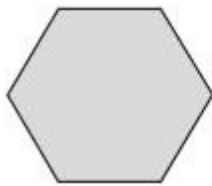**Q1.**

These two shapes have the **same** perimeter.

regular hexagon   square

Not actual size

The length of each side of the **hexagon** is **8** centimetres.

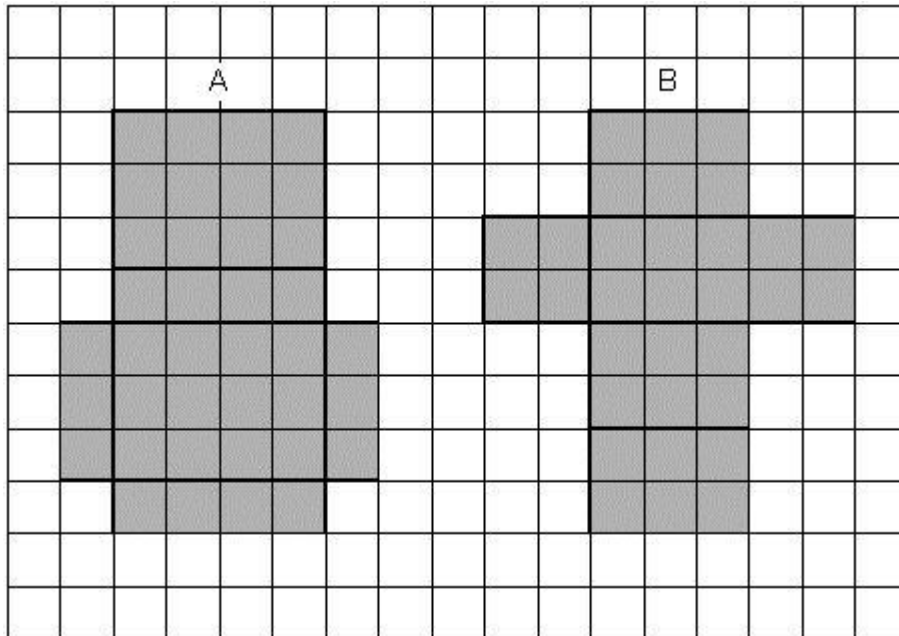Calculate the **area** of the **square**.

Show your method

cm²

2 marks

Q2.

Nets

The squared paper shows the nets of cuboid A and cuboid B.

(a)   Do the cuboids have the **same surface area**?

Show calculations to explain how you know.

_____

_____

_____

1 mark

(b)   Do the cuboids have the **same volume**?

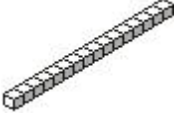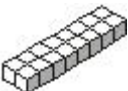Show calculations to explain how you know.

_____

_____

_____

2 marks

Q3.

Cuboids

You can make only four different cuboids with **16 cubes**.

		Dimensions		
Cuboid **A**		1	1	16
Cuboid **B**		1	2	8
Cuboid **C**		1	4	4
Cuboid **D**		2	2	4

(a) Which of the cuboids **A** and **D** has the **larger surface area**?

Tick (✓) the correct answer below.

Cuboid A ☐

Cuboid D ☐

Both the same ☐

1 mark

Explain how you know.

1 mark

(b)   Which cuboid has the **largest volume**?

Tick (✓) the correct answer below.

Cuboid A   ☐

Cuboid B   ☐

Cuboid C   ☐

Cuboid D   ☐

All the same   ☐

1 mark

(c)   How many of **cuboid D** make a cube of dimensions **4 × 4 × 4**?

_____

1 mark

(d)   You can make only six **different** cuboids with **24 cubes**.

Complete the table to show the dimensions.
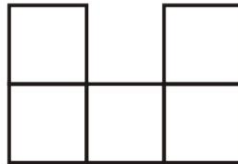
Two have been done for you.
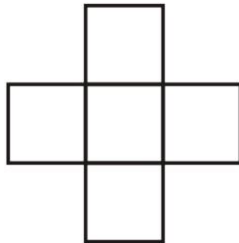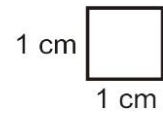
	Dimensions		
Cuboid E	1	1	24
Cuboid F	1	2	12
Cuboid G			
Cuboid H			
Cuboid I			
Cuboid J			

3 marks

Q4.

Here are two shapes made with centimetre squares.

1 cm
1 cm

Each shape has 5 squares.

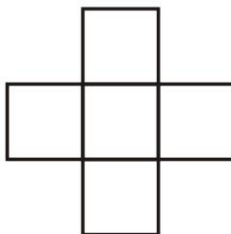Write **ONE** other thing which is the **same** about the two shapes.
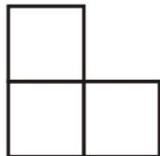
_____

_____

1 mark

Here are more shapes made with centimetre squares.

