2

Surface area and volume

This chapter deals with calculating the surface areas and volumes of right prisms and cylinders.

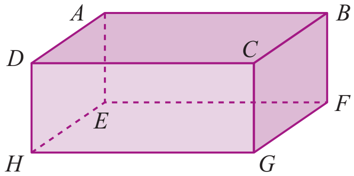
After completing this chapter you should be able to:

- solve problems involving the surface areas and volumes of right rectangular and triangular prisms
- calculate the surface areas and volumes of cylinders
- solve problems involving the surface areas and volumes of composite solids.

NSW Syllabus references: 5.2 M&G Area and surface area, 5.2 M&G Volume
Outcomes: MA5.2-1WM, MA5.2-2WM, MA5.2-11MG, MA5.2-12MG
MEASUREMENT & GEOMETRY – ACMMG242

Diagnostic test

Questions **1** to **3** refer to the prism below.



1 The face that corresponds to the face *ABFE* is:

A *DCHG* **B** *BFGC*
C *AEHD* **D** *DCGH*

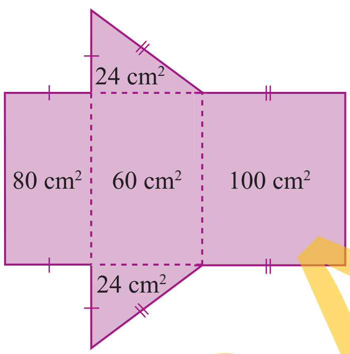
2 The face that corresponds to the face *CBFG* is:

A *ABFE* **B** *AEHD*
C *DAEH* **D** *DGCH*

3 The face that corresponds to the face *ABCD* is:

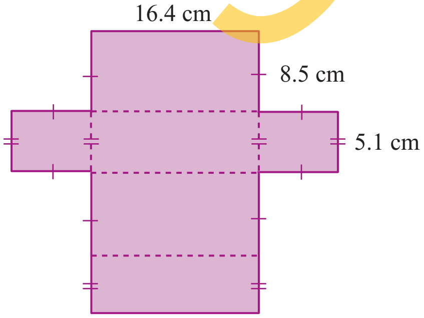
A *EFHG* **B** *HEFG*
C *EFGH* **D** *DCGH*

4 The surface area of the net shown is:



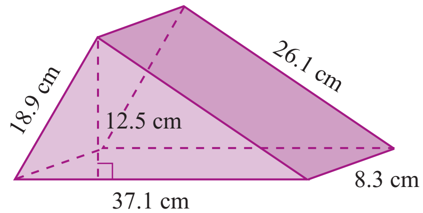
A 288 cm^2 **B** 324 cm^2
C 232 cm^2 **D** 264 cm^2

5 The surface area of the net shown is:



A 643.28 cm^2 **B** 532.78 cm^2
C 634.28 cm^2 **D** 537.28 cm^2

6 The surface area of this triangular prism is:

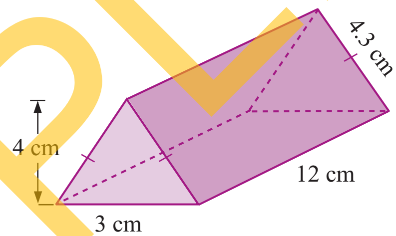


A 1329.5 cm^2 **B** 1052.43 cm^2
C 913.305 cm^2 **D** 1145.18 cm^2

7 The surface area of a cube of side length 8.7 cm is:

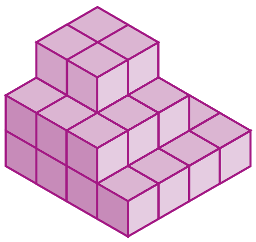
A 302.76 cm^2 **B** 658.503 cm^2
C 454.14 cm^2 **D** 378.45 cm^2

8 A chocolate bar is shown below. The surface area of the wrapping to the nearest cm² is:



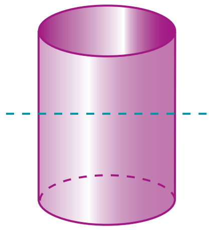
A 150 cm^2 **B** 151.2 cm^2
C 151 cm^2 **D** 152 cm^2

9 This solid is made from 1 cm³ cubes. The volume of the solid is:



A 18 cm^3
B 29 cm^3
C 16 cm^3
D 30 cm^3

10 The cross-section of this solid is:



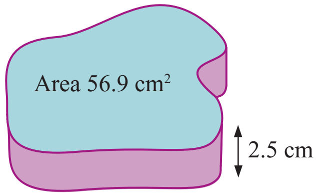
A an oval
B a cylinder
C an ellipse
D a circle

11 A solid that has a circular cross-section is called a:

A pyramid **B** cylinder
C rectangular prism **D** box

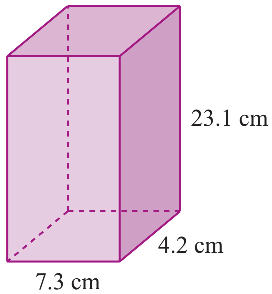
12 The volume of the solid shown is:

A 61.4 cm^3
B 268.2 cm^3
C 307 26 cm^3
D 142.25 cm^3

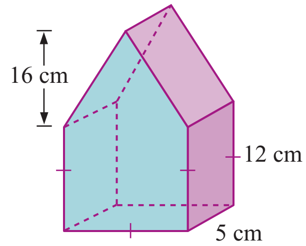


13 The volume of this solid to the nearest cm^3 is:

A 709 cm^3
B 708 cm^3
C 705 cm^3
D 710 cm^3



14 The volume of this composite solid is:



A 1680 cm^3 **B** 1350 cm^3
C 1200 cm^3 **D** 960 cm^3

15 The volume of a cube of side length 8.7 cm is:

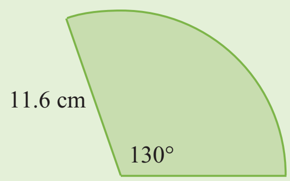
A 302.76 cm^3 **B** 658.503 cm^3
C 454.14 cm^3 **D** 378.45 cm^3

The diagnostic test questions refer to outcomes ACMMG210 and ACMMG218.

A Area review

EXAMPLE 1

Find the area of this sector to 1 decimal place.

