



GCSE Foundation 17

Shape, space and measure



101 minutes



96 marks

Properties of shape

Q1. Work out the area of a circle of radius 6 m.

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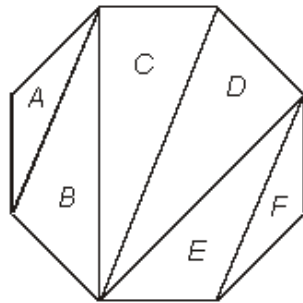
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Answer m²

(Total 2 marks)

Q2. A regular octagon is split into triangles *A*, *B*, *C*, *D*, *E* and *F*.

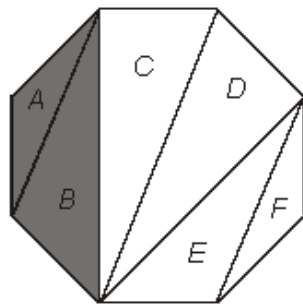


(a) Complete this list of pairs of congruent triangles.

<i>C</i>	and	<i>D</i>
<i>B</i>	and
<i>A</i>	and

(2)

(b) Triangles *A* and *B* make a trapezium as shown.



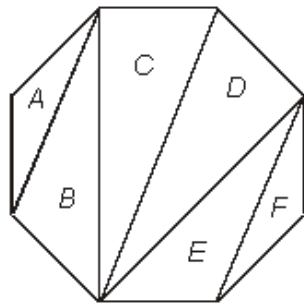
Which of the following triangles also make a trapezium?

Circle your answers.

B and C	C and D	D and E	E and F
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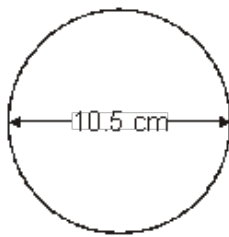
(2)

- (c) Shade **two** triangles in this diagram to make a kite.



(1)
(Total 5 marks)

- Q3.** Work out the circumference of a circle of diameter 10.5 cm.



Not drawn accurately

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Answer cm

(Total 2 marks)

- Q4.** (a) An isosceles triangle has one angle of 80° .

Write down the possible sizes of the other two angles.

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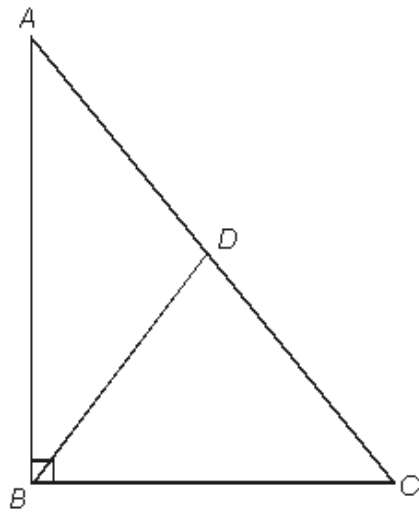
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Answer and degrees
or and degrees

(2)

- (b) Triangle ABC is a right-angled triangle.
 BDC is an equilateral triangle.



Not drawn accurately

Show that triangle ABD is an isosceles triangle.

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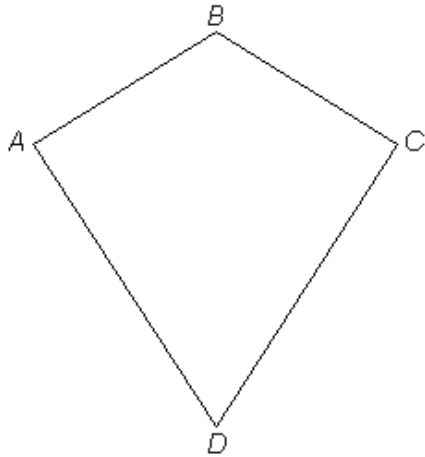
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(3)
(Total 5 marks)

Q5. The diagram shows a kite $ABCD$.



Tick a box to show whether each statement is true or false.

(a) AB is parallel to CD .

☐

True

☐

False

(1)

(b) Angle A = Angle C

☐

True

☐

False

(1)

(c) The kite has two lines of symmetry.

☐

True

☐

False

(1)

(d) The diagonals are at right angles to each other.