A   B   C   D
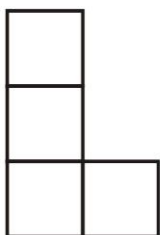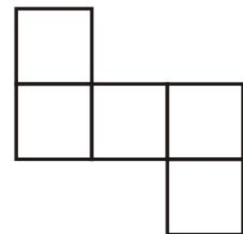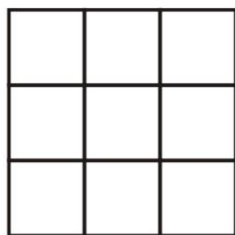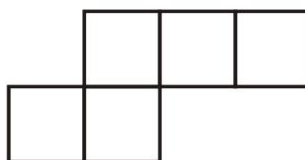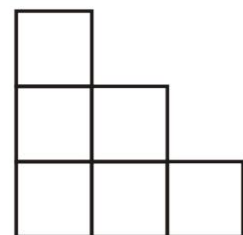
E   F   G   H

Which shape has a **perimeter** of 10 cm?
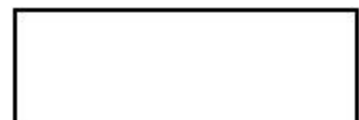
1 mark

Q5.

This plan of a garden is made of rectangles and triangles.

The area of each **rectangle** is **12 square metres.**

What is the **area** of the **whole garden**?
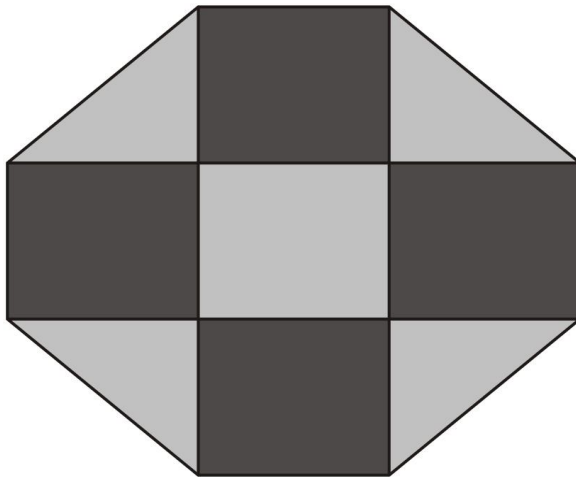
	m²

1 mark

The **perimeter** of the garden is **34 metres**.

What is the length of the **longest side** of each triangle?

3m

?

←— 4m —→
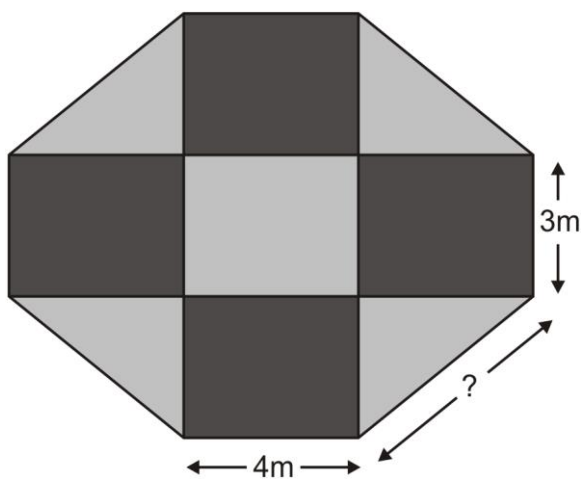
metres

2 marks

Q6.

Here are some shapes on a grid.
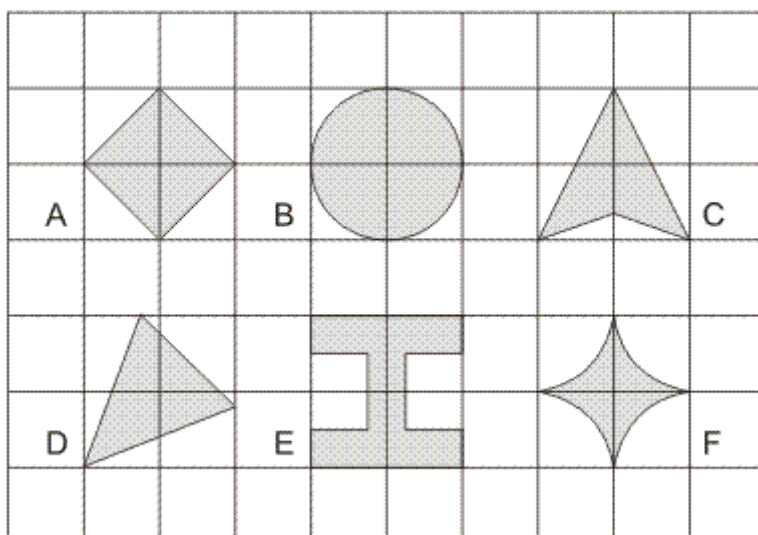
Which shape has the **longest perimeter**?