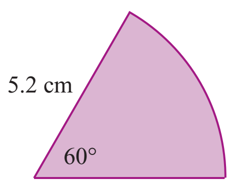


Solve	Think	Apply
$A = \frac{\theta}{360} \times \pi r^2$ $= \frac{130}{360} \times \pi \times 11.6^2$ $\approx 152.7\ cm^2$	Angle of a sector $= 130°$	Find the area of a sector of a circle by comparing its angle with the angle of a full circle, 360°. $\frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{sector angle}}{360}$ $A \text{ (of sector)} = \frac{\text{sector angle}}{360} \times \text{area of circle}$

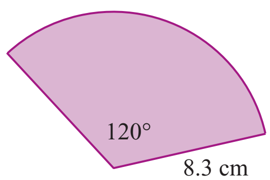
Exercise 2A

1 Calculate the area of each sector correct to 1 decimal place.

a



b



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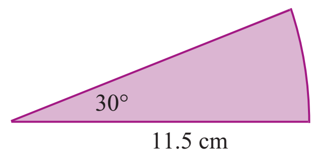
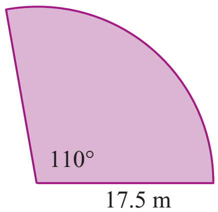
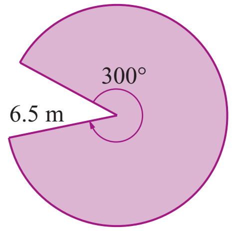


d



e



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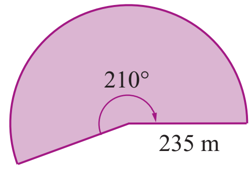
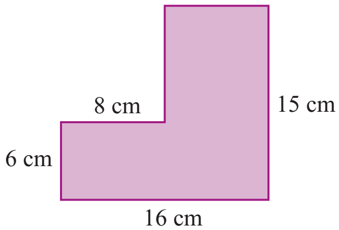


2 Find the areas of the following shapes.

a



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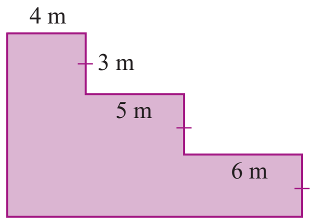

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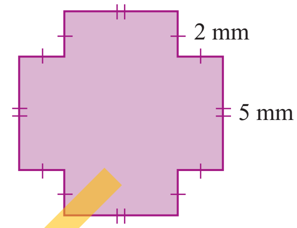

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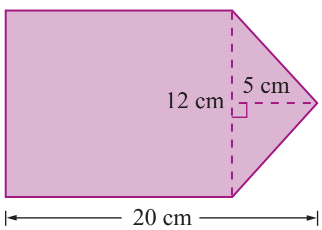

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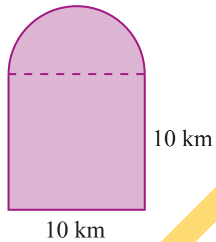

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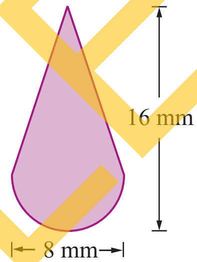
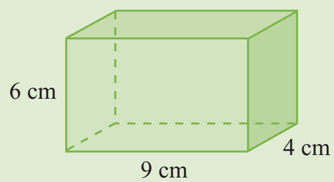
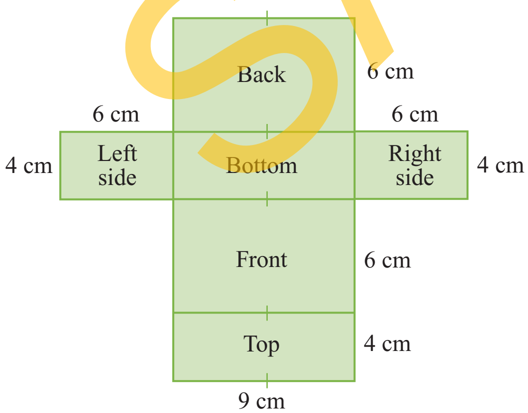


EXAMPLE 2

a Draw a net for this rectangular prism, showing the lengths of its edges.
b Calculate the surface area of the prism.



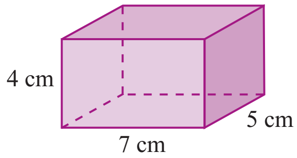
	Solve/Think	Apply
a		Draw the net, identify the faces, and transfer the edge lengths from the solid to the net. Calculate the area of each face and sum these areas.
b	SA = (bottom + top) + (front + back) + (left side + right side) $= (9 \times 4) \times 2 + (9 \times 6) \times 2 + (6 \times 4) \times 2$ $= 228\text{ cm}^2$	

3 For each of the following rectangular prisms:

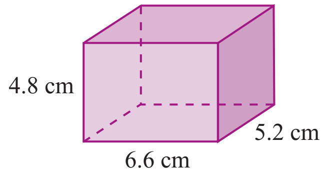
i Draw a net of each prism and mark its edge lengths.

ii Calculate the surface area.

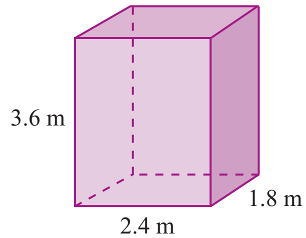
a



b



c



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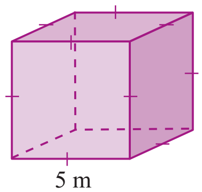

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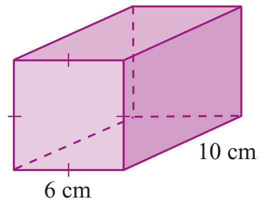

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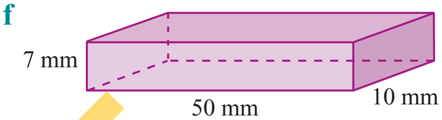
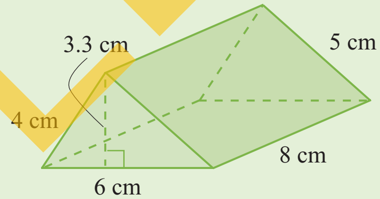
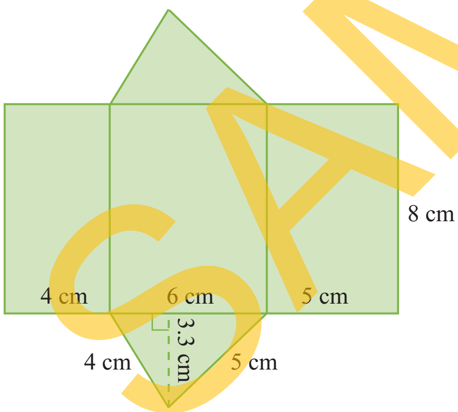


EXAMPLE 3

a Draw a net of this triangular prism, marking its edge lengths.

