20 - x$
 $0 = 20 - x$
 $-20 = -x$
 $20 = x$

$\therefore P(20, 0)$

$A_{OAP} = \frac{1}{2}bh$
 $= \frac{1}{2}(20)(6)$
 $= 60 \text{ units}^2$

$\therefore m_{AP} = -\frac{1}{3}$

\Rightarrow Line AP: $y = -\frac{1}{3}x + c$

Sub (2, 6) $6 = -\frac{1}{3}(2) + c$

$6 = -\frac{2}{3} + c$

$6 + \frac{2}{3} = c$

$6\frac{2}{3} = \frac{20}{3} = c$

$\therefore y = -\frac{1}{3}x + \frac{20}{3}$

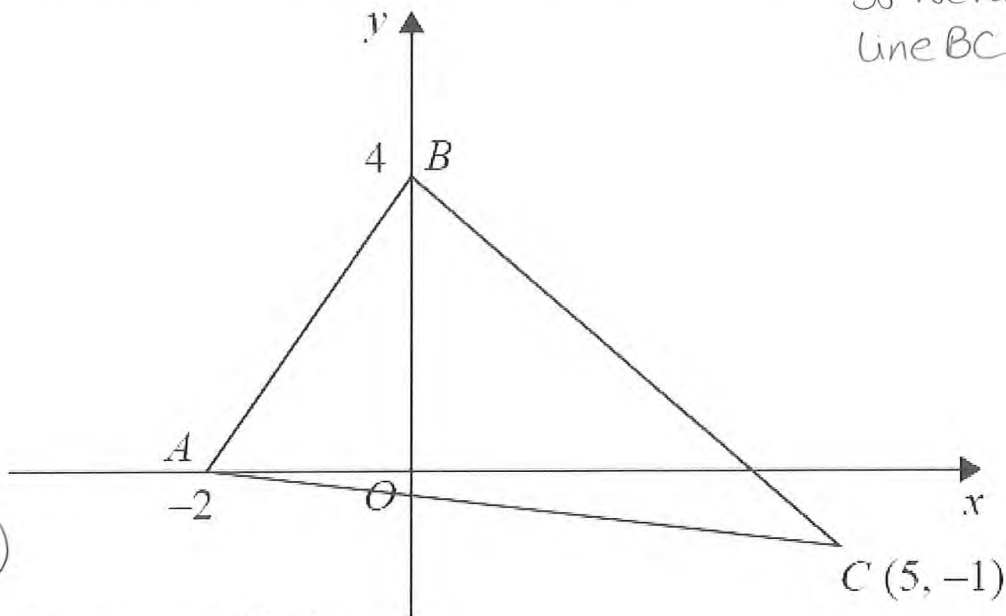
$\therefore 3y = -x + 20$

$3y = 20 - x$

[5]

14. Find an equation of the line that passes through C and is perpendicular to AB.

So we want eq'n of line BC.



$A(-2,0) B(0,4)$

$m_{AB} = \frac{4-0}{0-2} = \frac{4}{-2} = -2$

$m_{BC} = -\frac{1}{2}$

$\therefore y = -\frac{1}{2}x + C$

sub(5,-1)
 $y = -\frac{1}{2}x + C$
 $-1 = -\frac{1}{2}(5) + C$
 $-1 = -\frac{5}{2} + C$
 $-1 + \frac{5}{2} = C$
 $-\frac{2}{2} + \frac{5}{2} = C$
 $\frac{3}{2} = C$

$\therefore y = -\frac{1}{2}x + \frac{3}{2}$
 $2y = -x + 3$
 $2y = 3 - x$
 $2y + x = 3$
 $2y + x - 3 = 0$

[4]

15. Work out the equation of the line that is parallel to the line $y = 5x - 3$ passes through $(-2, -4)$

sub(-2,-4) $y = 5x + C$
 $-4 = 5(-2) + C$
 $-4 = -10 + C$
 $-4 + 10 = C$
 $6 = C$

$\therefore y = 5x + 6$

[3]

16. A straight line has equation $y = 6 - 2x$

Circle the gradient of the line.