1 mark

Which shape has the **largest area**?

1 mark

Q7.

Lara has some identical rectangles.

They are 7 centimetres long and 2 centimetres wide.

7cm

2cm

Not
actual size

She uses **five** of her rectangles to make the large rectangle below.
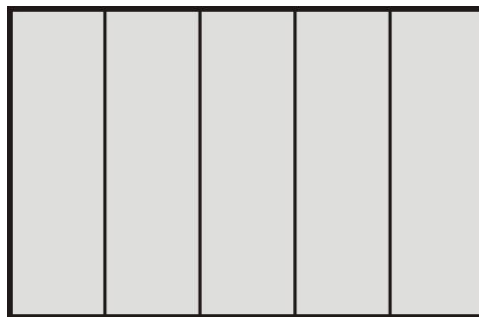
What is the **perimeter** of the large rectangle?

cm
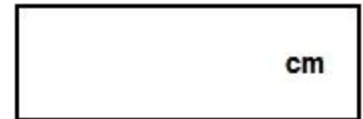
1 mark

What is the **area** of the large rectangle?

cm
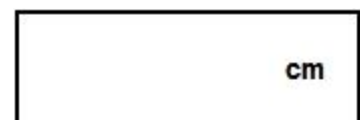
1 mark

Q8.

Here is a centimetre square grid.

On the grid draw a **shape** which has an **area** of **10** square centimetres.
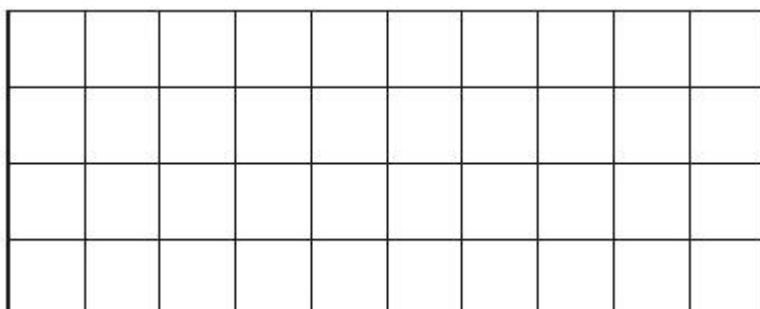
1 mark

On the grid below draw a **rectangle** which has a **perimeter** of **10** centimetres.
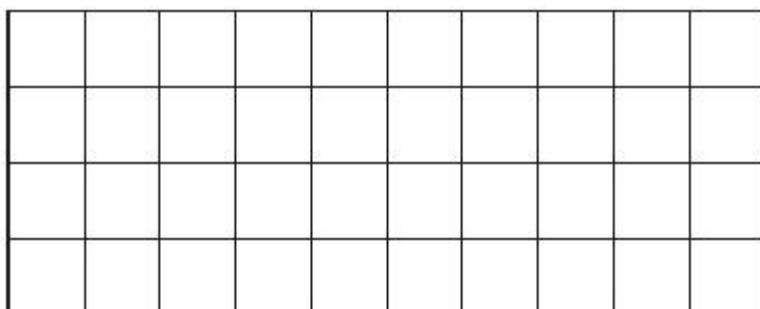
1 mark

Q9.

The area of a rectangle is 16 cm².

One of the sides is 2 cm long

What is the perimeter of the rectangle?

cm
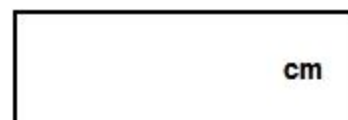
1 mark

Q10.