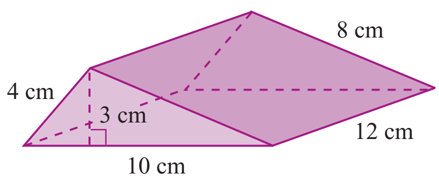
b Calculate the surface area of the prism.



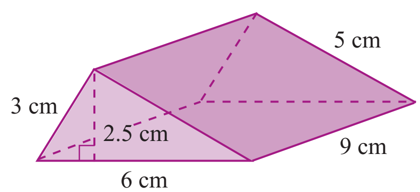
	Solve/Think	Apply
a		Draw the net, identify the faces and transfer the edge lengths from the solid to the net. Calculate the area of each face and sum these areas.
b	SA = area of 2 triangles + area of 3 rectangles $= (\frac{1}{2} \times 6 \times 3.3) \times 2 + 8 \times 4 + 8 \times 6 + 8 \times 5$ $= 139.8\ \text{cm}^2$	

4 Calculate the surface area of each of the following triangular prisms.

a

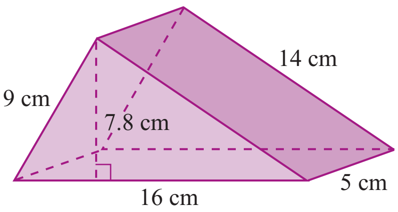


b

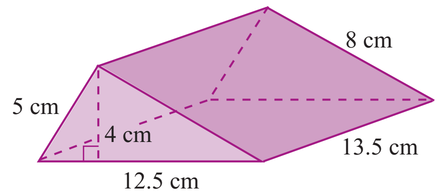


MEASUREMENT & GEOMETRY

c

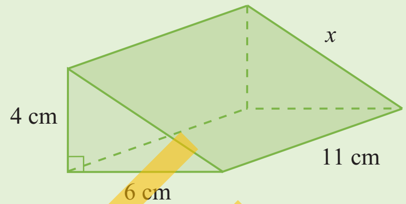


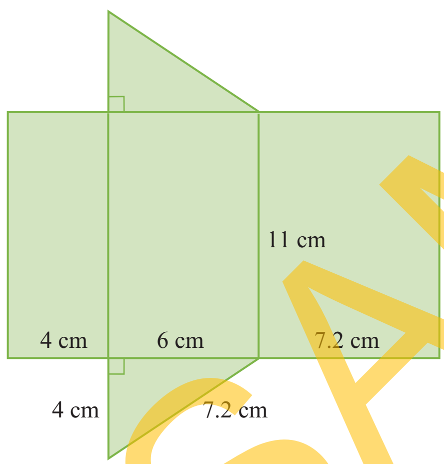
d



EXAMPLE 4

a Calculate the length of the unknown edge of this triangular prism.
b Draw a net of the prism.
c Calculate its surface area.



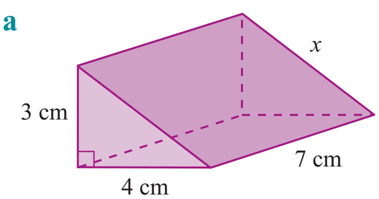
	Solve/Think	Apply
a	By Pythagoras' theorem: $x^2 = 4^2 + 6^2 = 52$ $\therefore x = \sqrt{52}$ ≈ 7.2 cm (1 decimal place)	Calculate the unknown edge using Pythagoras' theorem.
b		Draw the net and calculate the surface area as before.
c	$SA = (\frac{1}{2} \times 6 \times 4) \times 2 + 11 \times 4 + 11 \times 6 + 11 \times 7.2$ $= 213.2 \text{ cm}^2$	

5 For each triangular prism:

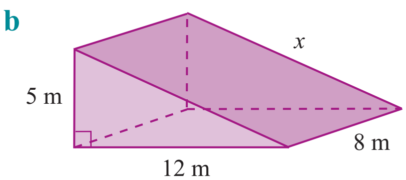
i Find the length of the unknown edge.

ii Calculate the surface area.

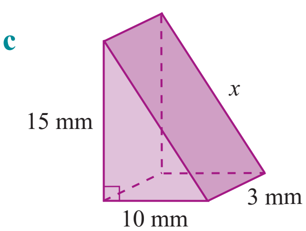
a



b



c



B Surface areas of right cylinders

The formula for the surface area of a cylinder can be developed by 'cutting' the cylinder and laying it out flat. The net then gives a formula for the surface area.

Remember:
Area of a circle is πr^2.

The curved part forms a rectangle of length $2\pi r$ and breadth h.

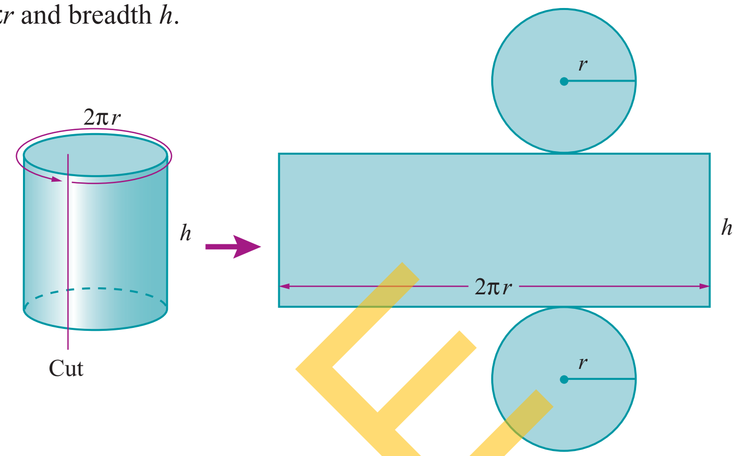
$$\begin{aligned} A &= 2(\text{area of circle}) + \text{area of rectangle} \\ &= 2 \times \pi r^2 + 2\pi r \times h \\ &= 2\pi r^2 + 2\pi rh \end{aligned}$$

The surface area of a closed cylinder is:

$$A = 2\pi r^2 + 2\pi rh$$

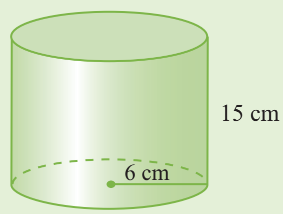
The surface area of a cylinder open at both ends is:

$$A = 2\pi rh$$



EXAMPLE 1

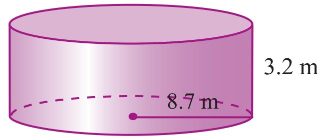
Find the surface area of this closed cylinder.



