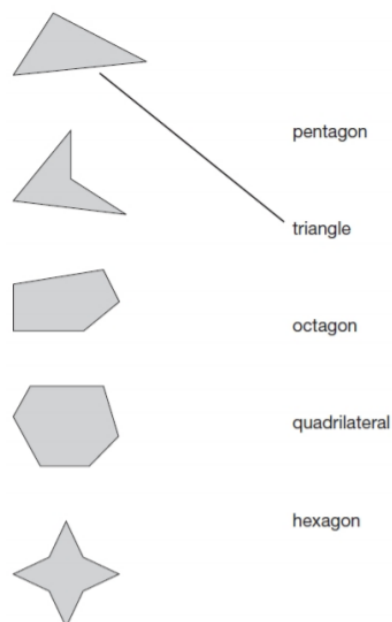# Maths Reasoning Activity – Shape

Click on this link to revise the topics linked to Shape on BBC Bitesize.

Warming up*

Q1.

1 Match each shape to the correct name.

One has been done for you.
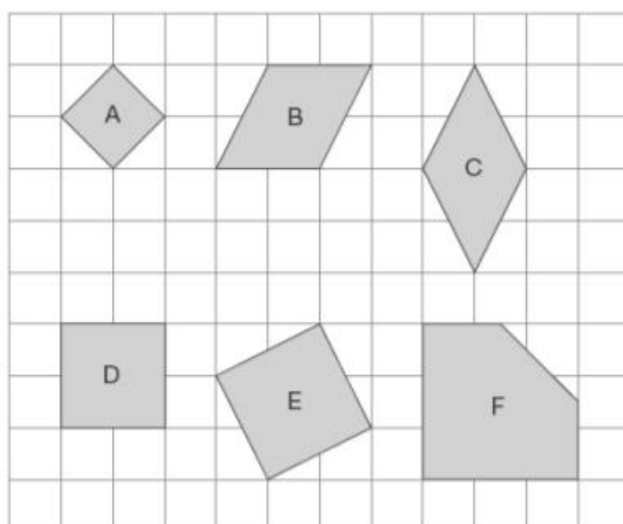
pentagon

triangle

octagon

quadrilateral

hexagon
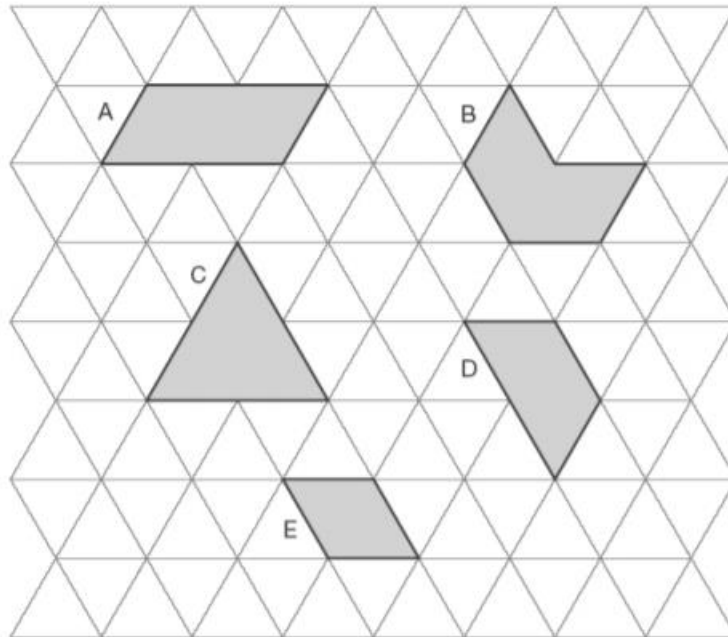
2 marks

Q2

Here are six shapes on a square grid.

Write the letters of **all** the shapes that are squares.

1 mark

Here are five shapes made from equilateral triangles.

Write the letter of the shape that is a **rhombus**.

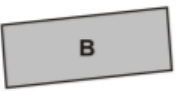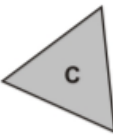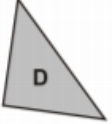Write the letter of the shape that has only **one** pair of parallel sides.

