CHAPTER 11

Measurement of 2D and 3D Shapes

Exercise 11.1

1 Convert each of the following measurements to m^2.

a 2000 cm^2 =

b 400 cm^2 =

2 Convert each of the following measurements to cm^2.

a 1.6 m^2 =

b 250 m^2 =

3 Convert each of the following to m^2.

a 3.2 km^2 =

b 0.49 km^2 =

4 Convert the following to km^2.

a 45 000 000 m^2 =

b 590 000 m^2 =

5 Convert each of the following to m^2.

a 2.5 ha =

b 0.12 ha =

6 Convert to ha.

a 79 000 m^2 =

b 8400 m^2 =

7 Convert to mm^2.

a 48 cm^2 =

b 14.5 cm^2 =

8 Convert to cm^2.

a 160 mm^2 =

b 3500 mm^2 =

9

You are required to cover the rectangular wall of dimension 6.6 m by 3.2 m by using square tiles of size 20 cm by 20 cm. How many square tiles are required?

10 A mathematician invents a new unit of measurement known as "dots". It is found that 1 m = 18 dots.

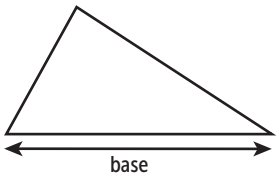
a Sam concluded that 1 m^2 = 18 $dots^2$. Explain why his argument is incorrect.

b What is the correct relation for m^2 and $dots^2$?

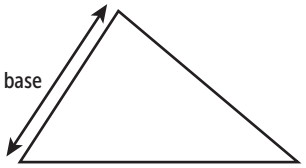
Exercise 11.2

1 Given the base, mark on each triangle the corresponding height.

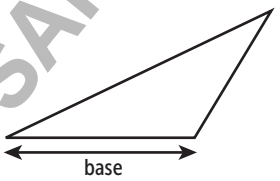
a



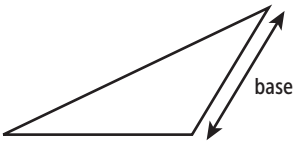
b



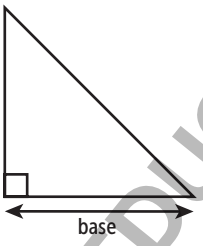
c



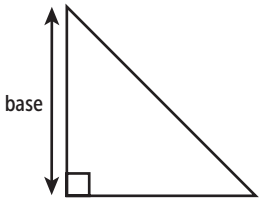
d



e

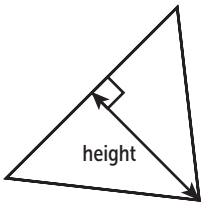


f

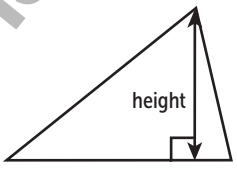


2 Given the height, mark on each triangle the corresponding base.

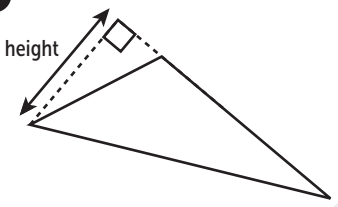
a



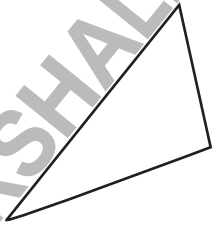
b

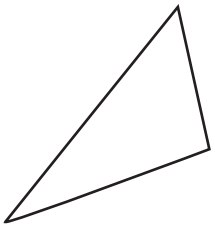


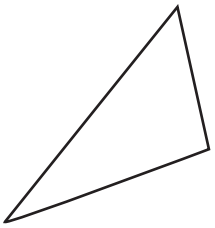
c



3 In the three identical triangles, draw three different sets of height and base.







4 Sketch a diagram for each of the following triangles with the given base and height. Then calculate the area of each triangle.

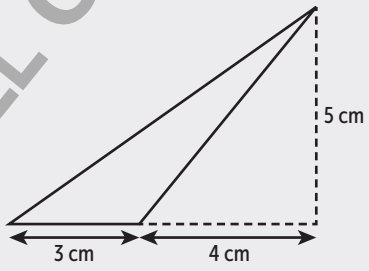
a Base = 12 cm, height = 5 cm

Diagram

b Base = 23 cm, height = 44 cm

Diagram

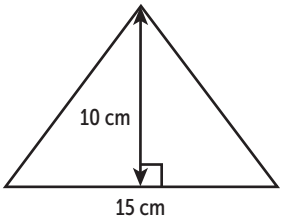
5 Leo and Rahul make the following statements after observing the triangle.



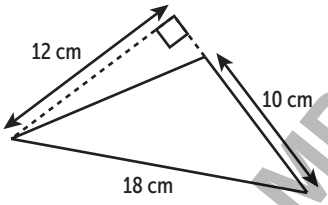
Leo argues that if the height is 5 cm, its base it 7 cm.
Rahul says that the base is 3 cm. Who is correct? Explain.