Here are some shapes on a 1cm square grid.
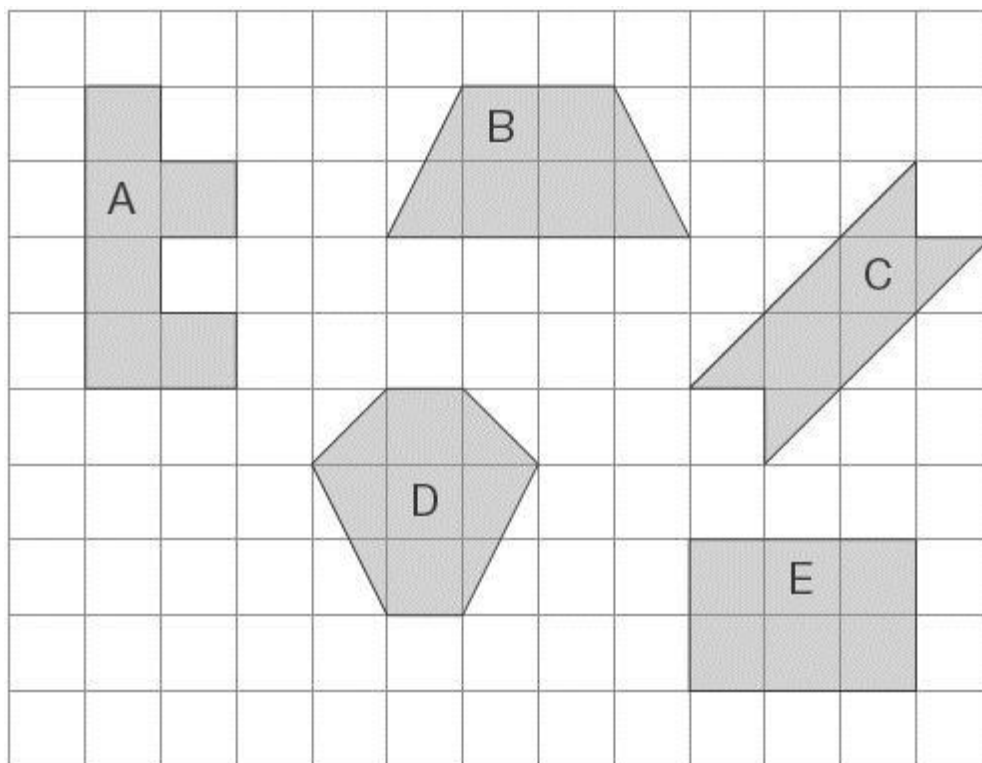
What is the **perimeter** of shape A?

cm

1 mark

Write the letter of the shape that has the **smallest area**.

1 mark

Q11.

Here is a grid of regular hexagons.

The shaded shape has an area of 3 hexagons and a perimeter of 14 cm.

Draw another shape on the grid which has an **area** of 4 hexagons and a **perimeter** of 14 cm.
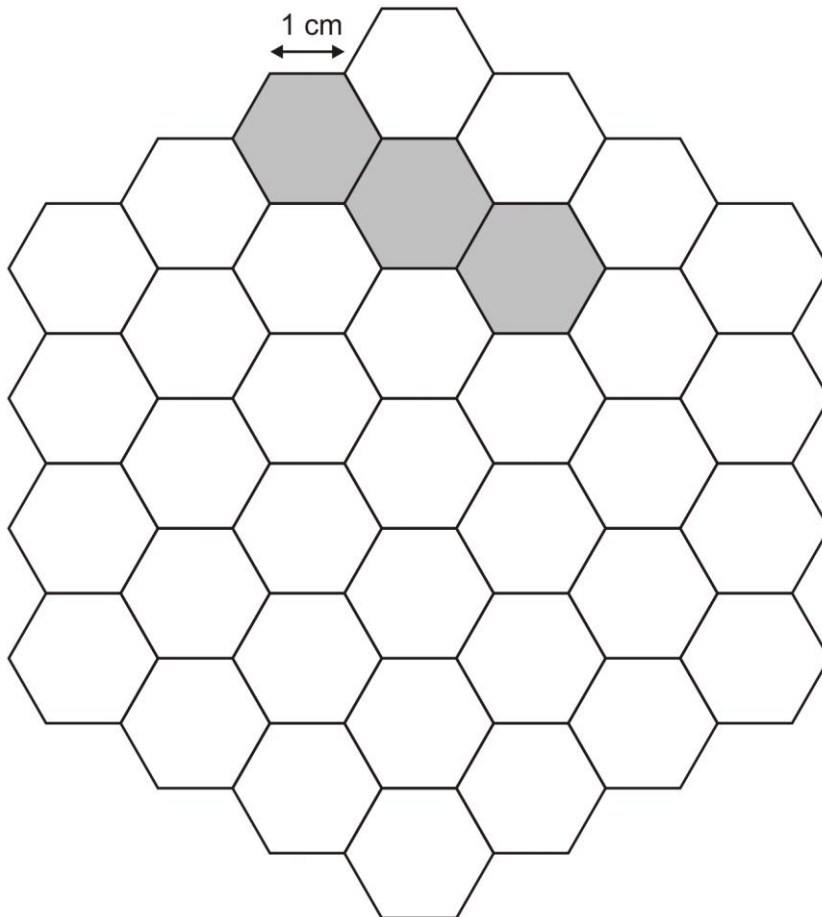
1 mark

Q12.