Q4

4 Here are four shapes in a Carroll diagram.

	Regular	Not regular
Quadrilateral	A	B
Not a quadrilateral	C	D

Use this information to write the letters **A**, **B** and **D** in the Venn diagram below.

Quadrilateral   Regular

C
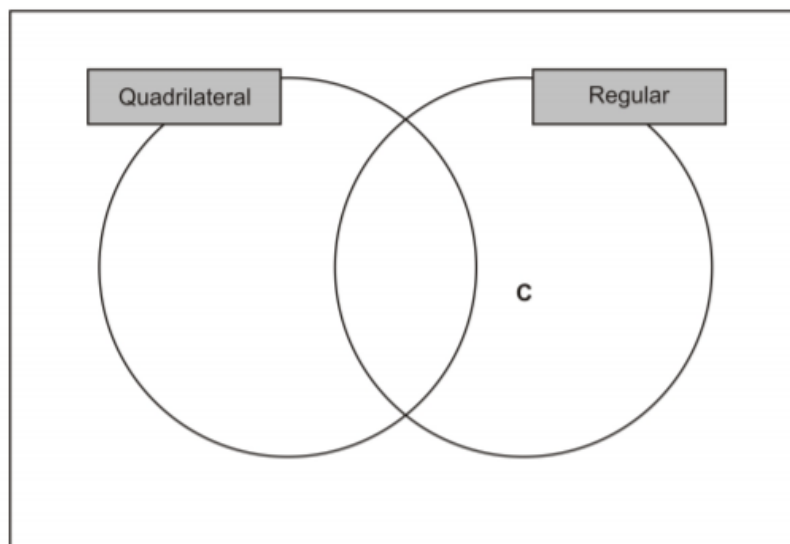
2 marks

Q5

5 Look at these shapes.
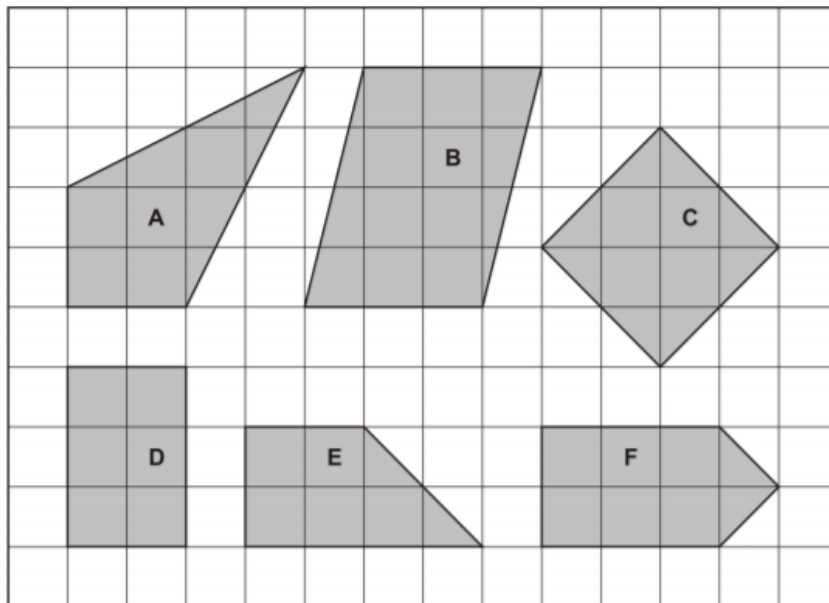
Complete the sentences below.

One has been done for you.

_____A_____   is a kite

_____   is not a quadrilateral

_____   has only 2 right angles

_____   has 2 acute angles

2 marks

Feeling more confident**

Q1

Two of the angles in a triangle are 70° and 40°

Jack says,

The triangle is equilateral.
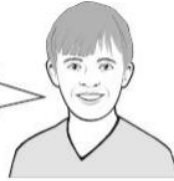
Explain why Jack is **not** correct.

1 mark

Q2

A shaded **isosceles** triangle is drawn inside a rectangle.

