



Nets and solid shapes

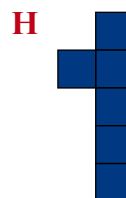
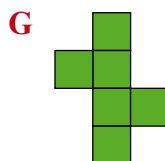
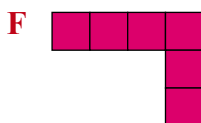
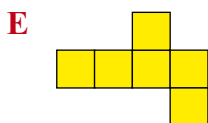
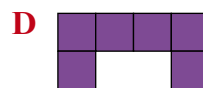
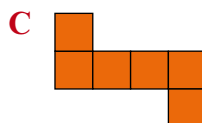
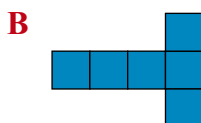
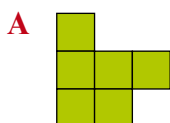
- Constructing a net for a solid shape
- Finding the surface area of a solid shape
- Relating the number of vertices, faces and edges of a solid shape

Keywords

You should know

explanation 1

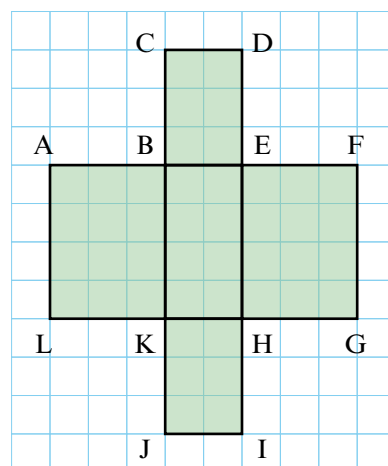
1 a Which of these diagrams could be used as a net for a cube?



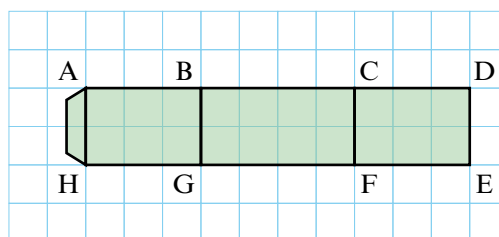
- How many vertices does a cube have?
- How many faces?
- How many edges?

2 The diagram shows a partly completed net for a cuboid drawn on a grid of 1 cm squares.

- What shape is needed to complete the net? Give its size.
- There are a number of options for where to place the missing part. List the edges where it could be attached.
- When the cuboid is made, which points will
 - meet A
 - be furthest from E
- Give the dimensions of the completed cuboid.
- Find the area of each of these rectangles.
 - ABKL
 - CDEB
 - BEHK
- Work out the total surface area of the cuboid.

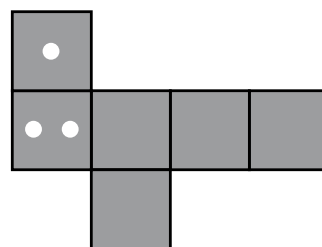


- 3** The diagram shows a partly completed net for a cuboid on a grid of 1 cm squares.



- Copy the diagram and complete it by drawing rectangles on the edges BC, DE and FE.
- The net has a flap on the edge AH. How many flaps are needed altogether? Add the necessary flaps to your net.
- Work out the surface area of the cuboid.

- 4** Copy this net for a cube onto paper or card and add any necessary flaps.



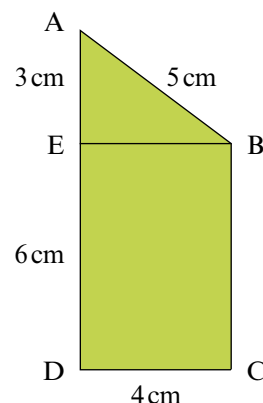
The cube is to be made into a dice.

- Complete the labels so that opposite faces add up to 7. In how many ways can this be done?
- Make the dice.

explanation 2

- 5** Here is a partly completed net for a triangular prism.

- Copy and complete the sketch by adding a triangle to the edge DC and rectangles to ED and BC. Include the measurements on your sketch.
- Work out the surface area of the triangular prism.
- Which of the labelled points will be furthest from A when the prism is complete?
- Find the numbers of vertices, faces and edges of a triangular prism.



- 6** Kay found the surface area of the prism in question 5 with this calculation.

$$3 \times 4 + 6(3 + 4 + 5)$$

- Explain why Kay's method works.
- Write an expression to find the surface area of a prism twice as long, but otherwise the same as the one in question 5.
- Use your expression to calculate the surface area of this prism.

- 7** Here is a partly completed net of a triangular prism.