6 Find the area of each of the following triangles.

a

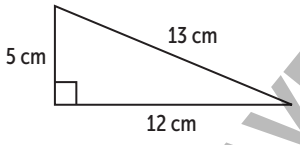


b

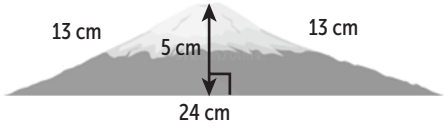


7 Find the area and perimeter of each of the following triangles.

a

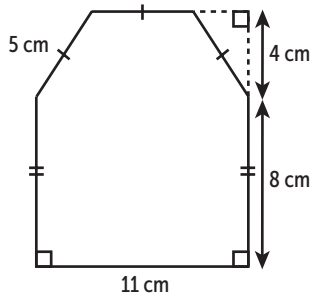


b The picture shows a sketch of Mount Fuji as a triangle.

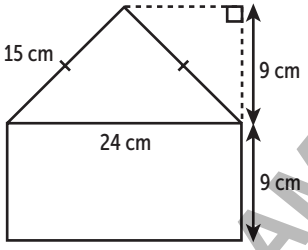


8 Find the area and perimeter of each of the following compound shapes.

a



b

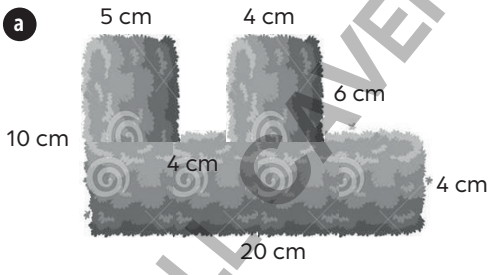


9 The pictures show some

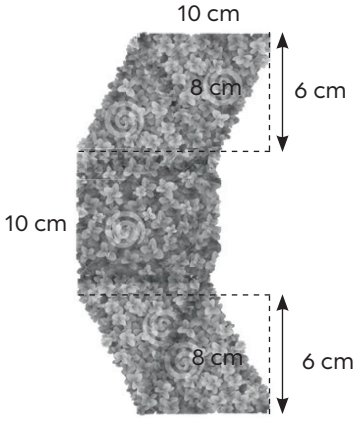
a Trace out the shape of the compound shape.

b Find the area and perimeter of the model you constructed.

a



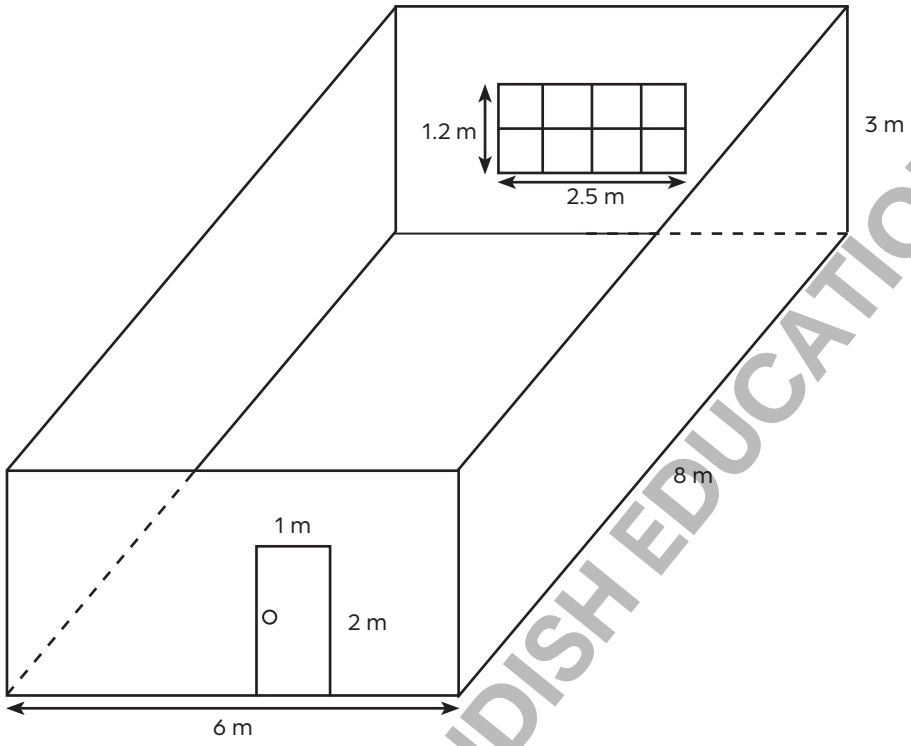
b



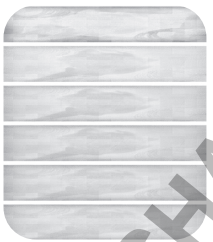
Activity 11A

Modelling Task: Wallpaper Dilemma

The diagram below shows the 3-D model of a master bedroom.
The width and height of the door is 1 m and 2 m respectively.
The width and height of the window is 2.5 m and 1.2 m respectively.



A home owner wishes to cover one or more walls of the master bedroom with wallpaper. He has chosen the following three wallpaper designs for his house. The rates are also given below.