Solve	Think	Apply
Surface area $= 2\pi r^2 + 2\pi rh$ $= 2\pi \times 6^2 + 2\pi \times 6 \times 15$ $\approx 791.7\ \text{cm}^2$ (1 decimal place)	Radius = 6 cm Height = 15 cm	For a cylinder closed at both ends: $SA = 2\pi r^2 + 2\pi rh$

Exercise 2B

1 Complete to find the surface area of this closed cylinder.



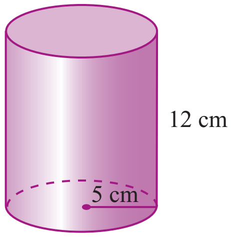
Surface area $= 2\pi r^2 + 2\pi$___

$= 2\pi \times$ ___$^2 + 2\pi \times 8.7 \times$ ___

$\approx$ ___ m^2 (1 decimal place)

2 Find the surface areas of these closed cylinders to the nearest whole number.

a



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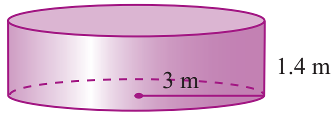

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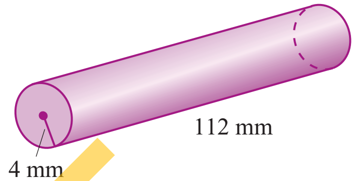

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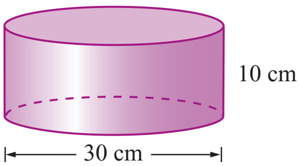

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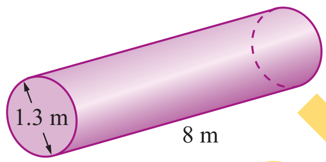

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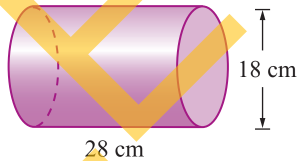
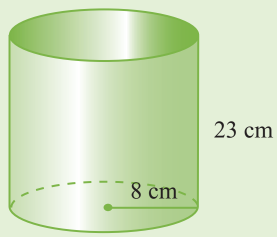


EXAMPLE 2

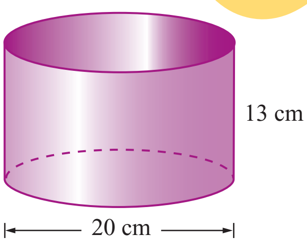
Find the surface area of this open cylinder.



Solve/Think	Think	Apply
Surface area $= 2 \times \pi \times 8 \times 23$ $= 1156.1$ cm^2	Radius = 8 cm Height = 23 cm	For an open cylinder: $SA = 2\pi rh$

3 Find the surface areas of the following open cylinders.

a



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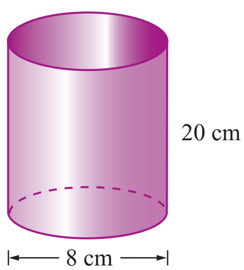

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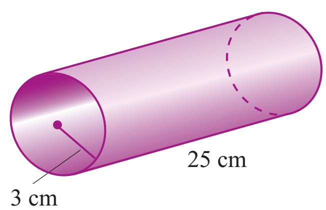


4 **a** Determine how much paint is required to cover the outside of a cylindrical container 12 m long with diameter 10 m if each litre of paint covers 15 m^2.

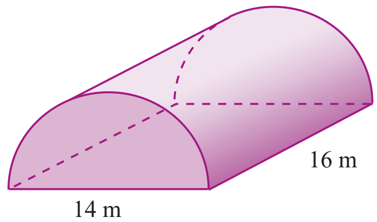
b Which has the greater surface area: a cylinder of length 15 cm and radius 8 cm, or a cylinder of length 8 cm and radius 10 cm?

5 Find the surface area, correct to 1 decimal place where necessary, of:

a an open can with radius of 4 cm and height of 15 cm

b an open-ended pipe of 10 cm radius and 5 m long

c the closed solid shown below.



6 Determine the cost of painting the exterior walls and top of a cylindrical wheat silo that is 40 m high and 20 m in diameter, given that each litre of paint costs \$7.25 and covers 8 m^2.

7 Find the cost of making 125 cylindrical tennis ball containers that have diameter 7 cm and height 21 cm, given that the metal costs \$4.50 per square metre (metal base but open at the top).

EXAMPLE 3

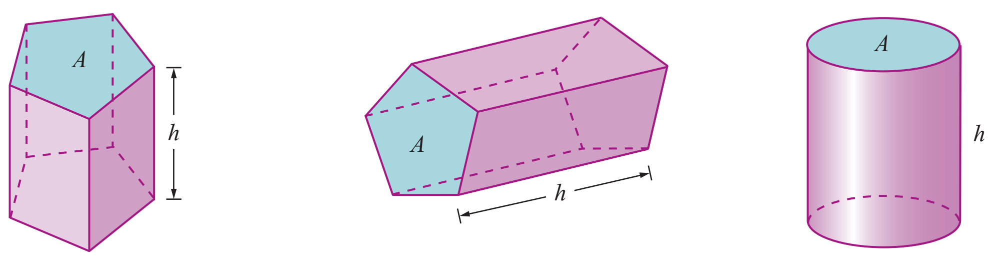
An open cylinder of radius of 8 cm has a curved surface area of 1000 cm^2. Find its height.

Solve	Think	Apply
$1000 = 2 \times \pi \times 8 \times h$ $= 16\pi \times h$ $h = \dfrac{1000}{16\pi}$ $= 19.9$ cm (1 decimal place)	To solve $1000 = 16\pi \times h$, divide both sides by 16π.	Substitute the given information into $SA = 2\pi rh$ and solve the resulting equation.

8 Find the height of an open cylinder of radius 10 cm and curved surface area of 2000 cm^2.

9 Find the radius of an open cylinder of height 5 cm and curved surface area of 1500 cm^2.

C Volumes with uniform cross-sections



The volume of a right prism (or cylinder) is given by:

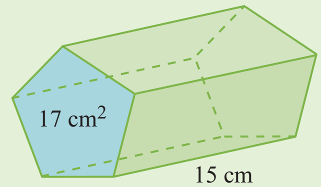
$$V = A \times h$$

where A is the area of the base (or cross-sectional area) and h is the perpendicular height.