-2

2

2x

6

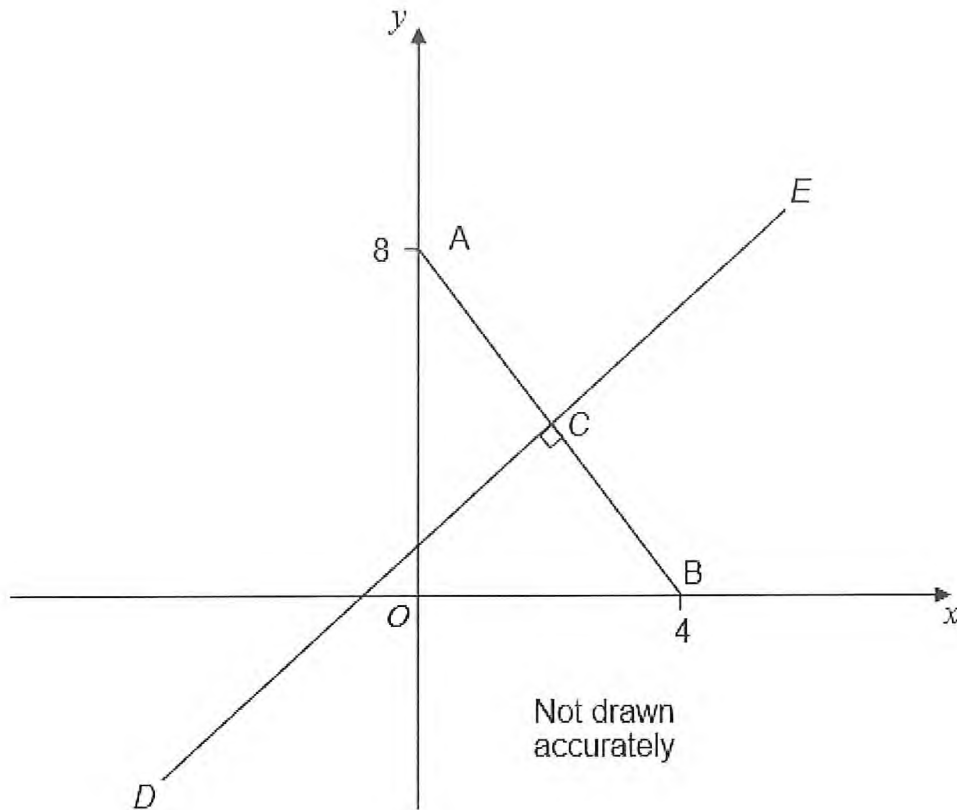
[1]

17. ACB is a straight line.

A is the point (0, 8), and B is the point (4, 0)

C is the midpoint of AB.

Line DCE is perpendicular to line ACB.



Work out the equation of line DCE.

$$m_{AB} = \frac{0-8}{4-0} = \frac{-8}{4} = -2$$

$$m_{DCE} = \frac{1}{2}$$

$$\Rightarrow y = \frac{1}{2}x + c$$

$$\text{Sub } (4,0) \quad y = \frac{1}{2}x + c$$

$$0 = \frac{1}{2}(4) + c$$

$$0 = 2 + c$$

$$0 = 2 + c$$

$$-2 = c$$

$$\therefore y = \frac{1}{2}x - 2$$

[5]

Equation of a Straight Line (H & F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	
Total Marks:	

1. Here are the equations of four straight lines.

Line A $y = 2x + 4$

Line B $2y = x + 4 \Rightarrow y = \frac{x}{2} + \frac{4}{2}$

Line C $2x + 2y = 4 \xrightarrow{\quad\quad\quad} 2y = 4 - 2x \Rightarrow y = \frac{4}{2} - \frac{2}{2}x \Rightarrow y = 2 - x$

Line D $2x - y = 4 \Rightarrow 2x - 4 = y$

Two of these lines are parallel.

Write down the two parallel lines.

Line A and line D [1]

2. Line **L** is drawn on the grid below.

Find an equation for the straight line **L**.

Give your answer in the form $y = mx + c$

$$m = \frac{2}{1} = 2$$

$$c = 1$$

$$\underline{\underline{y = 2x + 1}}$$

[3]