Design A
$105 per ream
1 ream = 1 m × 12 m

Design B
$140 per ream
1 ream = 1 m × 12 m

Design C
$200 per ream
1 ream = 1 m × 18 m

Assuming two different roles, that of the boss of the wallpaper company and the home owner, estimate the price of wallpapering the master bedroom with the wallpapers given. You may choose all 3 designs, 2 designs or stick to only 1 design. You may decide to wallpaper the whole bedroom or parts of the bedroom.

Activity Worksheet

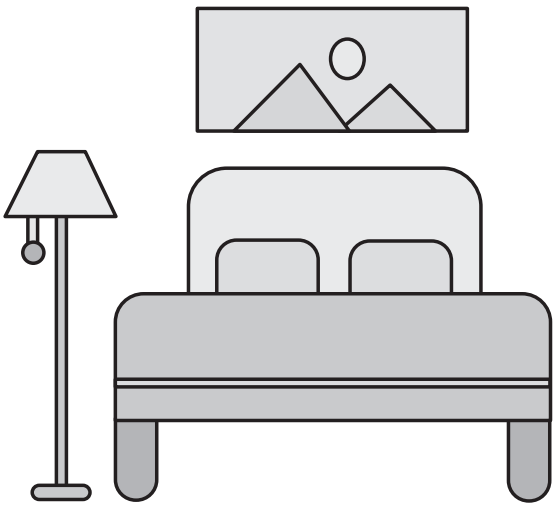
Three different homeowners have three different budgets.

Homeowner A: $2800

Homeowner B: $10 000

Homeowner C: $14 000

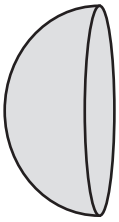
Imagine that you are the boss of the wallpaper company. Create the best possible design within the budget for each homeowner, identifying the amount of wallpaper used and the total cost used.



Exercise 11.3

1 **For each of the following 3D shapes, state the number of curved surface and the number of faces it has.**

a



hemisphere

Curved surface: ____

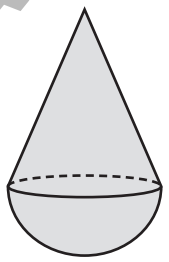
Faces: _____

b

Curved surface: ____

Faces: _____

c

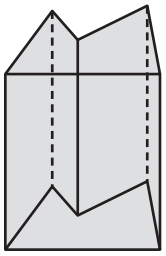


Curved surface: ____

Faces: _____

2 **For each of the following 3D shapes, state the number of faces, vertices and edges it has.**

a

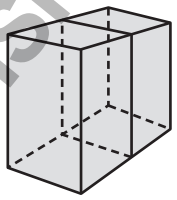


Faces: _____

Vertices: _____

Edges: _____

b

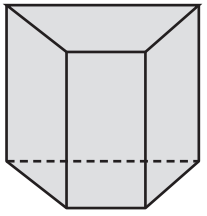


Faces: _____

Vertices: _____

Edges: _____

c

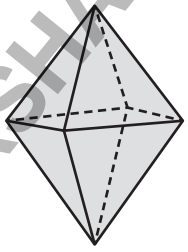


Faces: _____

Vertices: _____

Edges: _____

d

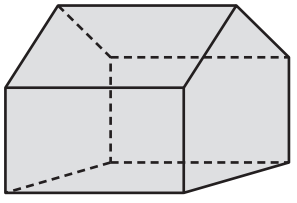


Faces: _____

Vertices: _____

Edges: _____

e



Faces: _____

Vertices: _____

Edges: _____

3 Sketch each of the following objects using straight edges. State the number of faces, vertices and edges each object has.

a

Faces: _____

Vertices: _____

Edges: _____

b

Faces: _____

Vertices: _____

Edges: _____

c

Faces: _____

Vertices: _____

Edges: _____

4 Convert each of the following to cm^3.

a 7 m^3

b 5 m^3

c 2.7 m^3

d 0.06 m^3

e 0.012 m^3

f 1.06 m^3

5 Convert each of the following to m^3.

a 78 000 cm^3

b 600 000 cm^3

c 420 cm^3

d 100 cm^3

e 4500 cm^3

f 1500 cm^3

6 Convert each of the following to cm^3.

a 2.3 l

b 1.2 l

c 285 ml

d 10 ml

7 **Convert each of the following to m^3.**

a 1.9 l

b 7.5 l

8 **Convert each of the following to l.**

a 1.8 m^3

b 7.9 m^3

9 **A mathematician invents a new unit of measurement known as "dots". It is found that 1 m = 18 dots.**

a Convert 14 m^3 to $dots^3$.

b Convert 500 $dots^3$ to m^3.

