1 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.

$a =$ .....

$b =$ .....

(Total for Question 1 is 2 marks)

2 A curve has equation $y = f(x)$
There is only one maximum point on the curve.
The coordinates of this maximum point are $(-3, 4)$

Write down the coordinates of the maximum point on the curve with equation

(i) $y = f(x) - 6$

(..... , ...)

(ii) $y = f(2x)$

(..... , ...)

(Total for Question 2 is 2 marks)

3 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 3 is 4 marks)

4 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 4 is 5 marks)

5 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 = ...

(4)

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

..... cm

(3)

(Total for Question 5 is 7 marks)

6 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 6 is 4 marks)

7 *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 7 is 7 marks)

8 The line with equation $2y = x + 1$ intersects the curve with equation $3y^2 + 7y + 16 = x^2 - x$ at the points A and B

Find the coordinates of A and the coordinates of B
Show clear algebraic working.

(..... , ...) and (..... , ...)

(Total for Question 8 is 5 marks)

9 ABC is a triangle in which angle $ABC = 90°$

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 = ...

q = ...

(Total for Question 9 is 5 marks)

10 *ABCD* is a trapezium with *AB* parallel to *DC*

A is the point with coordinates (–4, 6)
B is the point with coordinates (2, 3)
D is the point with coordinates (–1, 8)

The trapezium has one line of symmetry.
The line of symmetry intersects *CD* at the point *E*

Work out the coordinates of the point *E*

(..... , ...)

(Total for Question 10 is 6 marks)

11 The points A and B are on a coordinate grid.

The coordinates of A are (6, 4)
The coordinates of B are (17, j) where j is a constant.

The midpoint of AB has coordinates (k, 15) where k is a constant.

Find the value of j and the value of k

j = ...

k = ...

(Total for Question 11 is 3 marks)

12 The diagram shows a triangle ABC where A, B and C represent the positions of three towns.

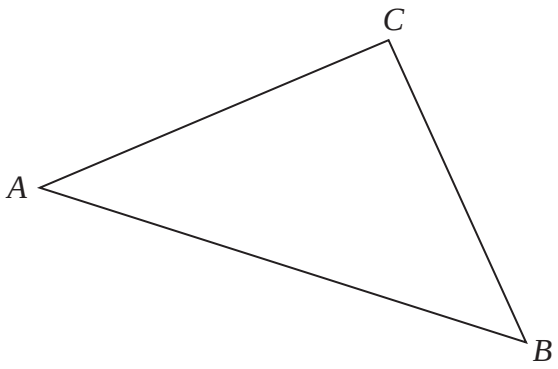

Diagram **NOT** accurately drawn

$$\overrightarrow{AB} = \begin{pmatrix} 7 \\ -2 \end{pmatrix} \qquad \overrightarrow{BC} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$$

Pru travels directly from A to B and then directly from B to C

Yang travels directly from A to C

Given that the values for $\overrightarrow{AB}$ and $\overrightarrow{BC}$ are in kilometres,

work out how much further Pru travels than Yang travels.
Give your answer in km, correct to one decimal place.

..... km

(Total for Question 12 is 5 marks)

13 Work out the coordinates of the points of intersection of

$$y - 2x = 1 \quad \text{and} \quad y^2 + xy = 7$$

Show clear algebraic working.

(..... , ...)

(..... , ...)

(Total for Question 13 is 5 marks)

14 $ABCD$ 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 14 is 6 marks)