Not to scale

a

38°
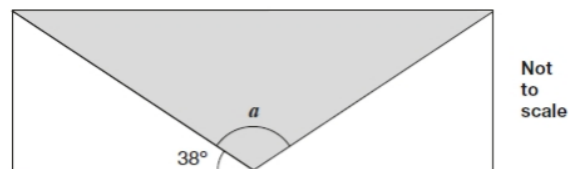
Calculate the size of angle a.

Show your method

°
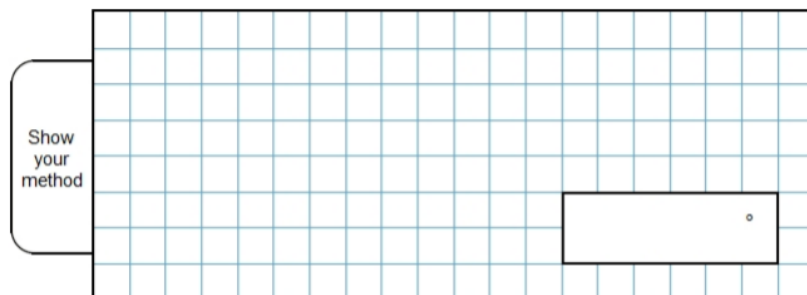
2 marks

Q3

Anna has four **different** triangles.

Complete the table to show the size of the angles in each triangle.

Type of triangle	Angle 1	Angle 2	Angle 3
Isosceles	90°		
Right-angled	80°		
Isosceles	70°		
Isosceles	70°		

2 marks

Q4 Here are some shapes on a grid.

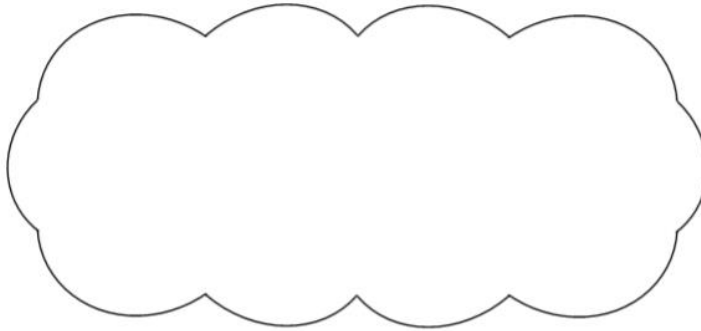Write the letter of each shape that has one pair of parallel sides.

_____

1 mark

Q5   An isosceles triangle has a perimeter of 12 cm.

One of its sides is 5 cm.

What could the length of each of the other two sides be?

Two different answers are possible.

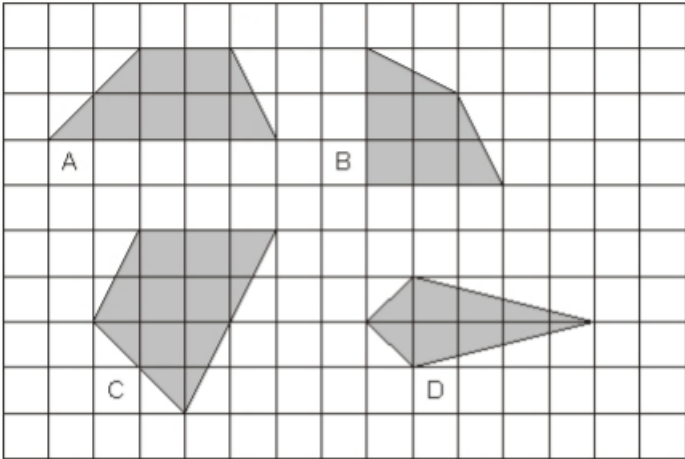Give **both** answers.

cm	and	cm	

cm	and	cm	

2 marks

Q6   Here are six quadrilaterals with their mathematical names.

square   parallelogram   rhombus

oblong   kite   trapezium

Lara chooses one of the quadrilaterals.

She says,

'It has two acute angles.
All four sides are the same length'.

Which quadrilateral did Lara choose?