The grid below is made of right-angled triangles like this:
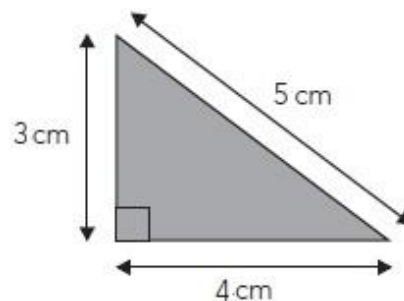
Shade triangles on the grid to make a **quadrilateral**.

Your quadrilateral must have an area of **24 cm**2 and a perimeter of 26 cm.

4 cm

3 cm
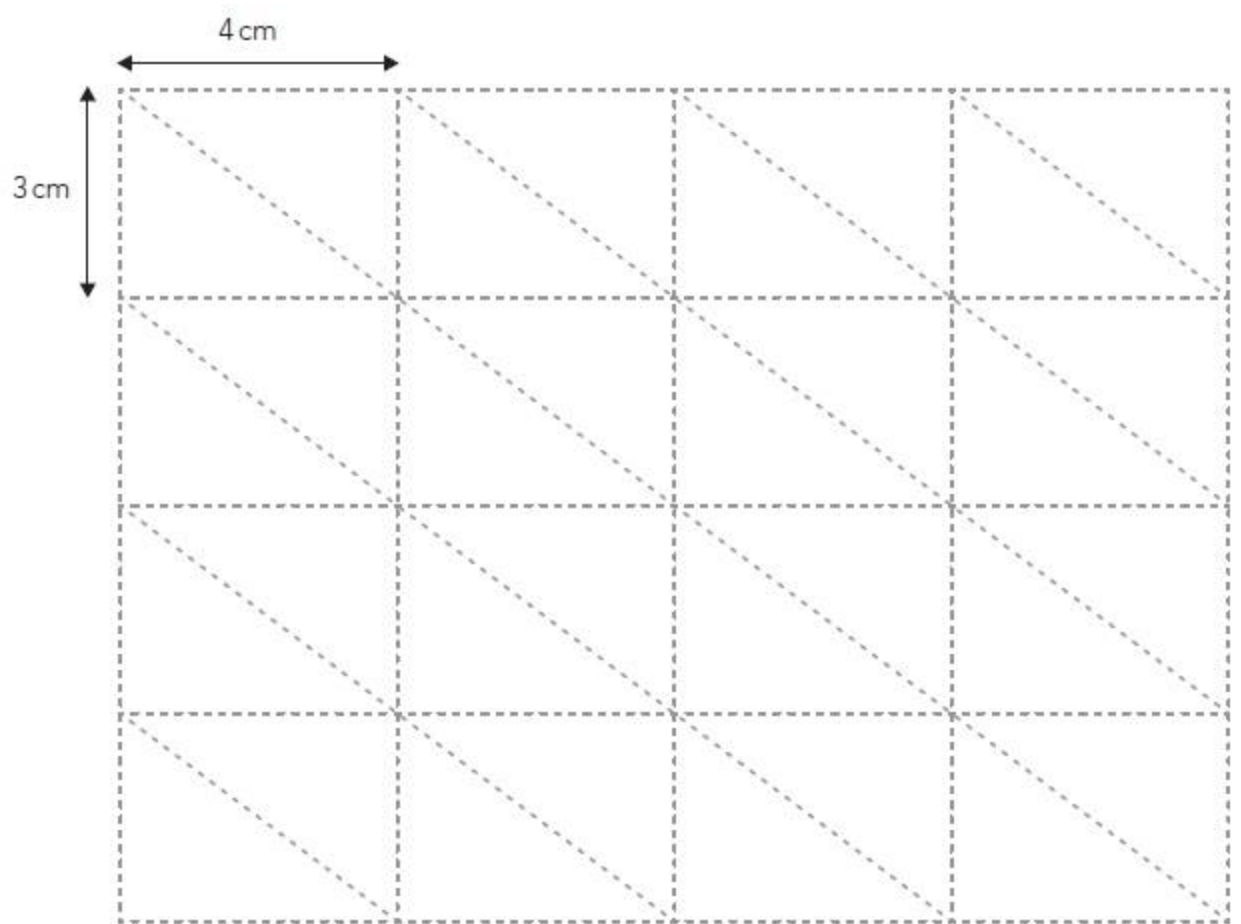
2 marks

Q13.