EXAMPLE 1

Find the volumes of these solids.

a



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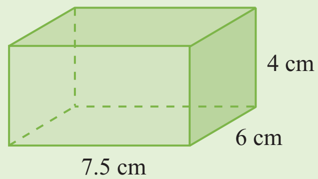

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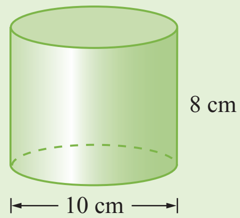


	Solve	Think	Apply
a	$V = 17 \times 15$ $= 255 \text{ cm}^3$	Area of base $= 17 \text{ cm}^2$	For prisms and cylinders use $V = Ah$.
b	$V = (7.5 \times 6) \times 4$ or $(7.5 \times 4) \times 6$ or $(6 \times 4) \times 7.5$ $= 180 \text{ m}^3$	Area of base $= 7.5 \times 6 \text{ cm}^2$	Choose any rectangle as the base.
c	$V = (\pi \times 5^2) \times 8$ $= 628.3 \text{ cm}^3$ (1 decimal place)	Area of base $= \pi r^2$ $= \pi \times 5^2 \text{ cm}^2$	The base is a circle.

Exercise 2C

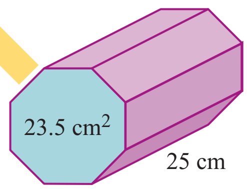
1 Complete to find the volume of this prism.

$V = A \times h$

where A is the area of ______ and h is the ______ height.

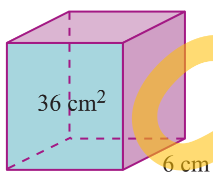
$V = \_\_\_ \times 25$

$= \_\_\_ \text{ cm}^3$



2 Calculate the volumes of these solids.

a



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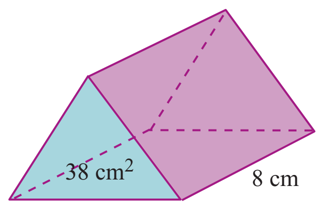

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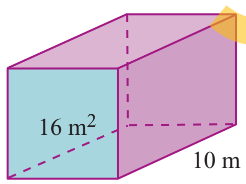

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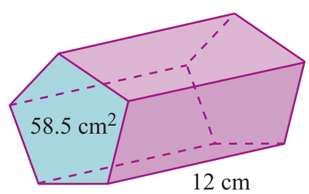
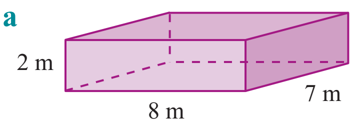


3 Calculate the area of the base and hence find the volume of each solid.

a



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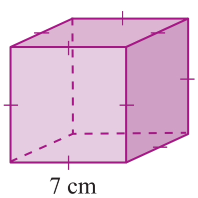

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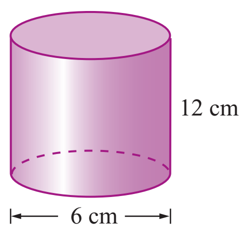

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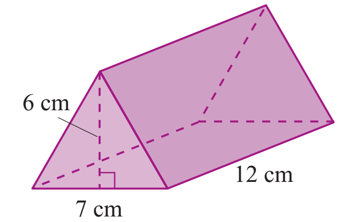

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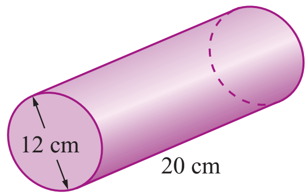

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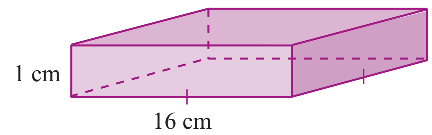
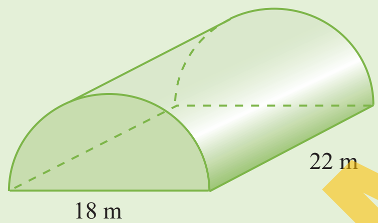


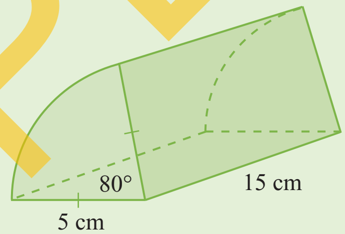
EXAMPLE 2

Calculate the volume of each solid correct to 1 decimal place.

a



b



	Solve	Think	Apply
a	$V = A \times h$ $= \frac{1}{2}\pi r^2 \times h$ $= \frac{1}{2} \times \pi \times 9^2 \times 22$ $= 2799.2 \text{ m}^3$	Diameter = 18 m so radius = 9 m The base is a semicircle so the area of the circle must be halved.	Calculate the area of the base first. Multiply by the height, which must be perpendicular to the base. The solid does not have to stand on the base.
b	$V = A \times h$ $= \frac{80}{360} \times \pi r^2 \times h$ $= \frac{80}{360} \times \pi \times 5^2 \times 15$ $= 261.8 \text{ m}^3$	The base is a sector. $A = \frac{\theta}{360} \times \pi r^2$ where $\theta = 80°$. The height is 15 m.	

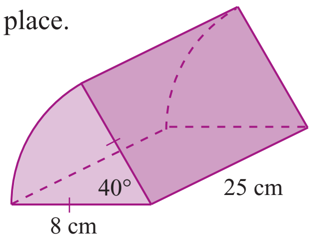
4 Complete to find the volume of this solid correct to 1 decimal place.

$V = A \times h$

$= \frac{\square}{360} \times \_\_\_ \times r^2 \times h$

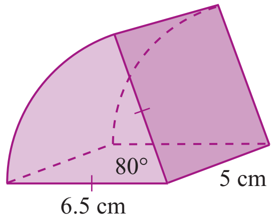
$= \frac{\square}{360} \times \pi \times \_\_\_^2 \times \_\_\_$

$= \_\_\_ \text{ cm}^3$



5 Calculate the volume of each solid.

a



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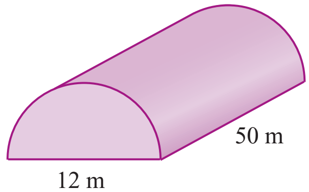

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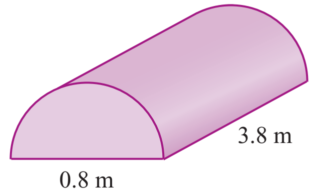

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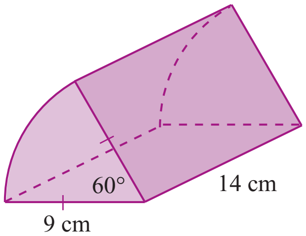

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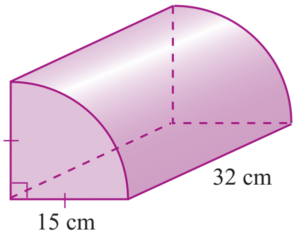