1 mark

Q7 Here is a kite.
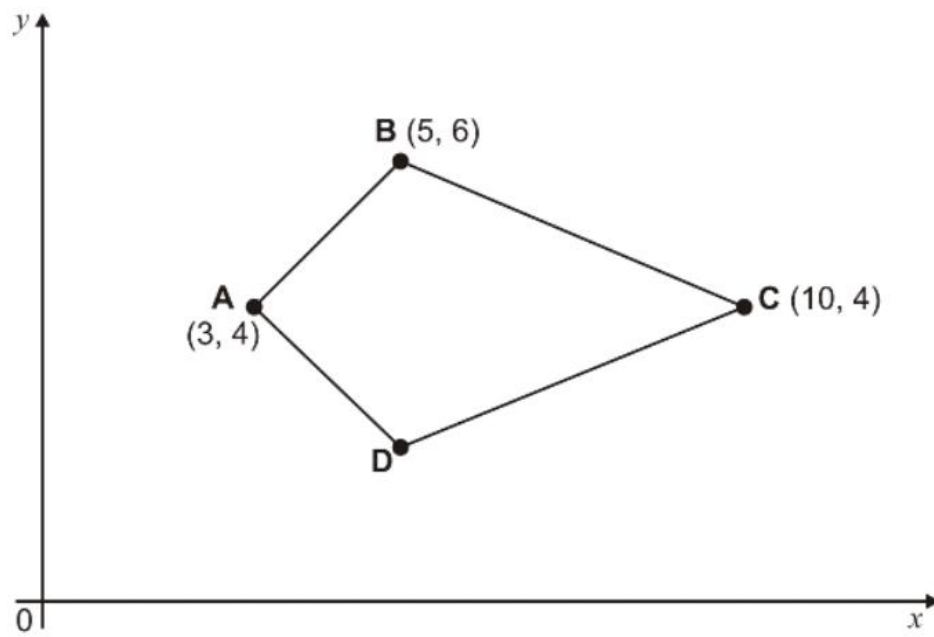
Write the coordinates of point **D**.

(,   )

1 mark
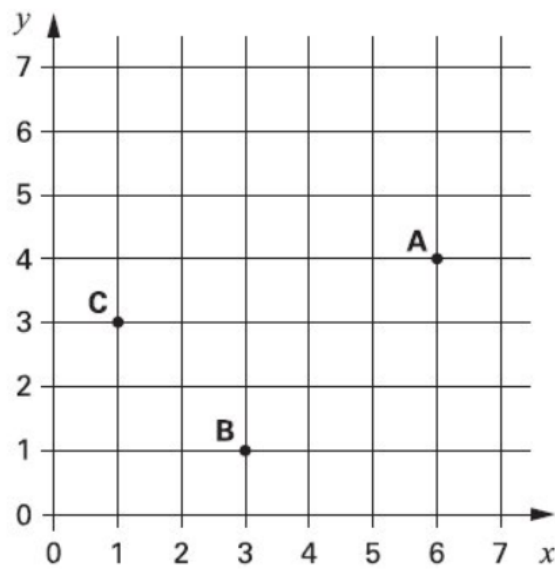
A, B and C are three corners of a rectangle.

What are the coordinates of the fourth corner?

(,   )

1 mark

Ready for a challenge***

Q1   Here is an equilateral triangle inside a square.
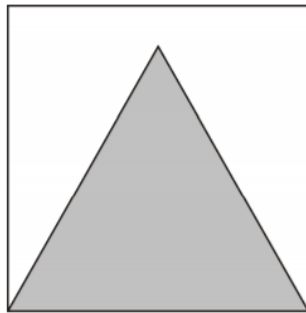
Not actual size

The perimeter of the triangle is 48 centimetres.

What is the perimeter of the **square**?