Megan says,

> *'If two rectangles have the same perimeter,*
> *they must have the same area.'*

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

Yes / No

Explain how you know.
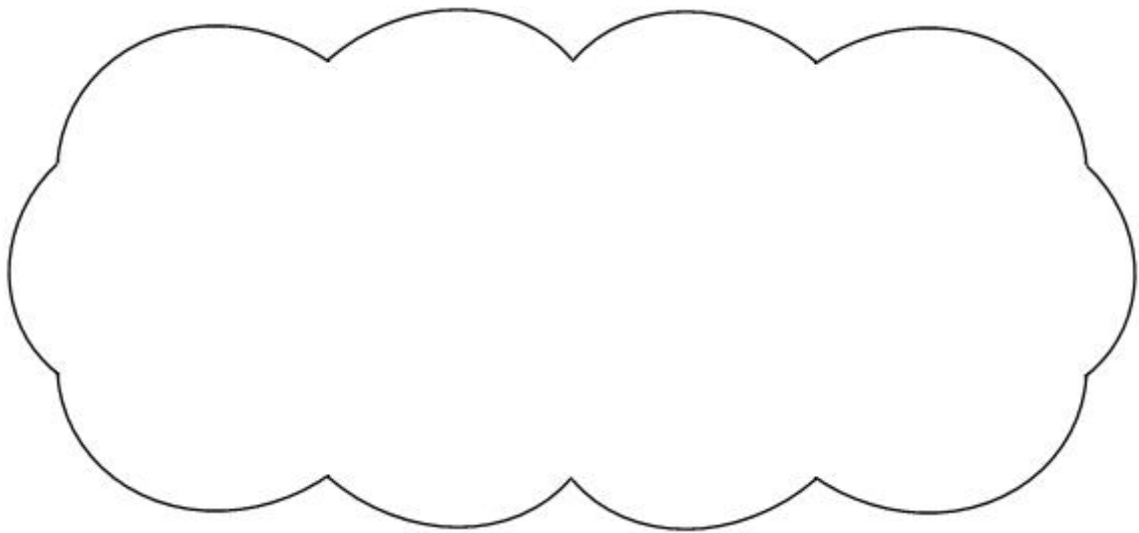
1 mark

Q14.

The **area** of this square is 36 cm².

Not actual size

The square is cut into quarters to create 4 identical rectangles.
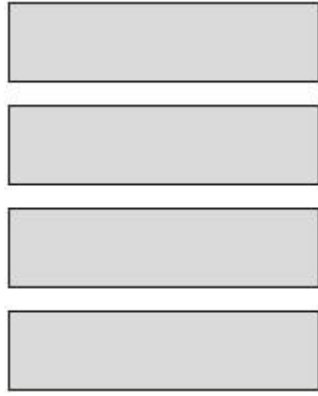
What is the **perimeter** of **one** of the small rectangles?

Show
your
method

cm

2 marks

Mark schemes

Q1.

Award **TWO** marks for the correct answer of 144

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

- $8 \times 6 = 48$
  $48 \div 4 = 13$ (error)
  $13 \times 13 = 169$

OR

Award **ONE** mark for:

- evidence for the side length of the square calculated correctly, i.e. 12
  *Answer need not be obtained for the award of **ONE** mark.*

Up to 2m

[2]

Q2.

(a)   Shows that the surface areas are different

The most common correct explanations:

Calculate A as 38, B as 32, eg

- A is $4 \times 8 + 6 = 38$, B is $3 \times 8 + 8 = 32$

State that the difference is 6, eg

- A has 6 more squares than B

Manipulate the nets to a form where comparison may be drawn without further computation, eg

- A is $6 \times 8 - 10$ but B would be $6 \times 8 - 16$
  Accept minimally acceptable explanation, eg
  - *38, 32*
  - *$4 \times 8 + 6$ isn't the same as $3 \times 8 + 8$*
  - *6 more*
  Do not accept incomplete explanation, eg
  - *I counted the squares*
  - *There are more squares in A than in B*
  !   Units given
  Ignore, eg, accept
  - *38²cm, 32²*

1

(b)   Shows that the volume of A is equal to that of B, eg

•

	length	width	height	volume
A:	4	3	1	12
B:	3	2	2	12

• A is 3 × 4 × 1 = 12,
  B is 2 × 3 × 2 = 12

• 3 × 4 × 1 = 2 × 3 × 2

• A is one layer of 12 cubes and
  B is two layers of 6 cubes

2

or   Shows the value 12, with no evidence of an incorrect method for this value
            Accept minimally acceptable explanation, eg
                • *Both 12*
                • *12, 12*
            Do not accept incomplete explanation, eg
                • *Both the same*
        !   **Units given**
            Ignore
        !   **Responses to parts (a) and (b) transposed but otherwise correct**
            Mark part (a) as 0 but mark part (b) as 1, 0

1

[3]

Q3.

