

1 The point A has coordinates $(5, -4)$

The point B has coordinates $(13, 1)$

(a) Work out the coordinates of the midpoint of AB .

(..... ,)
(2)

Line L has equation $y = 2 - 3x$

(b) Write down the gradient of line L .

.....
(1)

Line L has equation $y = 2 - 3x$

(c) Does the point with coordinates $(100, -302)$ lie on line L ?

You must give a reason for your answer.

.....
.....
.....
(1)

(Total for Question 1 is 4 marks)

- 2** Point A has coordinates $(-3, 11)$
Point B has coordinates $(47, b)$
The midpoint of AB has coordinates $(a, -19)$
Find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots$$

(Total for Question 2 is 2 marks)

- 3** Find the gradient of the straight line with equation $5x + 2y = 7$

.....

(Total for Question 3 is 2 marks)

4 The straight line **L** has equation $2y + 7x = 10$

(a) Find the gradient of **L**

.....
(2)

(b) Find the coordinates of the point where **L** crosses the y -axis.

(.....,)
(1)

(Total for Question 4 is 3 marks)

- 5 The straight line L_1 has equation $x + 2y = 4$
The straight line L_2 passes through the points $(-1, -7)$ and $(7, 9)$

Michael says that the lines L_1 and L_2 are perpendicular.

Is Michael correct?

You must show clearly how you get your answer.

(Total for Question 5 is 3 marks)

- 6 Point A has coordinates $(5, 8)$
Point B has coordinates $(9, -4)$

(a) Work out the gradient of AB .

.....
(2)

The straight line L has equation $y = -4x + 5$

(b) Write down the gradient of a straight line that is perpendicular to L .

.....
(1)

(Total for Question 6 is 3 marks)

- 7 Two circles, C_1 and C_2 , are drawn on a centimetre grid, with a scale of 1 cm for 1 unit on each axis.

The centre of circle C_1 is at the point with coordinates $(-1, 3)$ and the radius of C_1 is 13 cm.

The centre of circle C_2 is at the point with coordinates $(7, 18)$ and the radius of C_2 is 6 cm.

- (a) Work out the distance between the centre of C_1 and the centre of C_2

..... cm
(3)

- (b) Explain why circle C_1 intersects circle C_2

.....
.....
(1)

(Total for Question 7 is 4 marks)

- 8 The straight line L_1 has equation $y = 6 - 2x$
The straight line L_2 is perpendicular to L_1 and passes through the point $(4, 7)$
Find the coordinates of the point where the line L_2 crosses the x -axis.

(..... ,)

(Total for Question 8 is 4 marks)

9 The straight line L_1 has equation $2y = 6x - 5$

The straight line L_2 is perpendicular to L_1 and passes through the point $(9, -1)$

Find an equation for L_2

Give your answer in the form $ay + bx = c$

(Total for Question 9 is 4 marks)

10

The straight line **L** passes through the points $(4, -1)$ and $(6, 4)$

The straight line **M** is perpendicular to **L** and intersects the y -axis at the point $(0, 8)$

Find the coordinates of the point where **M** intersects the x -axis.

(..... ,)

(Total for Question 10 is 4 marks)

- 11** (a) Write down an equation of a line that is parallel to the line with equation $y = 7 - 4x$

.....
(1)

The line **L** passes through the points with coordinates $(-3, 1)$ and $(2, -2)$

- (b) Find an equation of the line that is perpendicular to **L** and passes through the point with coordinates $(-6, 4)$

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

.....
(4)

(Total for Question 11 is 5 marks)

12 The centre O of a circle has coordinates $(4, 7)$

The point A , on the circle, has coordinates $(6, 11)$ and AOP is a diameter of the circle.

Find an equation of the tangent to the circle at the point P

(Total for Question 12 is 4 marks)

13 Line **L** has equation $4y - 6x = 33$

Line **M** goes through the point $A(5, 6)$ and the point $B(-4, k)$

L is perpendicular to **M**.

Work out the value of k .

(Total for Question 13 is 4 marks)

14 $ABCD$ is a rhombus.

The diagonals, AC and BD , intersect at the point M .

The coordinates of M are $(6, -11)$

The points A and C both lie on the line with equation $2y + 7x = 20$

Find the exact coordinates of the point where the line through B and D intersects the y -axis.

(..... ,)

(Total for Question 14 is 4 marks)

15 ABC is an isosceles triangle with $AB = AC$.

B is the point with coordinates $(-1, 5)$

C is the point with coordinates $(2, 10)$

M is the midpoint of BC .