Show your method

cm
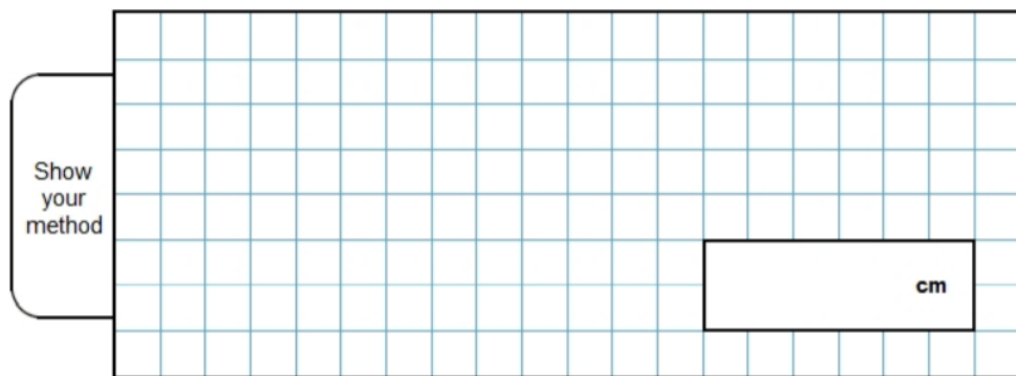
2 marks

Q2   This is the net of a cube.

20 cm

Not actual size
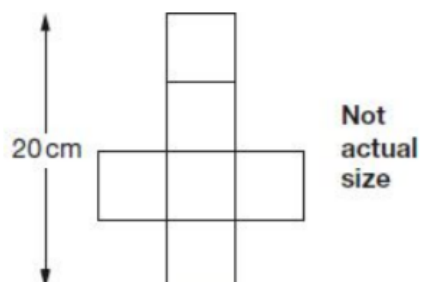
What is the **volume** of the cube?

cm³
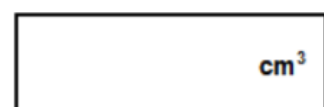
1 mark

Q3

Emma makes a cuboid using 12 cubes.

Write the letter of the cuboid that has a **different** volume from Emma's cuboid.

_____
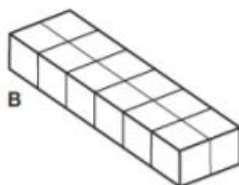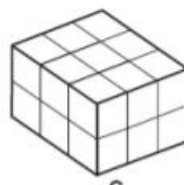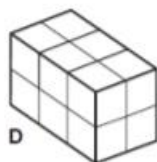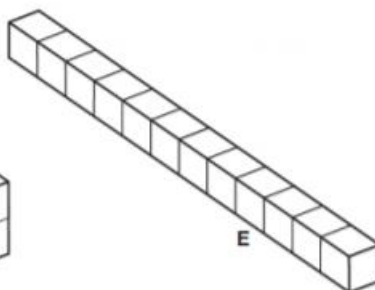
1 mark

Q4

Jack says,

"*Two 3D shapes with the same number of faces as each other also have the same number of vertices as each other*".

Is Jack correct?
Circle **Yes** or **No**.

Yes / No

Explain how you know.
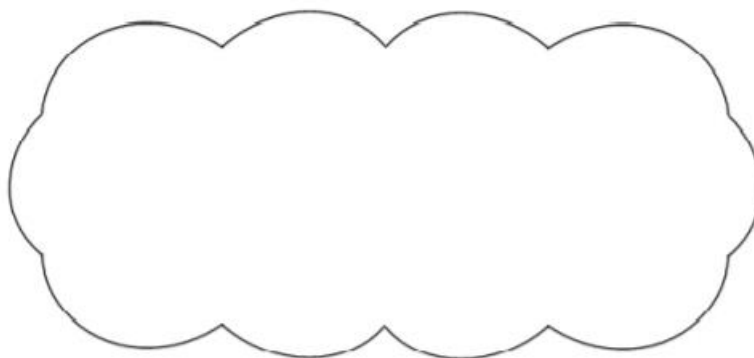
1 mark

Q5

Four large circles and five small circles fit exactly inside this rectangle.
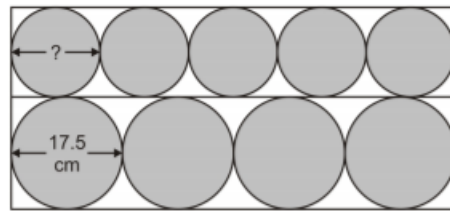
Not actual size

The **diameter** of a large circle is **17.5** centimetres.

