Name:

Level 2 Further Maths

Equation of a Line

Corbettmaths

Ensure you have: Pencil or pen

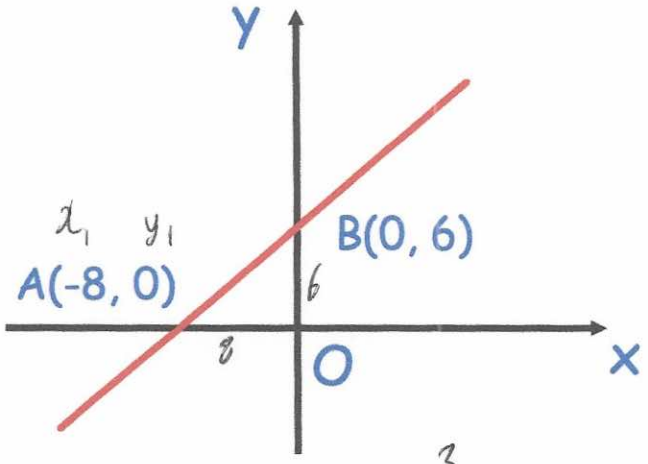
Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. A straight line passes through the point A (–8, 0) and the point B (0, 6)



$m = \frac{3}{4}$

(a) Find the equation of the line

$y - 0 = \frac{3}{4}(x - (-8))$

$y = \frac{3}{4}x + 6$

$y = \frac{3}{4}x + 6$

(2)

(b) Work out the coordinates of the midpoint of AB

$(-4, 3)$

(2)

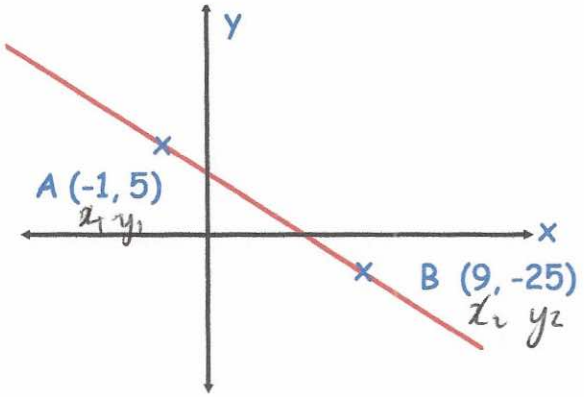
(c) Work out the area of triangle OAB

$\frac{1}{2} \times 8 \times 6$

24

(1)

2.



Find the equation of the line

$$m = \frac{-25-5}{9--1} = \frac{-30}{10} = -3$$

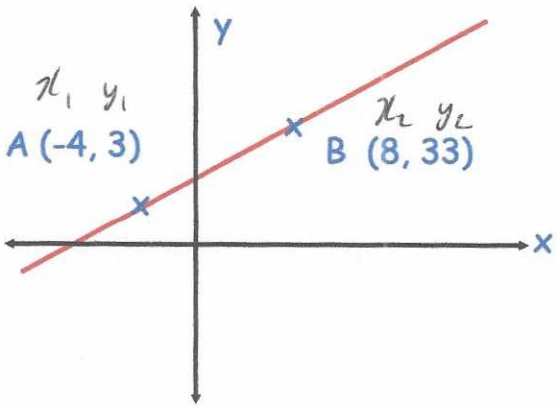
$$y--25 = -3(x-9)$$

$$y+25 = -3x+27$$

$y = -3x + 2$

(3)

3.



Find the equation of the line

$$m = \frac{33-3}{8--4} = \frac{30}{12} = \frac{5}{2}$$

$$y-3 = \frac{5}{2}(x+4)$$

$$y = \frac{5}{2}x + 13$$

$y = \frac{5}{2}x + 13$

(3)

x_1 y_1 x_2 y_2

4. Find the equation of the straight line that passes through (–10, –5) and (–7, 4)

$$m = \frac{4 - -5}{-7 - -10} = \frac{9}{3} = 3$$

$$y - (-5) = 3(x + 10)$$

$$y + 5 = 3x + 30$$

$$y = 3x + 25$$

$y = 3x + 25$

(3)

A B C

5. Do the points (1, 4), (4, 10) and (9, 20) lie in a straight line?

x_1 y_1 x_2 y_2 x_3 y_3

$$m = \frac{20 - 10}{9 - 4} = \frac{10}{5} = 2$$

$$m = \frac{10 - 4}{4 - 1} = \frac{6}{3} = 2$$

yes, as the gradients are the same and they both pass through (4, 10)

(3)