(a)   Indicates Cuboid A and gives a correct explanation

The most common correct explanations:

Show the correct surface area for both A and D
eg

• The surface area of A is 66, but D is 40

Consider the number of cube faces that are not visible
eg

• Each cube in D has 3 or 4 faces that cannot be
  seen but each cube in A has only 1 or 2

• Fewer faces of the cubes are touching each other in A

Consider the number of cube faces that are visible
eg

- In A the cubes show 4 or 5 faces, but in D it's 2 or 3

- There are more cube faces facing out on A than on D
    - *!   Units inserted*
      Ignore

      Accept minimally acceptable explanation
      eg, for the correct surface areas
        - *66 and 40 seen*
        - *4 × 16 + 2 is bigger than 4 × 8 + 8*
      eg, for cube faces that are not visible
        - *There are fewer hidden faces in A*
        - *D is more compact*
      eg, for cube faces that are visible
        - *Cubes in A show 4 or more faces, D shows less than 4*
        - *A has more faces showing*
        - *A is more spread out*
    - *!   Use of 'sides' for cube faces*
      Condone
      eg, accept
        - *More sides face out on A*
    - *!   Descriptors of cube faces*
      Note that pupils use a wide range of terms to describe the cube faces
      eg, for cube faces that are not visible
        - *Hidden faces*
        - *Faces pointing inside*
        - *Faces touching*
      eg, for cube faces that are visible
        - *Faces facing out*
        - *Faces showing*
        - *Faces you can see*
      Condone provided the pupil does not explicitly refer to the area of only one of the faces of each cuboid
      eg, do not accept
        - *You can see 8 faces on D and 16 faces on A*

      Do not accept use of 'square' for cube or cuboid
      eg
        - *You can see more of each square's surface in A than in D*

      Do not accept explanation is simply a description of one or both of the cuboids
      eg
        - *In A all 16 are in a line and not on top of each other*
        - *D is two cubes high*

      Do not accept incorrect statement
      eg
        - *Each cube in A shows 4 faces; D is 3*

U1

(b)   Indicates All the same

(c) 4

(d) Shows, in any order, all four correct sets of dimensions
     eg

   • 1   3   8
      1   4   6
      2   2   6
      2   3   4

or Shows three correct sets of dimensions

or Shows two correct sets of dimensions

        !   Repeated sets of dimensions
        eg
        • *1   3   8*
           1   8   3(repeated)
           2   2   6
           6   2   2 (repeated)
        Ignore the repeats and mark as 1, 0, 0
        Do not accept negative or non-integer dimensions used

[6]

Q4.

(a) A mathematical criterion such as:

   • "They are symmetrical."

   • "Each has three squares across."

   • "Both have the same perimeter."

   • "They have 4 joined-on lines."

   • "They have the same area."
        Do not accept *criteria which are implicit in the fact that the shapes are made from cm squares, eg:*
        • *"They have straight edges."*

(b) E

[2]

Q5.

(a) 84

(b) Award **TWO** marks for the correct answer of 5.

If the answer is incorrect, award **ONE** mark for an appropriate calculation such as:

- $(34 – 6 – 8) \div 4$ = incorrect answer.

up to 2

[3]

Q6.

(a)　E

1

(b)　B
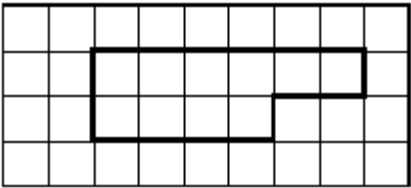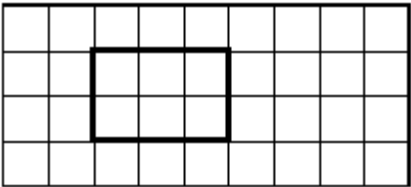
1

[2]

Q7.

(a)　34

1

(b)　70

1

[2]

Q8.

(a)　Any shape with an area of 10 cm², eg

> *The shape need not be aligned with the grid.*
> *Accept slight inaccuracies in drawing provided intention is clear.*

1

(b)　Any rectangle with a perimeter of 10 cm, eg

> *The rectangle need not be aligned with the grid.*
> *Accept slight inaccuracies in drawing provided the intention is clear.*

1

[2]

Q9.

20 (cm)

Q10.

   (a)   14

                                                       1

   (b)   C

                      Accept 5

                                                       1

                                                        [2]
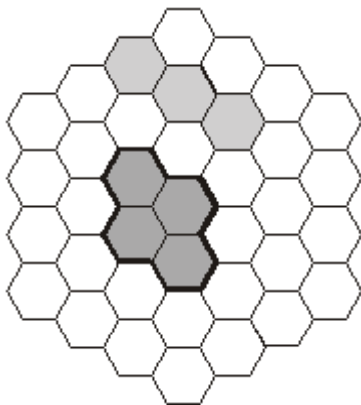
Q11.