☐

True

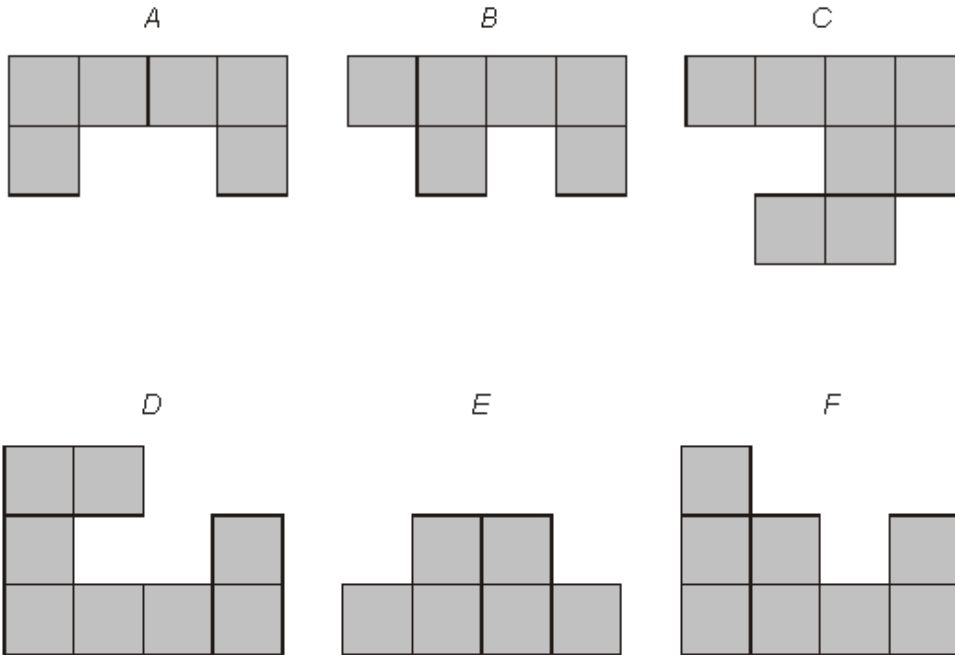
☐

False

(1)

(Total 4 marks)

Q6. Here are six shapes on centimetre grids.



(a) Which **two** shapes fit together to make a rectangle?

Answer and

(1)

(b) Which **two** shapes fit together to make a square?

Answer and

(1)

(c) Work out the area of shape *D*.
State the units of your answer.

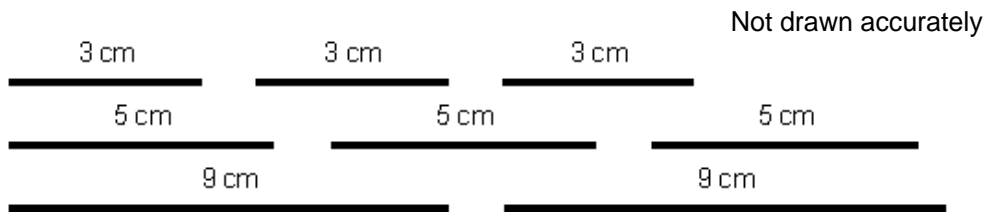
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Answer

(2)

(Total 4 marks)

Q7. Joanne is making shapes using some of these rods.



- (a) She makes an isosceles triangle using three of the rods.

Draw a sketch to show how she could do this.
Show the length on each side.

(1)

- (b) She makes a quadrilateral using two 3 cm rods and two 5 cm rods.

Write down the names of two possible quadrilaterals that she could make.

Answer and

(2)

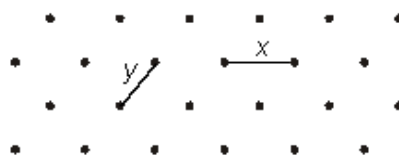
- (c) She tries to make a triangle using one rod of each length.
Explain why she **cannot** do this.

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(1)

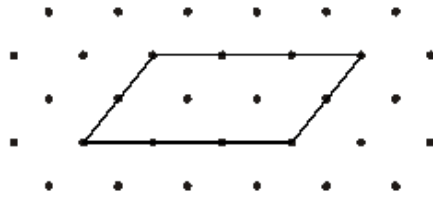
(Total 4 marks)

Q8. On the grid, the horizontal line is x units long and the sloping line is y units long.



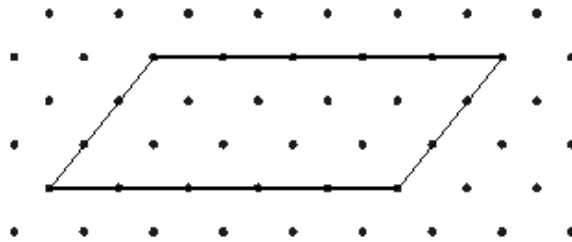
Shapes are drawn on the grid that have dots as their vertices.