10 Find the volume of the following containers in cm^3.

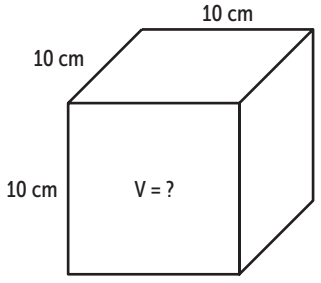
a 1.2 *l*

b 350 m*l*

Exercise 11.4

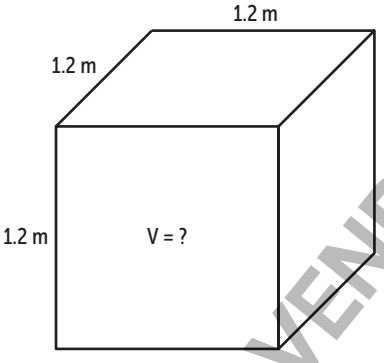
1 Find the missing numbers.

a



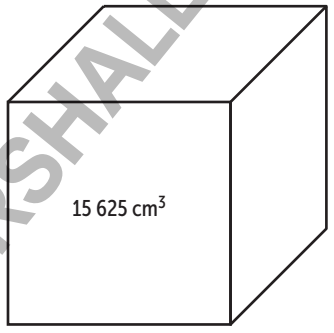
Volume of cube = _____ cm^3

b



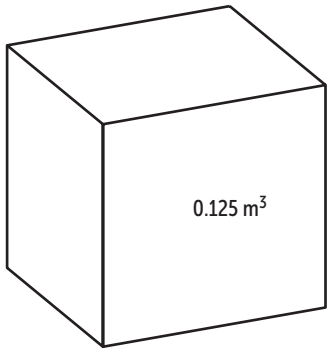
Volume of cube = _____ cm^3

c



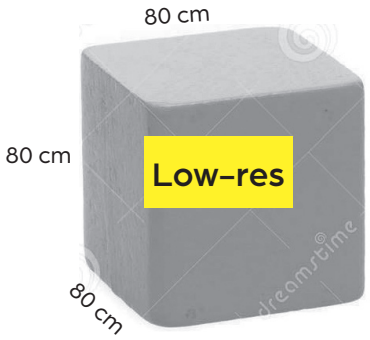
Length of cube = _____ cm

d



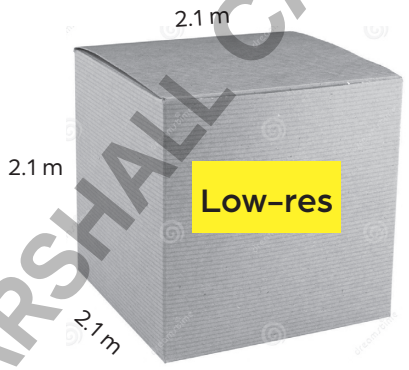
Length of cube = _____ m

2 **Find the volume of the block.**



Volume of block = _____ m^3

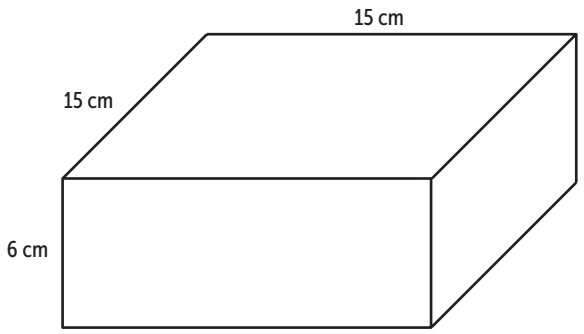
3 **Find the volume of the cardboard box.**



Volume of cardboard box = _____ cm^3

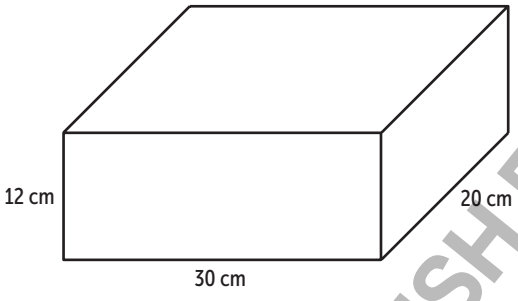
4 Find the missing numbers.