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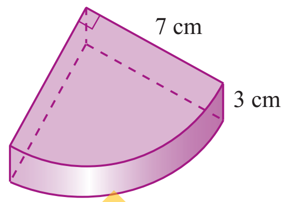

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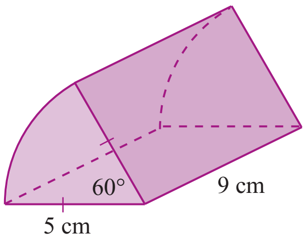

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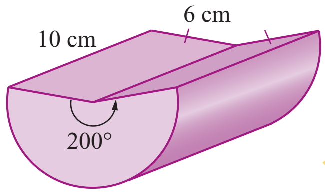

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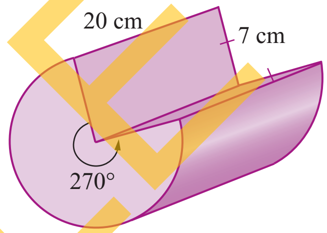
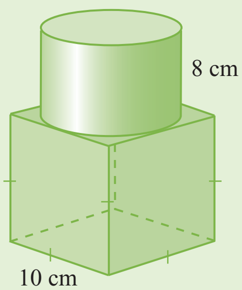


D Volumes of composite solids

EXAMPLE 1

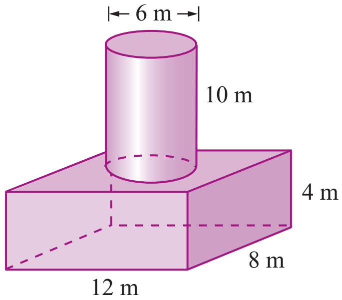
Calculate the volume of this composite solid.



Solve	Think	Apply
Cylinder: $V = \pi r^2 \times h$ $= \pi \times 5^2 \times 8$ $= 628.318\ldots \text{ cm}^3$ *Cube:* $V = Ah$ $= 10 \times 10 \times 10$ $= 1000 \text{ cm}^3$ Total volume $= 628.318 + 1000$ $= 1628 \text{ cm}^3$ to nearest cm^3	The solid is made up of a cylinder and a cube. *Cylinder:* Radius $= 10 \div 2 = 5$ cm Height $= 8$ cm *Cube:* $l = b = h = 10$ cm	Break the composite solid into simpler solids and find the volume of each one separately. Combine the volumes to give the answer.

Exercise 2D

1 Complete to find the volume of this composite solid.



The solid is a ____ and a rectangular prism.

Cylinder:

Diameter = 6 m   Radius = ____

$V = \pi r^2 \times$ ____

$= \pi \times$ ____$^2 \times$ ____

$=$ ____ m^3

Rectangular prism:

$V = Ah$

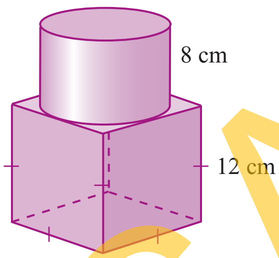
$= (12 \times$ ____$) \times 4$

$=$ ____ m^3

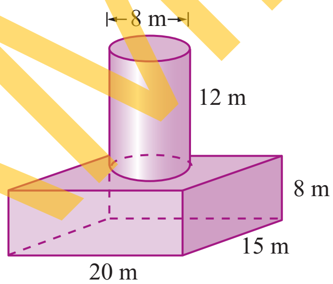
Total volume = ____ + ____ = ____ m^3 to the nearest whole number

2 Calculate the volume of each composite solid.

a



b



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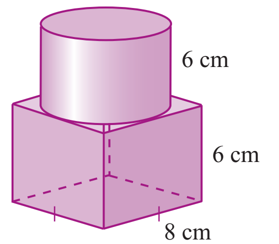

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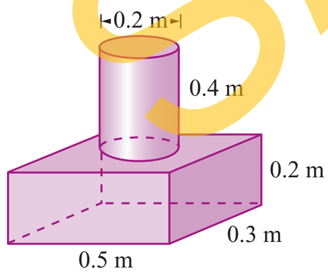

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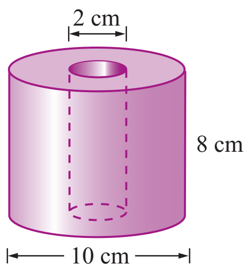

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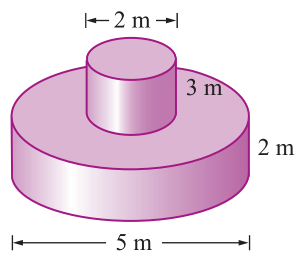

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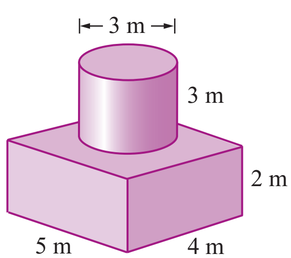

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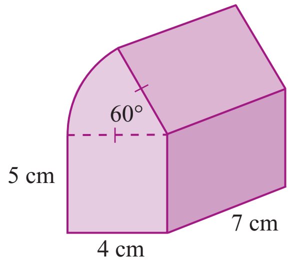

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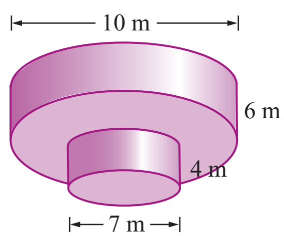
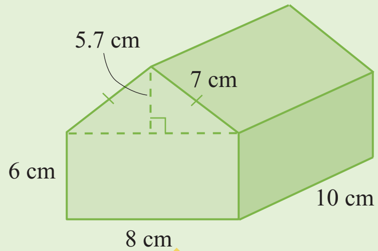


E Surface areas of composite solids

EXAMPLE 1

Calculate the surface area of the solid shown.



Solve	Think	Apply
Area of front face $= 8 \times 6 + \frac{1}{2} \times 8 \times 5.7$ $= 70.8\text{ cm}^2$ Total surface area $= 2 \times 70.8 + 2 \times (10 \times 6) + 2 \times (10 \times 7) + 10 \times 8$ $= 481.6\text{ cm}^2$	Total surface area = front + back + 4 sides + bottom	Find the total surface area by summing the areas of all the faces of the solid.