The perimeter of this shape is $6x + 4y$



Work out the perimeter of the following shapes in terms of x and y

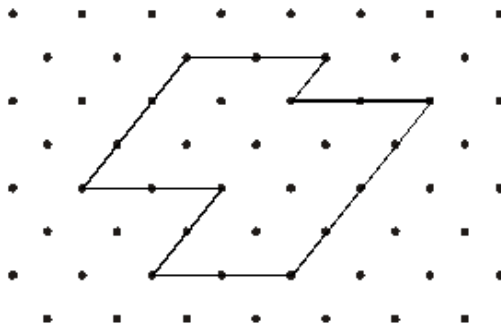
(a)



Answer

(2)

(b)



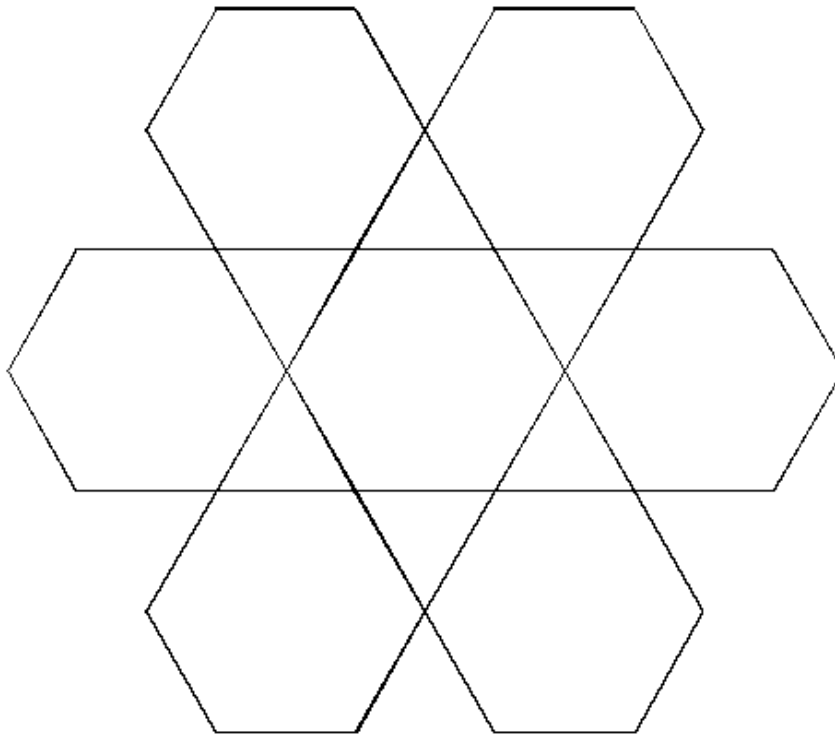
Answer

(2)

(Total 4 marks)

- Q9.** Shapes tessellate when they fit together with no gaps.
Here is a tessellating pattern made from equilateral triangles and regular hexagons.

Not drawn accurately



- (a) Write down the size of each interior angle in the equilateral triangle.

Answer degrees

(1)

- (b) Write down the size of each interior angle in the regular hexagon.

Answer degrees

(1)

- (c) Use your answers to parts (a) and (b) to explain why the two shapes form a tessellating pattern.

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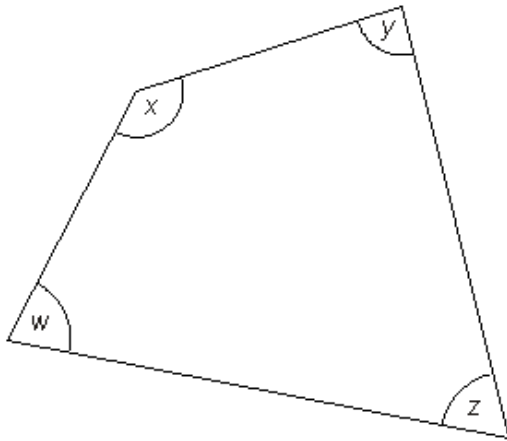
(3)

(Total 5 marks)

Q10. The diagram shows quadrilateral A.

The angles are labelled w , x , y and z .