a



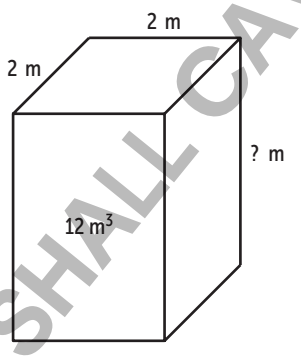
Volume of cuboid = _____ cm^3

b



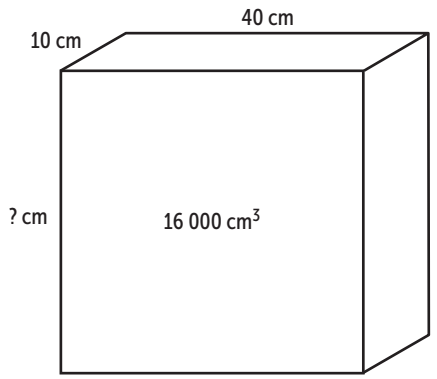
Volume of cuboid = _____ cm^3

c



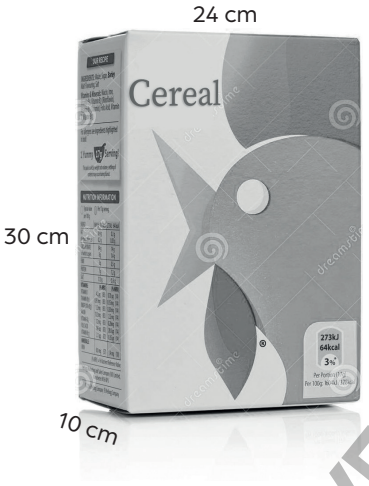
Height of cuboid = _____ m

d



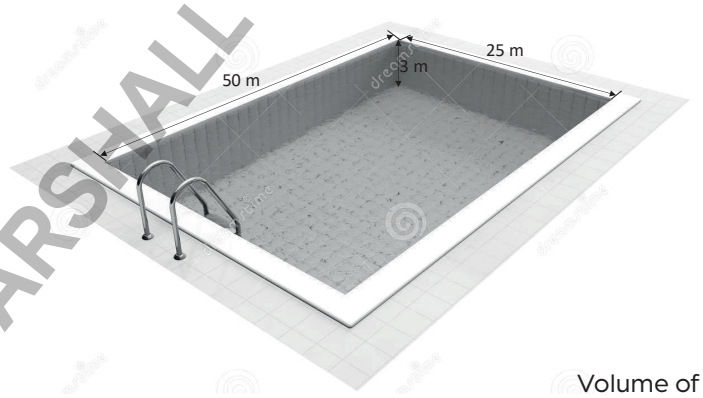
Height of cuboid = _____ cm

5 **Find the volume of the cereal box.**



Volume of cereal box = _____ cm^3

6 **Find the volume of water in the swimming pool.**

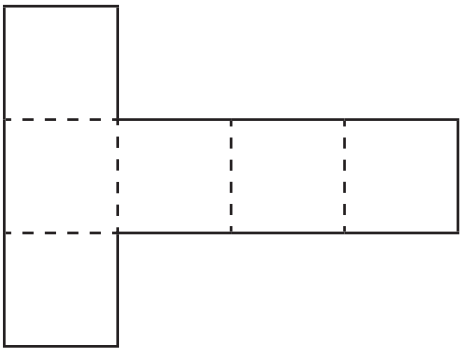


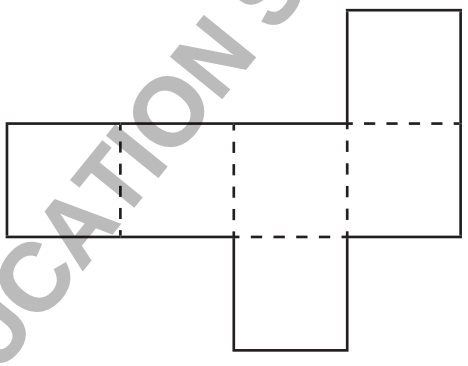
Volume of water in the swimming pool = _____ m^3

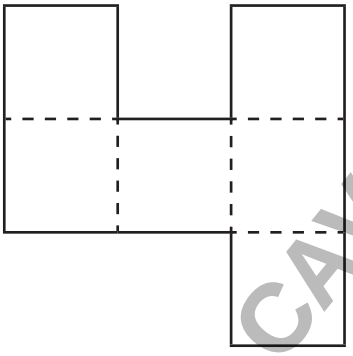
Activity 11B

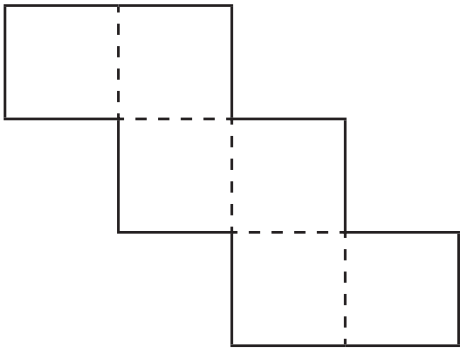
Make a copy and cut out the shapes on this page and the next.
Fold along the dotted lines.

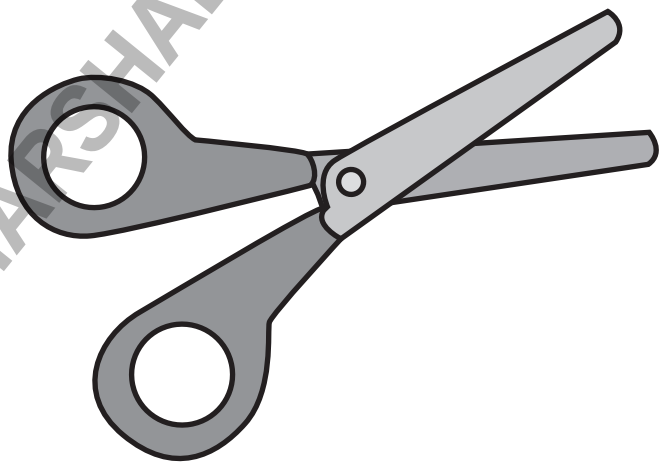
1. Which set of shapes can be folded into cubes?
2. Which set of shapes can be folded into cuboids?
3. What differences do you notice between the nets of cubes and the nets of cuboids?