Exercise 2E

1 Complete to find the surface area of this solid.

Total surface area = front + back + side + 4 rectangles

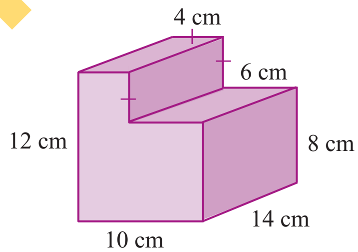
Area of front face $=$ ___ $\times 8 + 4 \times$ ___

$= 96\text{ cm}^2$

Total surface area $= 2 \times 96 + 12 \times$ ___ $+ 14 \times 8 + 14 \times$ ___

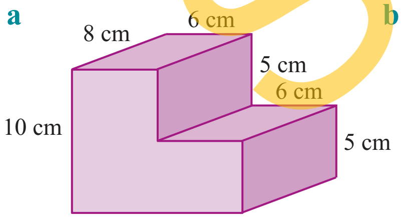
$+ 14 \times$ ___ $+ 14 \times 4 + 10 \times$ ___

$=$ ___ cm^2



2 Calculate the surface areas of the following solids.

a



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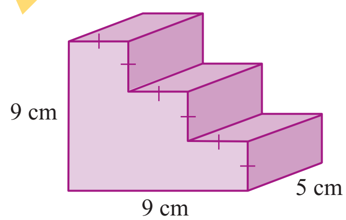

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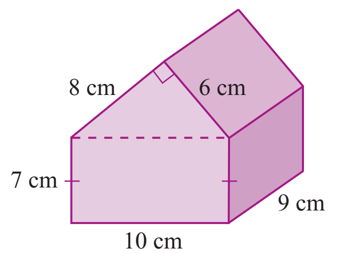

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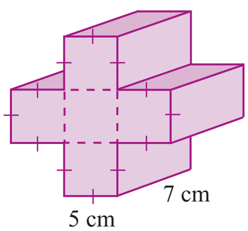

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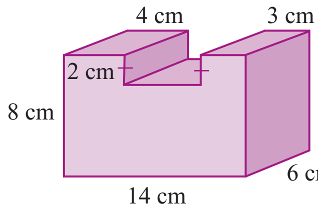

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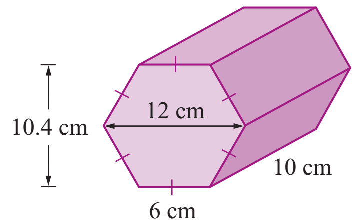
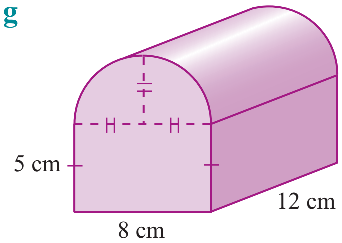


MEASUREMENT & GEOMETRY

g



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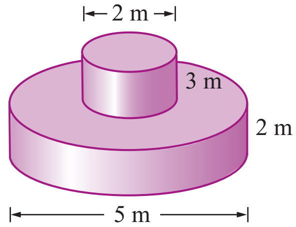

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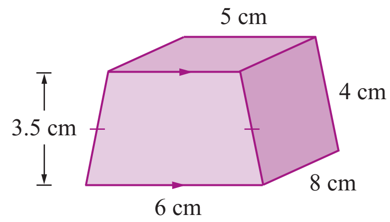


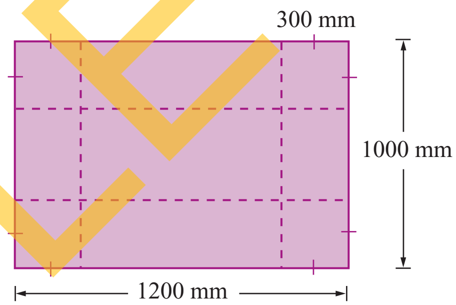
F Problems with surface area and volume

Exercise 2F

1 A sheet of cardboard 1200 mm by 1000 mm has squares of side-length 300 mm cut from each corner. The sides are folded up to form an open rectangular box.

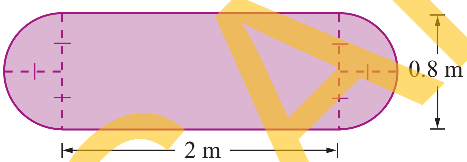
a Calculate its internal surface area.

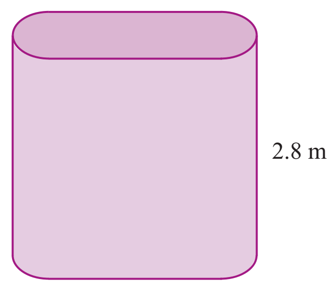
b What is the volume of the box?



2 A carport and workshop are covered by a flat rectangular roof 3.6 m by 11.2 m. All the rain that falls on the roof is collected in a water tank. If 3 mm of rain falls on the roof, how much water will be collected in the tank? ($1\ m^3 = 1000\ L$)

3 The cross-section of this closed rainwater tank is shown beside it.





a Calculate the area of this cross-section.

b Hence calculate the volume of the tank.

c What is the capacity of the tank if $1\ m^3$ holds 1000 L?

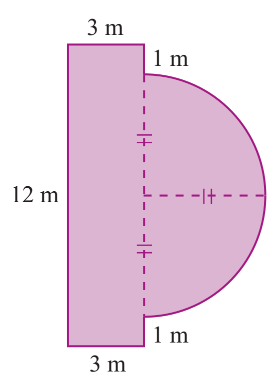
d The tank is completely made from sheet steel that costs $\$40/m^2$. What is the cost of the steel to make this tank?

4 The diagram shows the design for a concrete driveway.

a Calculate its area.

b A concrete contractor charges $\$70/m^2$ to supply and lay concrete. How much will he charge for this job? Give the answer to the nearest dollar.

c If the concrete needs to be 100 mm deep, calculate the volume of concrete needed, in cubic metres.



5 The cylindrical roller for a cricket pitch is 1.5 m wide and has a radius of 0.3 m.

a Calculate the curved surface area of the roller.

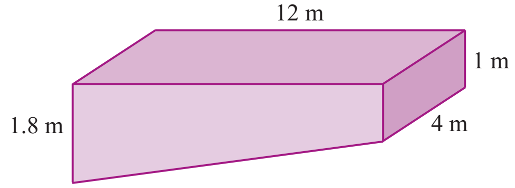
b What is the minimum number of revolutions the roller would have to make to roll the cricket pitch once if the pitch is 20 m long and 3 m wide? (Ignore any revolutions needed to turn the roller around.)

6 A backyard swimming pool has dimensions as shown.

a Calculate the volume of the pool.

b How long will it take to fill the pool with water from a garden hose that can supply water at the rate of 7.5 L/min? (Use 1 m^3 holds 1000 L of water.)

c What is the cost of filling the pool if water costs \$2.75/kL?