Quadrilateral A

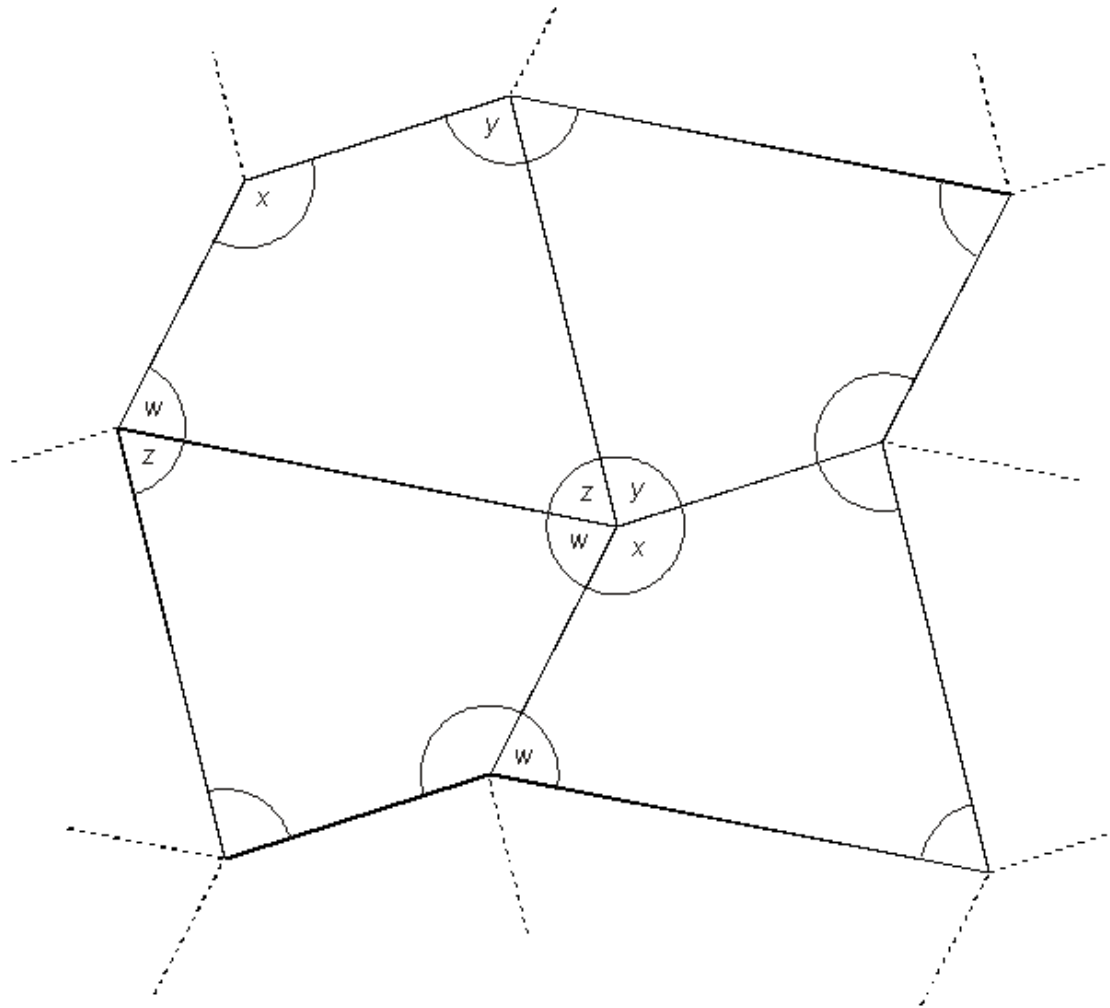


(a) Measure angle z .

Answer degrees

(1)

- (b) Quadrilaterals identical to quadrilateral A are used to make a tessellation. Part of the tessellation is shown below.



Label the remaining marked angles in the tessellation using either w , x , y or z . Some of these have been done for you already.

(2)

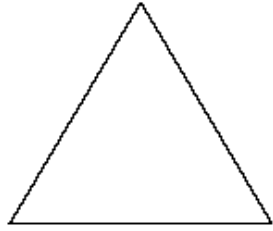
- (c) Give a reason why the diagram shows that the angles in a quadrilateral add up to 360°

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(1)

(Total 4 marks)

- Q11.** The diagram shows a triangle.
All the sides are equal in length.

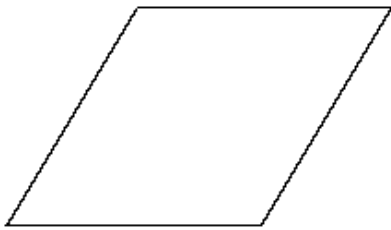


- (a) What is the name given to this special type of triangle?

Answer

(1)

- (b) The diagram shows a shape made up of two of these triangles.



- (i) What is the mathematical name of this shape?

Answer

(1)

- (ii) Write down the order of rotational symmetry of this shape.

Answer

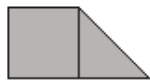
(1)

- (iii) Draw the lines of symmetry on the shape.