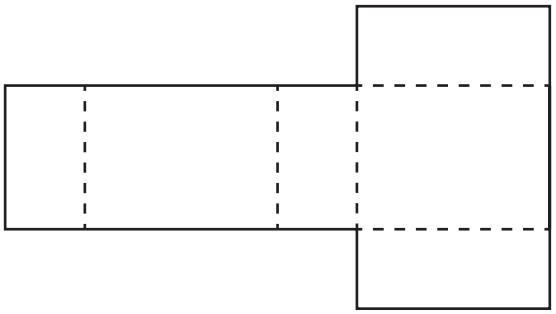


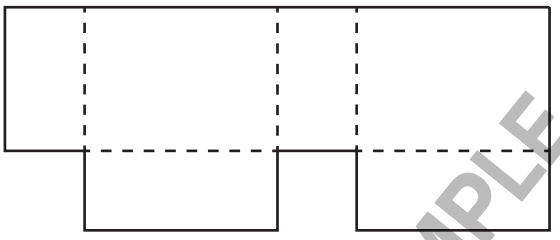


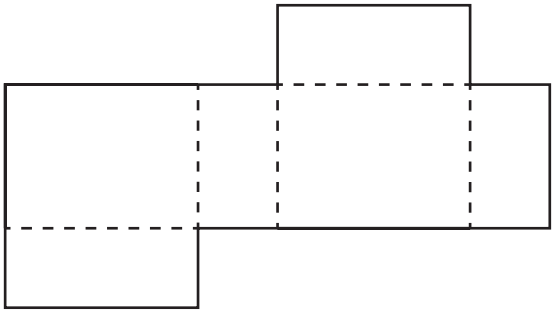


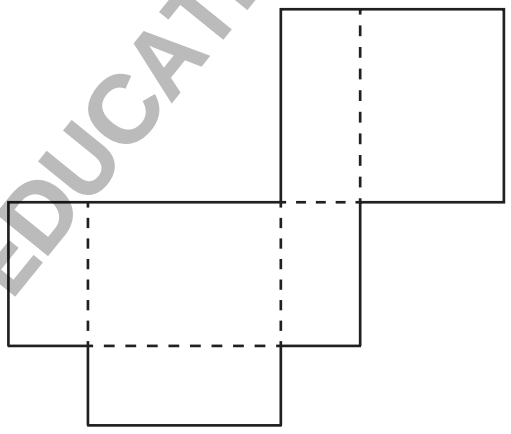


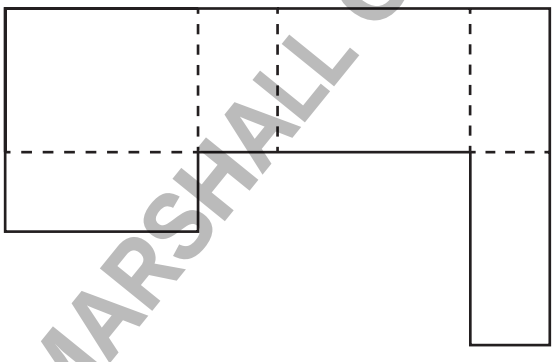


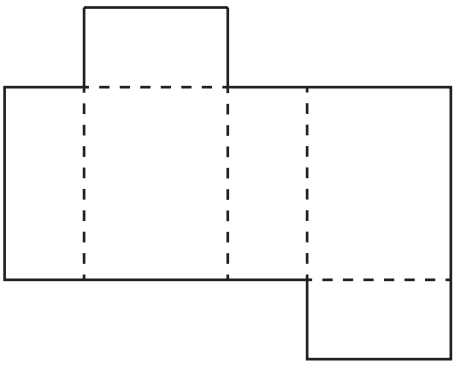








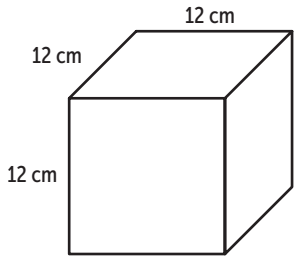




Exercise 11.5

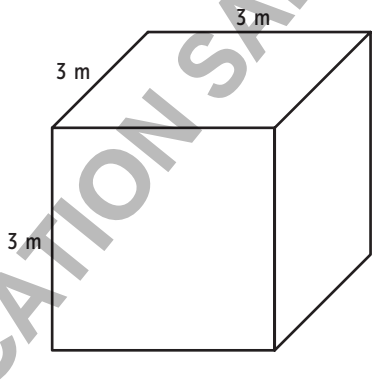
1 **Find the total surface area of each of the following cubes.**