Calculate the **diameter** of a small circle.

Show your method

| | cm |

2 marks

Q6

The diagram shows a shaded square inside a larger square.

3cm

14cm
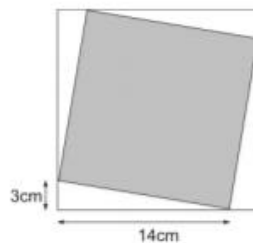
Calculate the area of the **larger square**.

| | cm² |

1 mark

Calculate the area of the **shaded square**.

Show your method

| | cm |

2 mark

Q7

The diagram shows a shaded triangle inside a rectangle.

10cm

6cm

Not actual
size

4cm
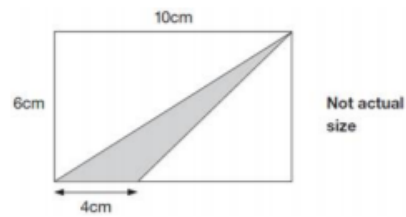
What is the area of the shaded triangle?

Show
your
method

cm²

2 marks

Here is an **equilateral triangle** inside a **rectangle**.

Q8

x

12°

Not to scale
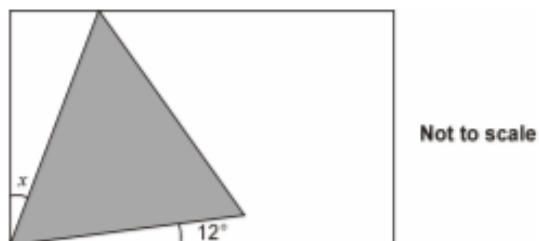
Calculate the value of angle **x**.

Do **not** use a protractor (angle measurer).

Show
your
method

°

2 marks

Warming up*

Mark schemes

Award **TWO** marks for four shapes correctly matched as shown:

Q1
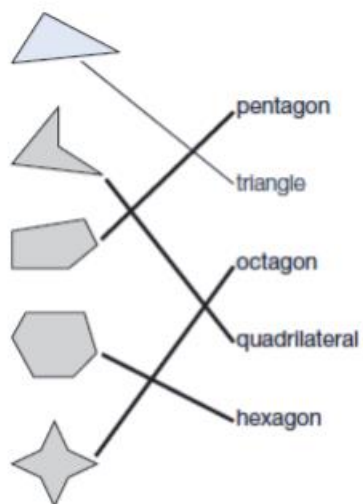
If the answer is incorrect, award **ONE** mark for at least two shapes correctly matched.

Lines need not touch shapes or names, provided the intention is clear.

Do not *credit any shape which has been matched to more than one name.*

Up to 2

Q2

A **AND** D **AND** E

Letters may be given in any order.

Q3 (a) E

(b) D

Award **TWO** marks for the three letters written in the correct regions as shown:

Q4
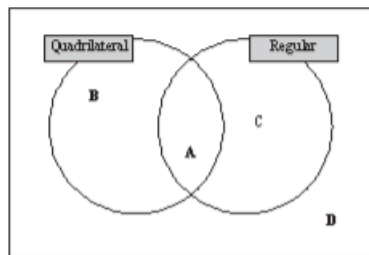
If the answer is incorrect, award **ONE** mark for two letters written in the correct regions.

> *Do not accept letters written in more than one region.*
>
> *Accept alternative unambiguous indications, eg lines drawn from the shapes to the appropriate regions of the diagram.*
>
> *Accept unambiguous shapes drawn in the appropriate regions of the diagram.*

Up to 2 (U1)

Q5   Award **TWO** marks for all three letters in the correct order as shown:

F

E

B

If the answer is incorrect, award **ONE** mark for two of the three letters correct.

Up to 2

Mark schemes

Q1

An explanation showing an understanding:

- that this specific triangle has angles 70, 70 and 40

OR

- of the properties of an equilateral triangle − all angles are equal (60°)

and therefore that this triangle cannot be equilateral, e.g.