(2)

(Total 5 marks)

- Q12.** This shape is used to draw patterns on centimetre squared paper.



- (a) Here is one pattern.



- (i) A student writes down some statements about the pattern.

Put a tick in the box next to each correct statement.

Put a cross in the box next to each incorrect statement.

There are congruent shapes in the pattern.

☐

The pattern has a line of symmetry.

☐

The pattern is made from parallelograms.

☐

The shaded shape is a trapezium.

☐

The shaded shape has two right angles.

☐

(3)

- (ii) Work out the total area of the four shaded shapes in the pattern.

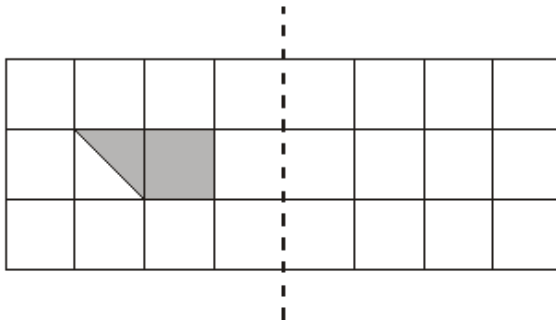
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Answer cm^2

(2)

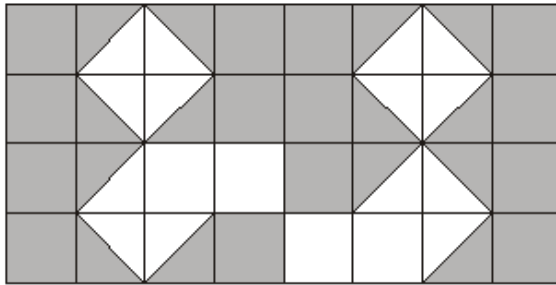
- (b) Reflect the shaded shape in the dotted line.



(1)

- (c) Sarah uses the shaded shape to draw a repeating pattern.

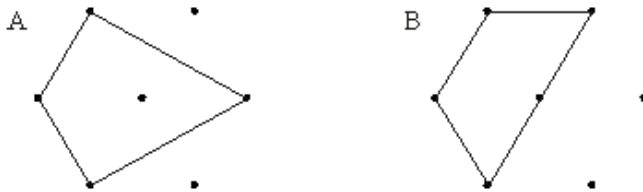
Two of the shaded shapes in her pattern are missing.



Complete Sarah's pattern.

(2)
(Total 8 marks)

- Q13.** Frank draws two quadrilaterals on a seven-point triangular grid.



- (a) (i) What special name is given to quadrilateral A?

Answer

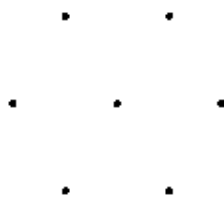
(1)

- (ii) What special name is given to quadrilateral B?

Answer

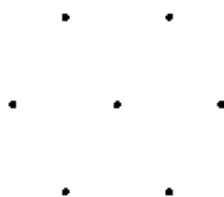
(1)

- (b) By joining 4 dots on the seven-point grid below draw a rectangle.



(1)

- (c) By joining 3 dots on the seven-point grid below draw an equilateral triangle.



(1)

- (d) The perimeter of quadrilateral A can be found using the formula

$$P = 2a + 2b$$

Find P when $a = 3$ and $b = 5.2$

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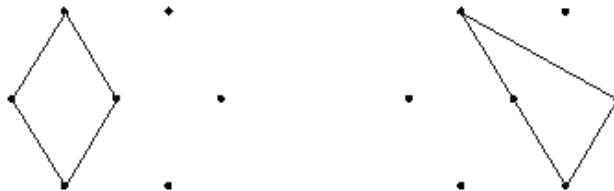
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Answer $P =$

(2)

- (e) Frank now draws a quadrilateral and a triangle.



Explain why the areas of the two shapes are the same.