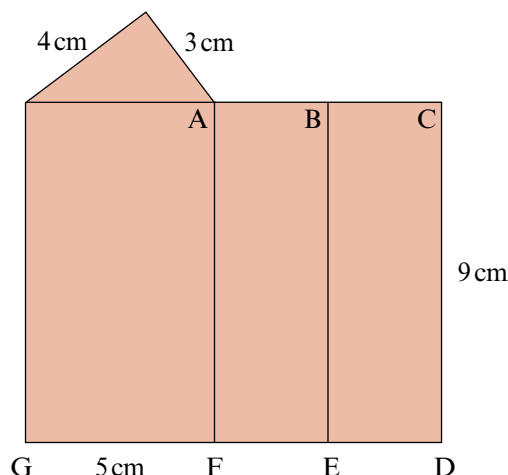
a Write down the length of

i AB **ii** BC

b Copy the net and complete it by adding a triangle to the edge GF. Label the lengths of its sides.

c Repeat part **b** but, this time, attach the triangle to the edge FE.

d Work out the surface area of the triangular prism.



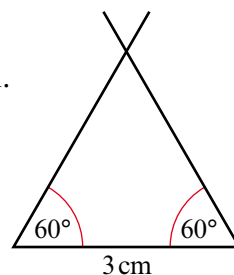
- 8** Read the whole question before you do part **a**.

a Use a ruler and protractor to construct the triangle shown.

Check that each side is 3 cm long.

b Use your triangle as part of a net for a triangular prism of length 5 cm.

c Add flaps to your net and make the prism.



- 9** The diagram shows the net of a prism.

a Which labelled point will be joined to A when it is complete?

b Write down these lengths

i AB **ii** BC

iii CD **iv** DE

v EF **vi** FG

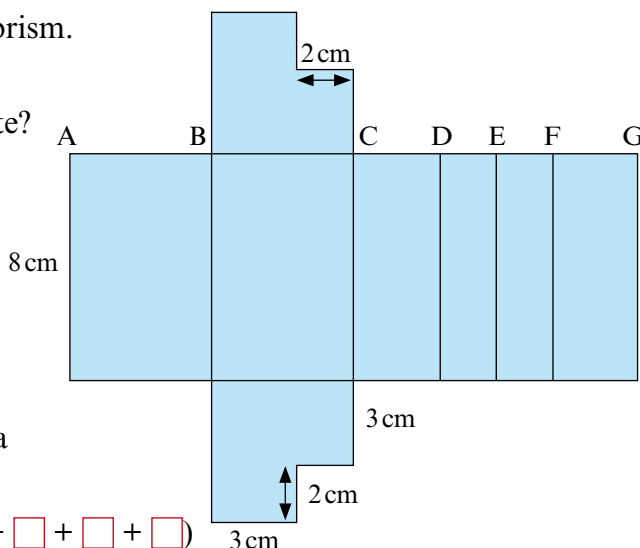
c Copy and complete this expression for the surface area of the prism.

$$2(5^2 - \square^2) + \square(5 + \square + \square + \square + \square + \square)$$

d What is the surface area?

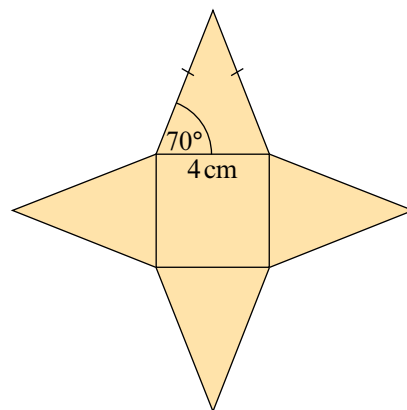
e Find the number of vertices, faces and edges of the prism.

f What is the smallest shape that can be added to the prism to make a cuboid?

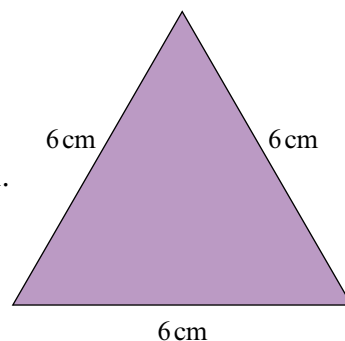


explanation 3

- 10 a** Construct the net shown for a square-based pyramid and add any flaps as necessary.
- b** Cut out the net and make the pyramid.
- c** The angle at the base of the triangle is 70° . What would happen if this angle was 45° ?
- d** Find the number of vertices, faces and edges of the pyramid.



- 11 a** Construct the triangle shown below.
- b** Join the midpoints of the sides to make the net of a tetrahedron and add the flaps.
- c** Cut out the net and fold to make the tetrahedron.
- d** Find the number of vertices, faces and edges of the tetrahedron.



- 12 a** Use your results from questions 1, 5, 9, 10 and 11 to complete the table.

Shape	Vertices (V)	Faces (F)	Edges (E)
Cube			
Triangular prism			
Prism			
Square-based pyramid			
Tetrahedron			

- b** Try to find a formula connecting the values of V, F and E.
- 13** Find the length of each edge of a cube if its surface area is
- a** 96cm^2 **b** 216cm^2 **c** 486cm^2