6. Where does the line $5x + 4y - 10 = 0$ cross the x-axis?

$y = 0$

$$5x - 10 = 0$$

$$5x = 10$$

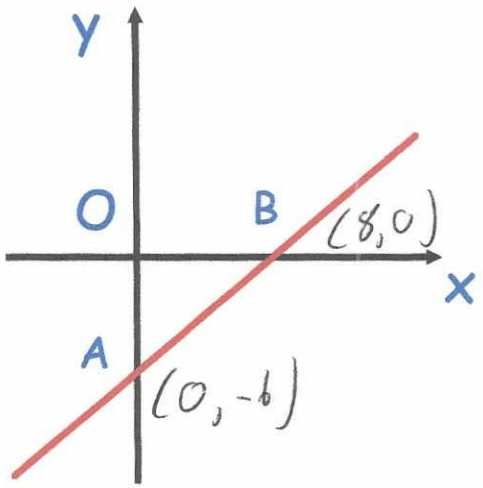
$$x = 2$$

(2, 0)

(2)

7. A straight line has equation $3x - 4y = 24$

The line crosses the y-axis at the point C
The line crosses the x-axis at the point D.



Work out the area of triangle OAB

$x = 0 \quad -4y = 24$
$y = -6$

$\frac{1}{2} \times 8 \times 6$

$y = 0 \quad 3x = 24$
$x = 8$

24

.....

(4)

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8. Find the gradient of the straight line with equation $8x + 3y = 30$

$3y = -8x + 30$

$y = -\frac{8}{3}x + 10$

$-\frac{8}{3}$

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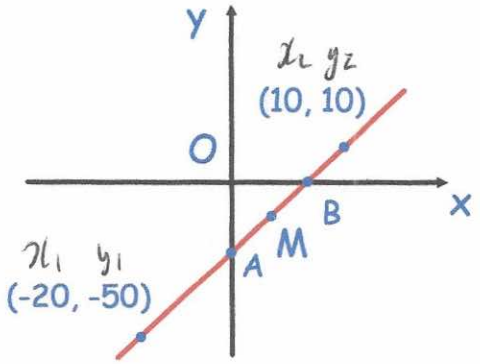
(2)

9. The line below passes through the point (–20, –50) and (10, 10)



The line meets the y-axis at the point A and the x-axis at the point B.

M is the midpoint of A and B.

Find the coordinates of the point M.

$m = \frac{10 - -50}{10 - -20} = \frac{60}{30} = 2$

$y = 2x - 10$

A (0, -10)

B (5, 0)

(2·5, -5)

(5)

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10. Work out the point of intersection of the lines

$y = 2x + 1$ and $y = 4x - 2$

$2x + 1 = 4x - 2$

$3 = 2x$

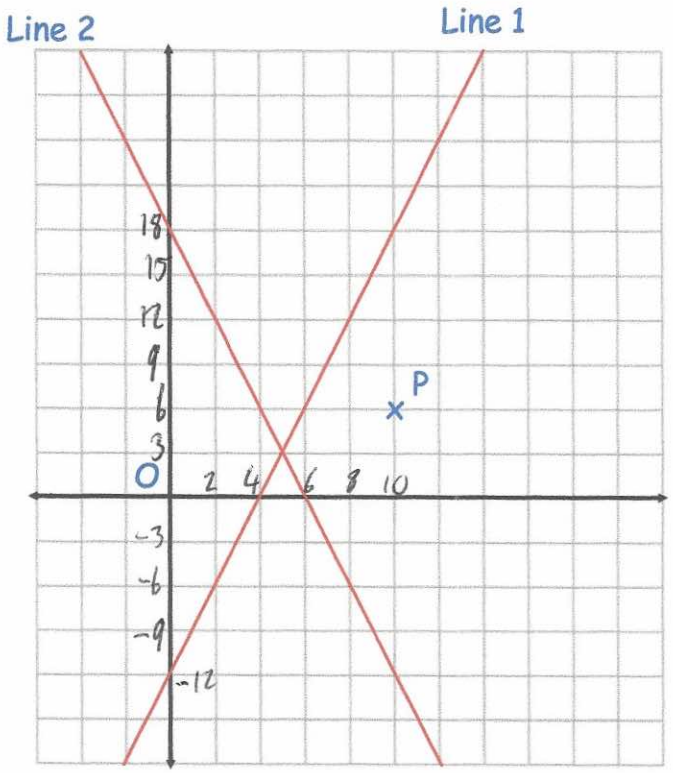
$x = 1·5$

$y = 2 \times 1·5 + 1$

(1.5, 4)

(3)

11.