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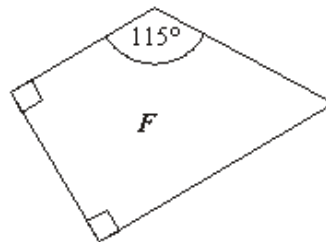
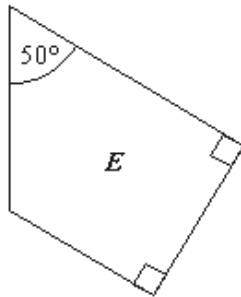
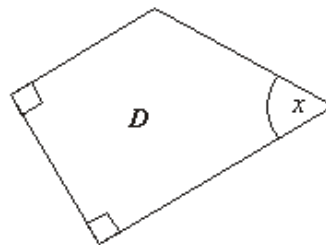
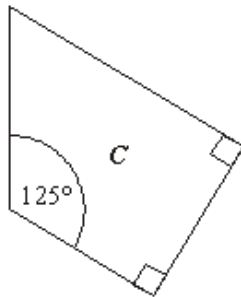
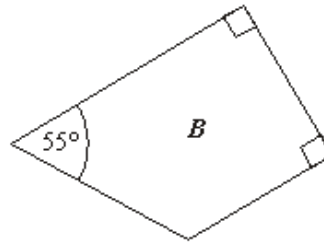
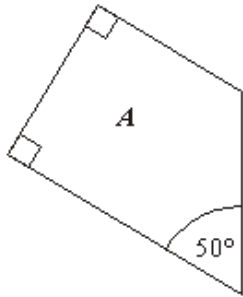
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(2)

(Total 8 marks)

- Q14.** Rebecca has three rectangular sheets of paper.
 She cuts each sheet into two pieces.
 She now has the six pieces, **A** to **F**, shown below.

Not drawn accurately



- (a) Which piece is part of the same rectangle as **A**?

Answer

(1)

- (b) Which piece is part of the same rectangle as **B**?

Answer

(1)

- (c) Calculate the size of angle x on piece **D**.

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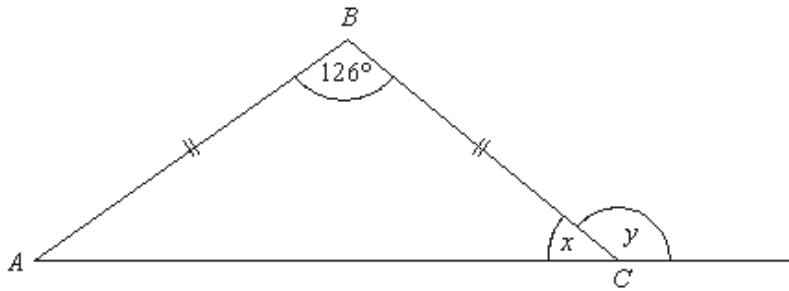
Answer $x =$ degrees

(2)

(Total 4 marks)

- Q15.** ABC is an isosceles triangle.
 $AB = BC$

Not drawn accurately



Work out the values of x and y .

.....

.....

.....

Answer $x =$ degrees

$y =$ degrees

(Total 3 marks)

- Q16.** Julie is drawing a quadrilateral with these properties.

It has 4 equal sides.
 Its diagonals intersect at 90° .

She draws a square.

- (a) Draw a different type of quadrilateral with these properties.

(1)

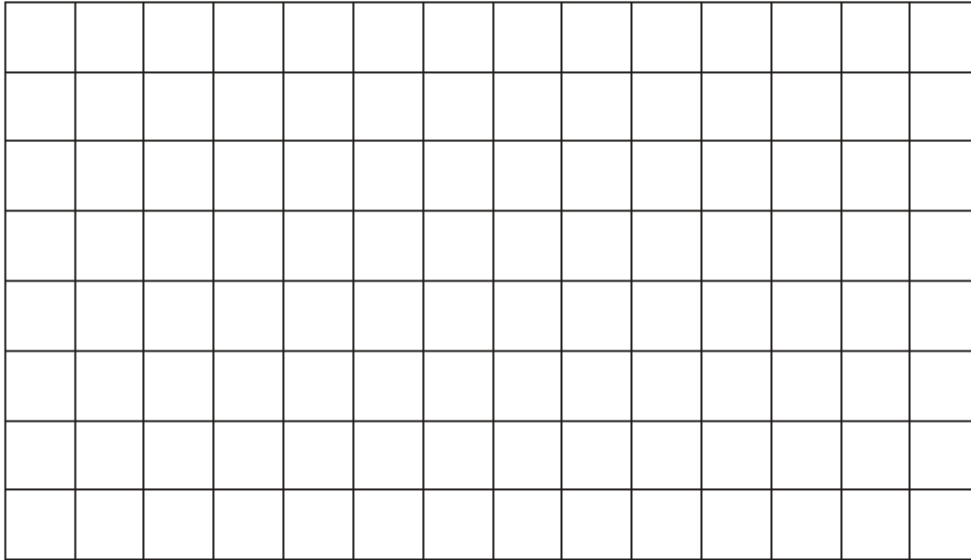
- (b) What is the name of this quadrilateral?