a



Total surface area = _____ cm^2

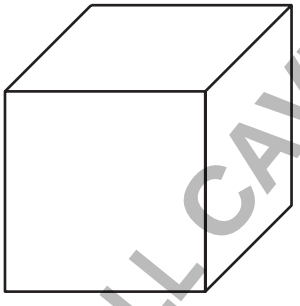
b



Total surface area = _____ m^2

2 **Find the length of each of the following cubes.**

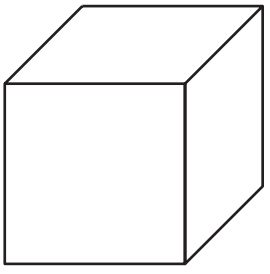
a



Total surface area = 5400 cm^2

Length of cube = _____ cm

b



Total surface area = 3.84 m^2

Length of cube = _____ m

3 A cube has a total surface area of 216 cm^2. What is the length of the cube?

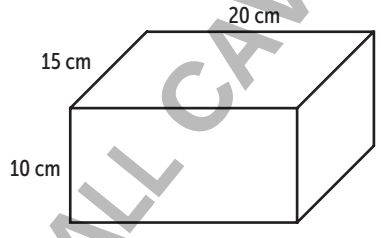
Length of cube = _____ cm

4 A cube has a total surface area of 150 cm^2. What is its length in cm?

Length of cube = _____ cm

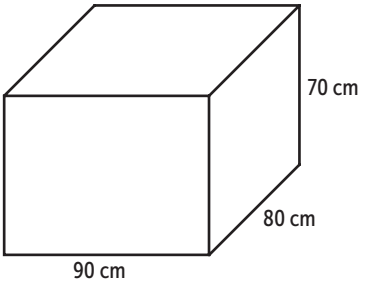
5 Find the total surface area of the following cuboids.

a



Total surface area = _____ cm^2

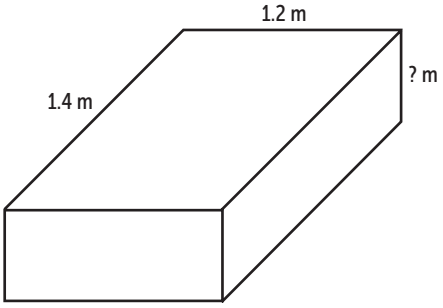
b



Total surface area = _____ cm^2

6 Find the height of each of the following cuboids.

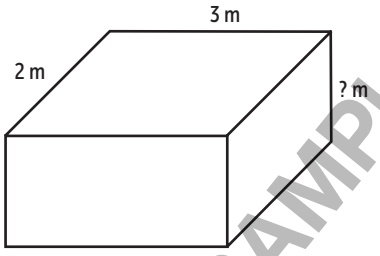
a



Total surface area = 5.96 m^2

Height of the cuboid = _____ m

b

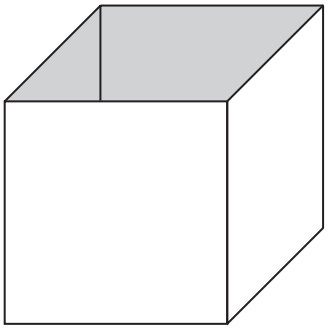


Total surface area = 27 m^2

Height of cuboid = _____ m

7 A swimming pool of length 25 m and breadth 10 m has a depth 1.2 m throughout the pool. The water is drained out and the inside of the pool is to be painted. What is the total area that needs to be painted?

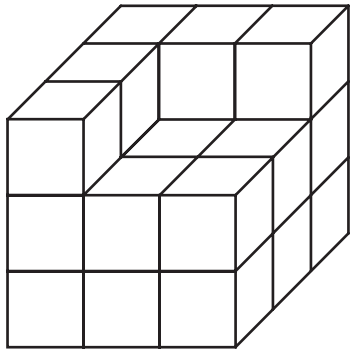
8 An open rectangular tin is 20 cm long, 15 cm wide and 30 cm tall. If the exterior of the tin is to be painted, and every 1 cm^2 costs $0.50, what is the total cost of painting the tin?



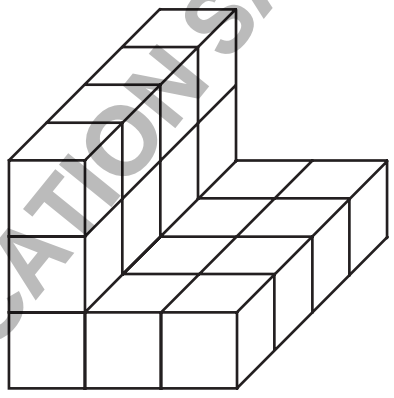
Exercise 11.6

1 Find the total volume and surface area of each of the following composite solids which are made up of cubes of length 1 cm.