Find an equation of the line through the points A and M .

Give your answer in the form $py + qx = r$ where p , q and r are integers.

.....

(Total for Question 15 is 5 marks)

16 ABC is an isosceles triangle such that

$$AB = AC$$

A has coordinates $(4, 37)$

B and C lie on the line with equation $3y = 2x + 12$

Find an equation of the line of symmetry of triangle ABC .

Give your answer in the form $px + qy = r$ where p , q and r are integers.

Show clear algebraic working.

.....

(Total for Question 16 is 5 marks)

17 $ABCD$ is a kite with $AB = AD$ and $CB = CD$.

B is the point with coordinates $(10, 19)$

D is the point with coordinates $(2, 7)$

Find an equation of the line AC .

Give your answer in the form $py + qx = r$ where p , q and r are integers.

.....
(Total for Question 17 is 5 marks)

18 L_1 and L_2 are two straight lines.

The origin of the coordinate axes is O .

L_1 has equation $5x + 10y = 8$

L_2 is perpendicular to L_1 and passes through the point with coordinates $(8, 6)$

L_2 crosses the x -axis at the point A .

L_2 intersects the straight line with equation $x = -3$ at the point B .

Find the area of triangle AOB .

Show your working clearly.

(Total for Question 18 is 5 marks)

19 ABC is a triangle in which angle $ABC = 90^\circ$

p and q are integers such that

the coordinates of A are $(p, 10)$

the coordinates of B are $(-1, -5)$

the coordinates of C are $(8, q)$

Given that the gradient of AC is $-\frac{6}{7}$

work out the value of p and the value of q

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots$$

(Total for Question 19 is 5 marks)

20 P and Q are two points.

The coordinates of P are $(-1, 6)$

The coordinates of Q are $(5, -4)$

Find an equation of the perpendicular bisector of PQ .

Give your answer in the form $ax + by + c = 0$ where a , b and c are integers.

(Total for Question 20 is 6 marks)

- 21** [In this question 1 cm = 1 unit on the x -axis and
1 cm = 1 unit on the y -axis]

P is a point on a circle with centre $(0, 0)$

The coordinates of P are $(8, -10)$

The line L is the tangent to the circle at the point P

L crosses the x -axis at the point Q and crosses the y -axis at the point R

Work out the length of RQ

Give your answer correct to 3 significant figures.

..... cm

(Total for Question 21 is 6 marks)

22

Triangle HJK is isosceles with $HJ = HK$ and $JK = \sqrt{80}$

H is the point with coordinates $(-4, 1)$

J is the point with coordinates $(j, 15)$ where $j < 0$

K is the point with coordinates $(6, k)$

M is the midpoint of JK .

The gradient of HM is 2

Find the value of j and the value of k .

$j =$

$k =$

(Total for Question 22 is 6 marks)

23 A rectangle $ABCD$ is to be drawn on a centimetre grid such that

A has coordinates $(-4, -2)$

B has coordinates $(1, 10)$

C has coordinates $(19, a)$

D has coordinates (b, c)

(a) Work out the value of a , the value of b and the value of c .

$a =$

$b =$

$c =$

(b) Calculate the perimeter, in centimetres, of rectangle $ABCD$.

..... cm

(3)

(Total for Question 23 is 7 marks)

24 $ABCD$ is a kite with $AB = AD$ and $CB = CD$

A is the point with coordinates $(-2, 10)$

B is the point with coordinates $\left(-\frac{27}{5}, 4\right)$

C is the point with coordinates $(4, -5)$

Work out the coordinates of D

(..... ,)

(Total for Question 24 is 6 marks)

- 25** The straight line **L** passes through point $A(-6, 2)$ and point $B(5, 3)$
The straight line **M** is perpendicular to **L** and passes through the midpoint of A and B .
The line **M** intersects the line $x = -1$ at point C .

Calculate the area of triangle ABC .

.....
(Total for Question 25 is 7 marks)

26 $ABCD$ is a kite, with diagonals AC and BD , drawn on a centimetre square grid, with a scale of 1 cm for 1 unit on each axis.

A is the point with coordinates $(-3, 4)$

The diagonals of the kite intersect at the point M with coordinates $(0, 2)$

Given that $AB = AD = 6.5$ cm and the x coordinate of B is positive,

find the coordinates of the points B and D .

(..... ,)

(..... ,)

(Total for Question 26 is 7 marks)