Answer

(1)

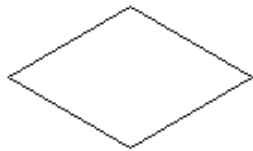
(Total 2 marks)

Q17. Draw, on the centimetre square grid below, a rectangle that has an area of 12 cm^2 .



(Total 2 marks)

Q18. (a) Write down the name of this quadrilateral.



Answer

(1)

- (b) Three of these statements are true for a kite.
Draw arrows from the statements that are true to the picture of the kite.
One of them has been done for you.

Two pairs of sides are equal

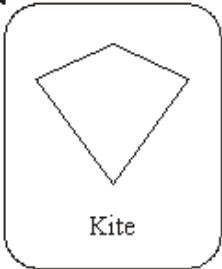
It has 2 lines of symmetry

It has rotational symmetry of order 2

The diagonals cross at right angles

Opposite angles are equal

One pair of opposite angles are equal

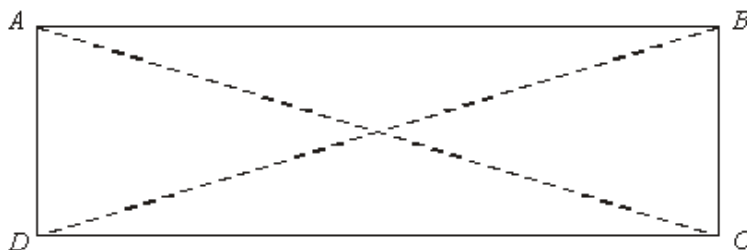


Kite

(2)
(Total 3 marks)

Q19. $ABCD$ is a rectangle.

The rectangle has two diagonals AC and BD .



Tick the correct boxes to say whether the following statements are true or false.

	True	False
(a) The diagonals are equal in length.	<input type="checkbox"/>	<input type="checkbox"/>
(b) The diagonals cross at right angles.	<input type="checkbox"/>	<input type="checkbox"/>
(c) The diagonals bisect each other.	<input type="checkbox"/>	<input type="checkbox"/>
(d) The diagonals are lines of symmetry.	<input type="checkbox"/>	<input type="checkbox"/>

(Total 3 marks)

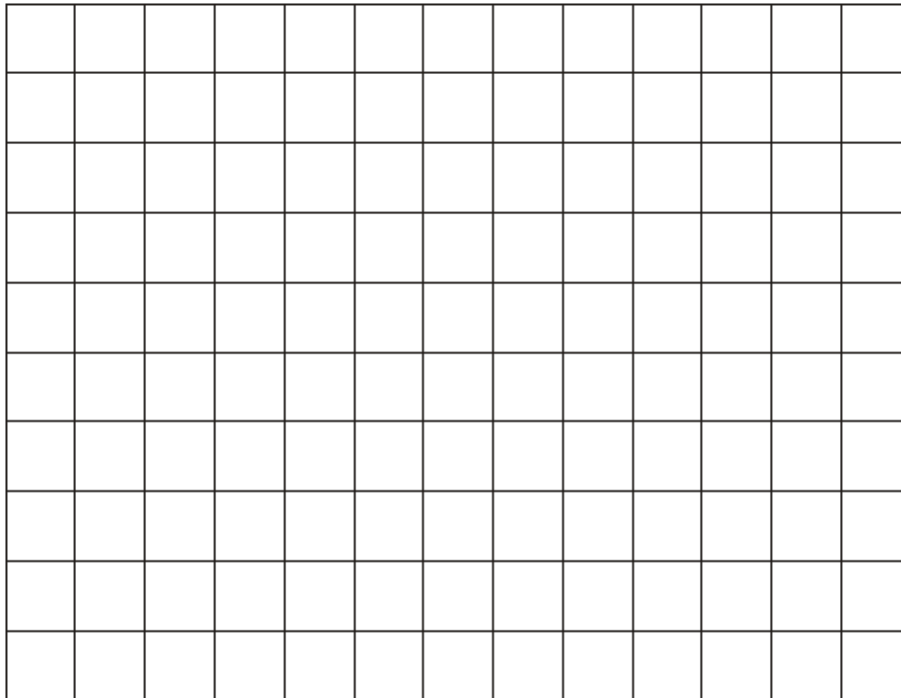
- Q20.** A rectangle has an area of 40 cm^2 and a perimeter of 26 cm.
Find the length and width of the rectangle.
You may use the grid to help you.