Line 1 has equation $y = 3x - 12$

(a) Find the coordinates of P

(10, 6)

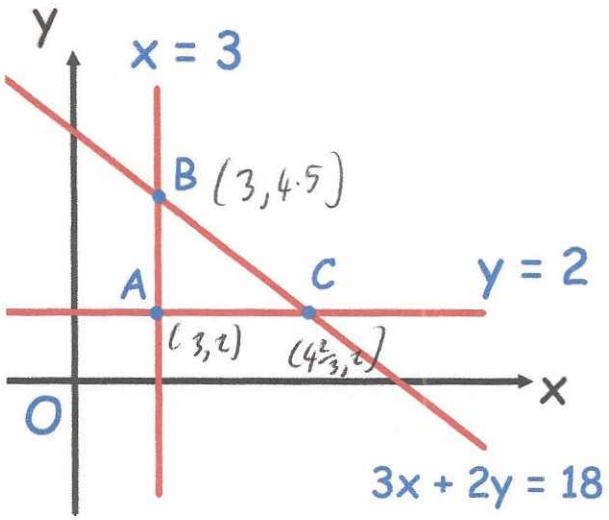
(3)

(b) Find the equation of Line 2

$y = -3x + 18$

(3)

12. Shown below are the lines $x = 3$ $y = 2$ and $3x + 2y = 18$



Find the area of triangle ABC

$x = 3$

$9 + 2y = 18$

$2y = 9$

$y = 4.5$

$y = 2$

$3x + 4 = 18$

$3x = 14$

$x = \frac{14}{3}$

$x = 4\frac{2}{3}$

$A = \frac{1}{2} b h$

$= \frac{1}{2} \times 1\frac{2}{3} \times 2.5$

$= \frac{1}{2} \times \frac{5}{3} \times \frac{5}{2} = \frac{25}{12}$

$2\frac{1}{12}$

.....

(5)

13. The straight line l_1 has an equation $4x + 2y + 1 = 0$
The straight line l_2 has an equation $y = 5 - x$

The lines l_1 and l_2 intersect at the point A

Work out the coordinates of A

$4x + 2(5-x) + 1 = 0$

$4x + 10 - 2x + 1 = 0$

$2x + 11 = 0$

$x = -5.5$

$y = 5 - -5.5$

$y = 10.5$

(-5.5, 10.5)

(4)

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14. The lines $y = x - 7$ and $y = 3x - 19$ intersect at the point A.

The point B has coordinates $(-2, 11)$

Find the equation of the line that passes through A and B.

$3x - 19 = x - 7$

$2x = 12$

$x = 6$

$y = -1$

A $(6, -1)$
$x_2 \quad y_2$

B $(-2, 11)$
$x_1 \quad y_1$

$m = \frac{-1 - 11}{6 - -2} = \frac{-12}{8}$

$= -\frac{3}{2}$

$y - 11 = -\frac{3}{2}(x + 2)$

$y - 11 = -\frac{3}{2}x - 3$

$y = -\frac{3}{2}x + 8$

(5)

15. A line has equation $y = 2x + 6$
The line crosses the x–axis at the point A
The line crosses the y–axis at the point B
The point C has coordinates (1, 9)
The point D is the midpoint of AB

Find the equation of the line that passes through C and D

A (-3, 0)

B (0, 6)

C (1, 9)

D (-1.5, 3)

$m = \frac{9-3}{1--1.5} = \frac{6}{2.5}$

$= 6 \div \frac{5}{2}$

$= 6 \times \frac{2}{5}$

$= \frac{12}{5}$

$y = \frac{12}{5}x + \frac{33}{5}$

(5)

$y = \frac{12}{5}x + c$

$9 = \frac{12}{5} + c$

$\frac{45}{5} - \frac{12}{5} = c$

$c = \frac{33}{5}$

16. Line l_1 passes through the points (1, 5) and (7, 8)

(a) Find the equation of the line l_1

$m = \frac{8-5}{7-1} = \frac{3}{6} = \frac{1}{2}$

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

$5 = \frac{1}{2} + c \quad c = \frac{9}{2}$

$y = \frac{1}{2}x + \frac{9}{2}$

(3)

The line l_1 meets the x-axis at the point A

(b) Find the coordinates of the point A

$y = 0$

$0 = \frac{1}{2}x + \frac{9}{2}$

$-4.5 = 0.5x$

$x = -9$

$(-9, 0)$

(2)

Line l_2 passes through the origin and has a gradient of 2.

$y = 2x$

The lines l_1 and l_2 intersect at the point B.

(c) Find the area of the triangle OAB

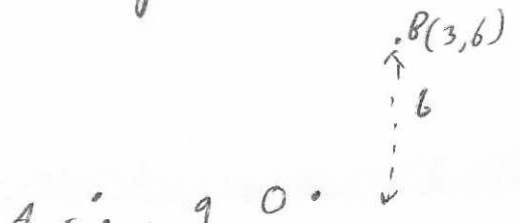
$2x = \frac{1}{2}x + \frac{9}{2}$

$4x = x + 9$

$3x = 9$

$x = 3$

$y = 6$



$\frac{1}{2} \times 9 \times 6$

27

(4)