- The angles aren't 60°
- There is not a 60° angle
- It has two different angles (70° and 40°) so it can't be equilateral
- The angles aren't the same
- An equilateral triangle has 60° + 60° + 60°
- All the angles are the same in an equilateral triangle
- It's an isosceles triangle.

(In the context of this question, the term isosceles triangle is treated as not including equilateral triangles as a special type, as the national curriculum does not specify this at key stage 2.)

Do not accept vague or incomplete explanations, e.g.

- *The other angle is 70°*
- *They aren't (all) the same. (No reference to angles)*
- *An equilateral triangle has equal angles. (Does not say all.)*

Do not accept explanations which include incorrect mathematics or incorrect information that is relevant to the explanation, e.g.

- *40 + 70 = 110 + 70 = 180*

[1]

Q2

Award **TWO** marks for the correct answer of 104°.

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g:

- 180 − 38 − 38 = a

  *Answer need not be obtained for the award of **ONE** mark.*

Up to 2

Completes all four rows of the table correctly, eg:

Q3

90°	45°	45°
80°	90°	10°
70°	70°	40°
70°	55°	55°

Accept angles within a row in either order

Accept the bottom two rows may be given in either order

! *Condone omission of degree signs*

! *For 2 marks, do not accept correct angles in 3rd row repeated in 4th row, in either order*

Q 4

A **AND** C

Answers may be given in either order.

Q5

Award **TWO** marks for two different answers as shown:

| 5 | and | 2 | **or** | 2 | and | 5 |

AND

| 3.5 | and | 3.5 |

If the answer is incorrect, award **ONE** mark for any one of the above answers.

The two answers may be given in either order.

Do not *accept '5 and 2'* **AND** *'2 and 5' for two marks.*

Up to 2

Q6

(a)   rhombus

Accept unambiguous abbreviations or recognisable misspellings.

1

(b)   kite

Accept unambiguous abbreviations or recognisable misspellings.

1

Q 7   (5, 2)

Coordinates must be in the correct order.

Accept unambiguous answers written on the diagram.

(4, 6)

> *Both* numbers must be correct for the award of the mark.
>
> *Accept correct answers written on the diagram with or without brackets.*
>
> *Coordinates must be written in the correct order.*

Ready for a challenge***

Mark schemes

Q1

Award **TWO** marks for the correct answer of 64

If the answer is incorrect, award **ONE** mark for evidence of appropriate working, eg

48 ÷ 3 = 16

16 ÷ 4 = wrong answer

> *Calculation must be performed for the award of **ONE** mark.*

Up to 2 (U1)

Q2

125

Q3

C

> *Accept 18.*

Q4

Any explanation recognising that the statement is not true, e.g. using a counter example accompanying two shapes with the same number of faces, e.g. a cube has 6 faces and 8 vertices, but a pentagonal pyramid has 6 faces but only 6 vertices.

> *Do not accept another example where the two shapes do not have the same number of faces as each other*

[1]

Q5

Award **TWO** marks for the correct answer of 14

If the answer is incorrect, award **ONE** mark for evidence of appropriate method, eg

17.5 × 4 = 70

70 ÷ 5

*Accept for **ONE** mark 140 **OR** 1.4 as evidence of appropriate method.*

*Answer need not be obtained for the award of **ONE** mark.*

Up to 2 (U1)

[2]

Q6

(a) 289

1

(b) Award **TWO** marks for a correct answer of 205 **OR** a number calculated from the answer given in *(a)*, ie
(answer given in *(a)*) – 66

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg

196 – (4 × 16.5)

OR
(answer given in *(a)*) – (4 × 16.5)

OR
$14^2 + 3^2 = 196 + 9$ (Pythagoras)

Calculation need not be completed for the award of the mark.

Up to 2

[3]

Q7

12

or

Shows or implies a complete correct method, eg:

- 4 × 6 ÷ 2 = 13 *(error)*

- 60 – (10 × 6 ÷ 2) – (6 × 6 ÷ 2)

- 60 – 48

Q8

Award **TWO** marks for the correct answer of 18°

Calculation need not be performed for the award of the mark.

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg 90 – 60 – 12

Up to 2