Shape drawn on grid as shown:

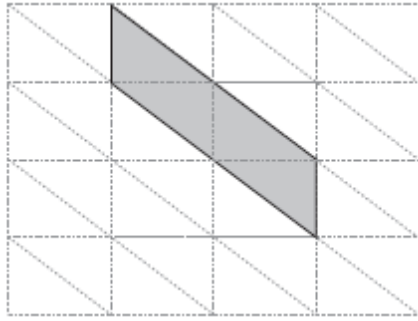   *Accept: shape in any position or orientation.*

                      Accept: slight inaccuracies in drawing provided the intention is clear.

                      Accept: alternative unambiguous indications of the correct shape provided the intention is clear.

                      Accept: mathematically correct answers involving fractions of a hexagon.

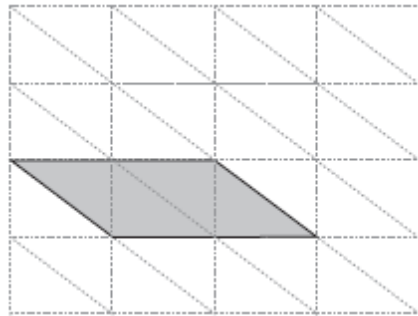   *Shape need not be shaded.*

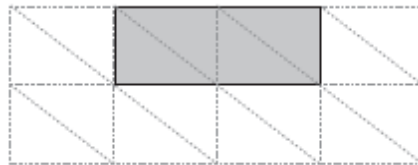   **[1]**
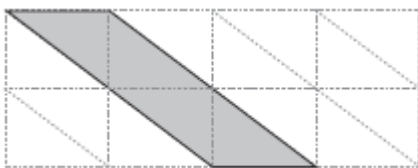
Q12.

Shows a correct quadrilateral, eg

•

OR

-

or

Shows a quadrilateral with an area of 24 cm² but not a perimeter of 26 cm, eg

-

OR

-

1

> *! Shading omitted*
> *Accept provided the quadrilateral drawn is unambiguous*
> *! Lines not ruled or accurate*
> *Accept slight inaccuracies in drawing provided the pupil's intention is clear*

[2]

## Q13.

Indicates No and gives a correct explanation that

includes indicating two different areas, eg:

- A rectangle with sides 6 cm by 2 cm has a perimeter of 16 cm and an area of 12 cm² but a rectangle with sides 5 cm and 3 cm has the same perimeter of 16 cm but it has an area of 15 cm² which is different so she is not correct

- A square with sides 3 cm by 3 cm and a rectangle with sides 4 cm by 2 cm have the same perimeter of 12 cm but they have different areas of 9 cm² and 8 cm²

Accept minimally acceptable explanation, eg:

- *6 × 2 = 12, 5 × 3 = 15*

-
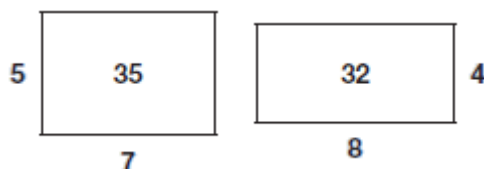
! Ignore any incorrect units given in an otherwise correct explanation, eg:
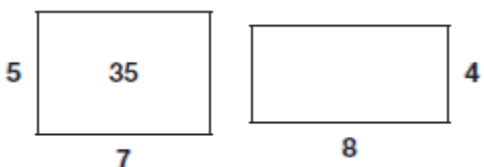
- *6² for 6 cm²*

! Indicates Yes, or no decision made, but explanation clearly correct

Condone, provided the explanation is more than minimal

Do not accept *Incomplete or incorrect explanation, eg:*

- *6 × 2, 5 × 3*

- *Two rectangles, one with sides 6 cm by 5 cm and one with sides 8 cm by 3 cm have the same perimeter of 22 cm but they don't have the same area*

-

[1]

Q14.

15

2

or

6(cm) and 1.5(cm) seen (*the dimensions of the rectangle*)

OR

Shows or implies a complete correct method, eg:

- $\sqrt{36}$ = 8 (*error*)

$8 \div 4 = 2$
$2 \times (8 + 2)$

- $6 \times 6 = 36$
  $6 \div 4 = 1.2$ (*error*)
  $6 + 1.2 + 6 + 1.2$

> ***Do not accept*** *confusion between area and perimeter, ie:*
> - *side of square is $36 \div 4 = 9$ (error)*
>   *$2 \times (9 + 2.25)$*

1

[2]