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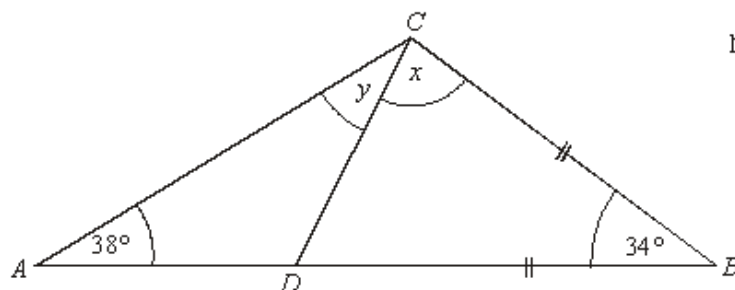


Answer Length cm

Width cm

(Total 2 marks)

- Q21.** ABC is a triangle.
 D is a point on AB such that $BC = BD$.



Not drawn accurately

- (a) Work out the value of x .

.....

Answer degrees

(2)

- (b) Work out the value of y .

.....

Answer degrees

(2)

- (c) Does $AD = DC$?
 Give a reason for your answer.

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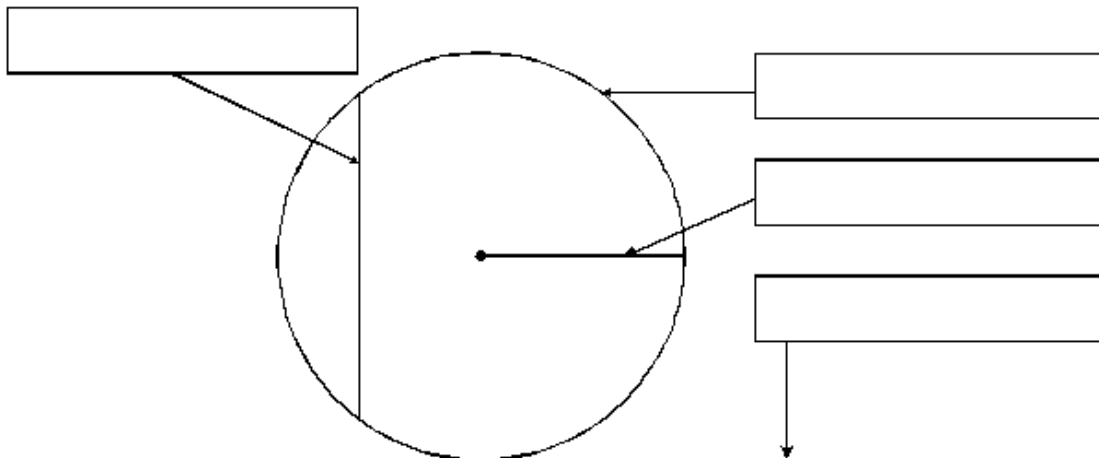
(1)

(Total 5 marks)

Q22. Here is a list of words that are connected with circles.

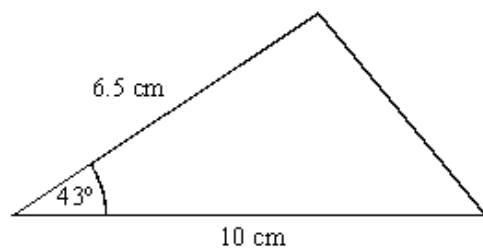
centre radius chord diameter circumference tangent

Label the four boxes on this diagram, by choosing the correct word from the list.

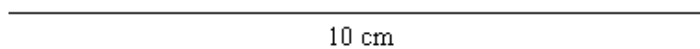


(Total 4 marks)

- Q23.** In the space below, make an accurate drawing of this triangle.
The base line has been drawn for you.

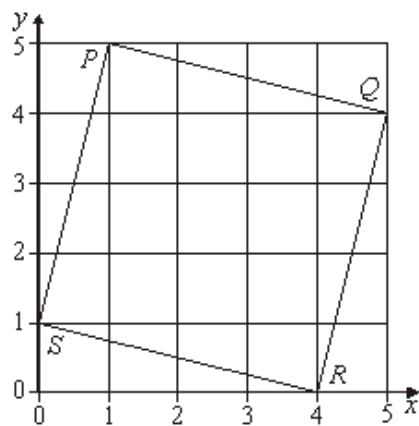


Not drawn accurately



(Total 2 marks)

- Q24.** The square $PQRS$ is drawn on a centimetre square grid.



- (a) The coordinates of P are $(1, 5)$.
Write down the coordinates of Q , R and S .

Answer Q (..... ,)

R (..... ,)

S (..... ,)

(2)

- (b) Calculate the area of square $PQRS$.
You **must** show your working.
State the units of your answer.

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Answer

(4)

(Total 6 marks)