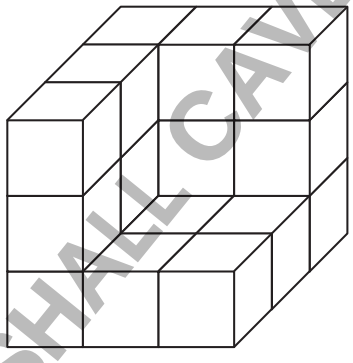
a



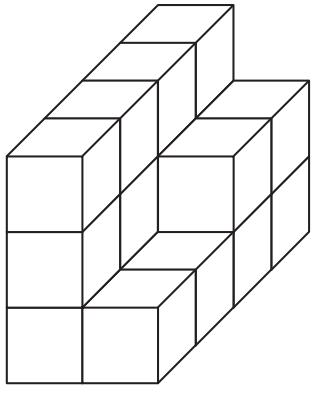
b



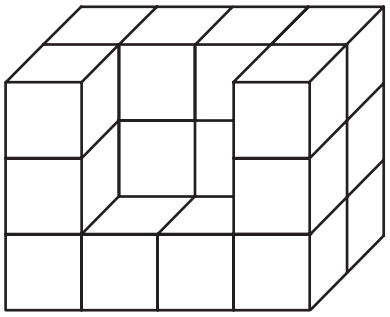
c



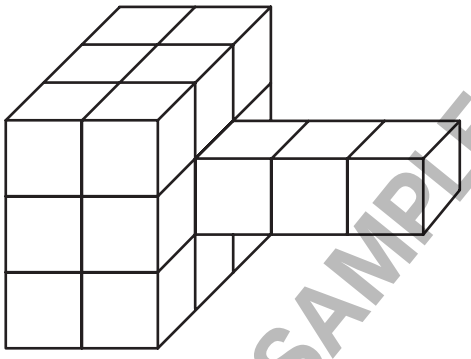
d



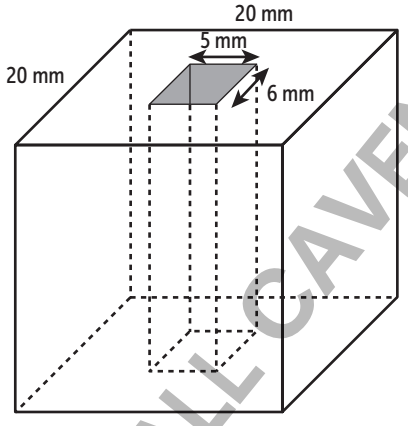
e



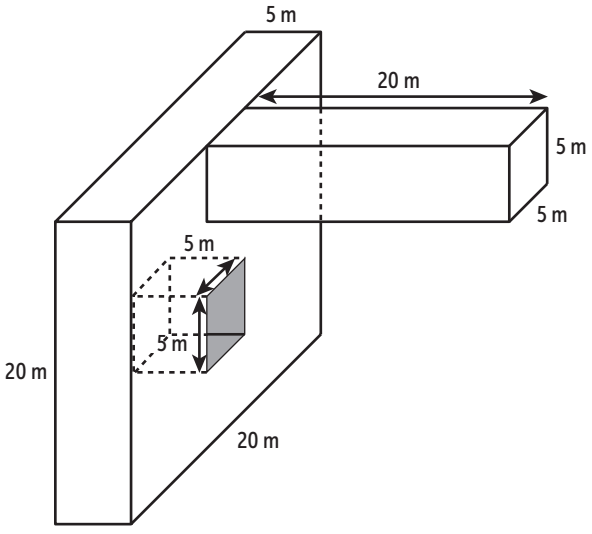
f



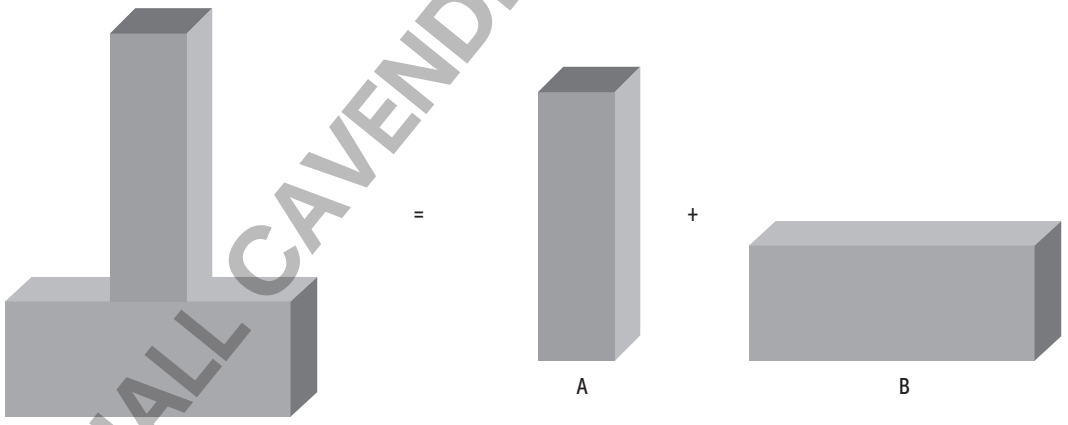
2 **A cube of length 20 mm has a hole 5 mm by 6 mm by 20 mm drilled through it. What is the total volume and the total surface area of the remaining solid?**



3 **Find the volume and the total surface area of the following solid if it has a hole 5 m by 5 m by 5 m drilled through it as shown.**



4 **Abdullah made model of a cat scratching post using two cuboids.**



Abdullah argued that

(1) Volume of the model = Volume of A + Volume of B

(2) Surface area of the model = Surface area of A + Surface area of B

Do you agree with the arguments? Explain.