7 A hollow iron pipe is 2 m long. Its external diameter is 10 cm and it is 1 cm thick. Calculate the weight of the pipe if iron weighs 8.2 g/cm^3.

8 A fish tank has a rectangular base 40 cm by 20 cm. Water is poured in to a height of 24 cm.

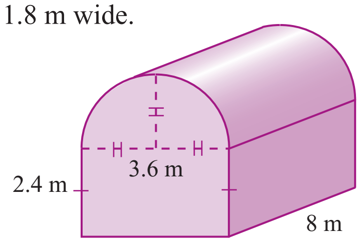
a What is the volume of water in the tank?

b If a further 2 litres of water is poured into the tank, by how much will the water level rise?

9 A pontoon with base 3 m by 3 m is floating on a lake. When a man swims out and climbs onto it the pontoon sinks 1 cm. If 1 L of water weighs 1 kg, what is the weight of the man? (*Hint:* Archimedes' principle tells us that the weight of the man is equal to the weight of water displaced.)

10 A 50 cm^3 block of metal is made into wire of diameter 1 mm. How long will the wire be?

11 A greenhouse with the dimensions shown is to be covered on the top and sides only (not the front and back) with shade cloth. The shade cloth comes in 20 m rolls and is 1.8 m wide.



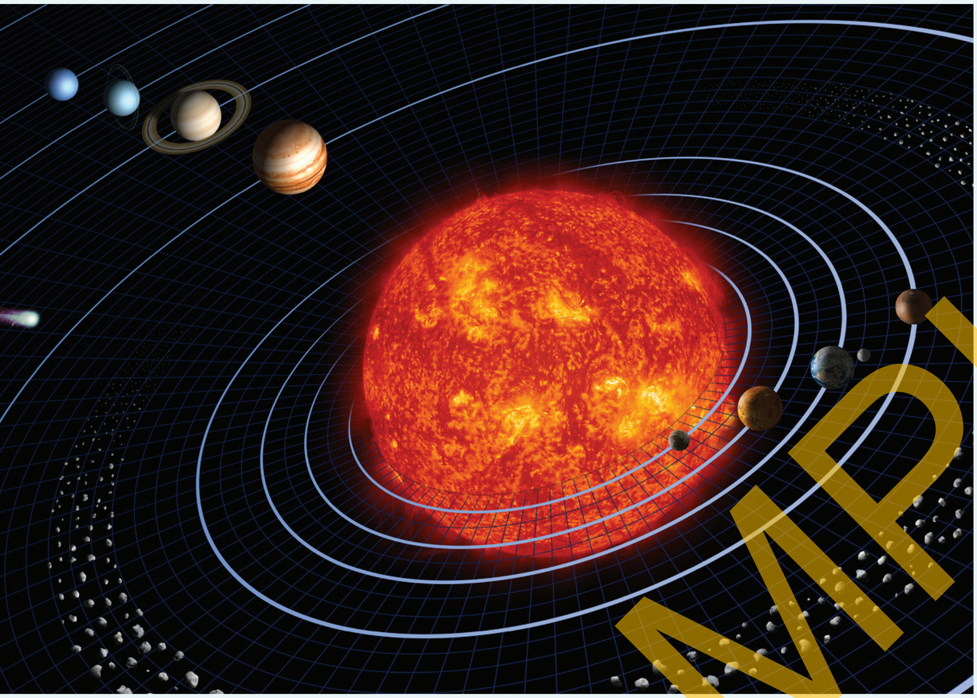
a Calculate the number of linear metres of shade cloth needed.

b How many rolls will be needed?

Language in mathematics

Johann Kepler (1571–1630)

Johann Kepler was born in the German town of Wurttemberg. As a child he was small and suffered from ill health, but he was recognised as being intelligent. He was given a scholarship to attend the University of Tubingen, where he studied first for the Lutheran ministry and then science. He studied under a master in astronomy who believed in, and taught, the Copernican theory that Earth rotated around its own axis and around the Sun. Kepler taught mathematics in Graz from 1594.



In 1600 he went to Prague and became assistant to Tycho Brahe, an important astronomer. After Brahe's death, Kepler succeeded him as astronomer and mathematician to the emperor. Kepler had access to Brahe's extensive records of observations and calculations.

Kepler believed in the Copernican theory, and became one of the founders of modern astronomy. He developed three fundamental laws of planetary motion, now known as Kepler's Laws, in 1609. These proposed, among other things, that the Sun was at the centre of our planetary system, and that the orbits of the planets were elliptical rather than circular. Sixty years later these laws helped Newton to develop his Universal Law of Gravitation.

Kepler also suggested that tides are caused by the Moon's gravitational pull on the seas. He produced tables giving the positions of the Sun, Moon and planets, which were used for about 100 years. In 1611 he proposed an improved refracting telescope, and later he suggested a reflecting telescope that was developed by Newton.

1 **a** How old was Kepler when he died?
b When and where did Kepler teach mathematics?
c Describe the development of Kepler's ideas concerning planetary motion.
d Research Kepler's three laws.
e For how long were Kepler's tables of positions of the Sun, Moon and planets used?
f How are tides formed?

2 Rearrange these words to form a sentence.
a a circle a semicircle A half is of.
b a is of quarter quadrant A circle a.
c may way than Composite more in areas one be found.

3 Use every third letter to find the sentence.

W D T R F H T G E H Y A U J R N H E G B A V F O E D F S W A A Z R D F H H J O L P
M O E B Q A U Z D S F Y O I J R B W A Q A K C G I H J T I I E O P I L L S G F H D
E A S K L A X F V B T H Q H S O E Y A P E F R H K O I P D N M U A E C S D T C G O
H N F B E T W X H A U E I O D A G I B H A J K G N H O D S N W E A D F L T Y S

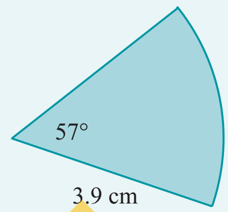
Terms

area	circle	composite	diameter	formula	prism
quadrant	quadrilateral	radius	right	sector	semicircle

Check your skills

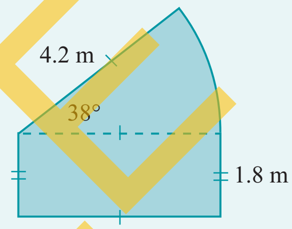
1 The area of this sector is closest to:

A 3.87 cm^2 **B** 7.6 cm^2
C 15.6 cm^2 **D** 222.3 cm^2



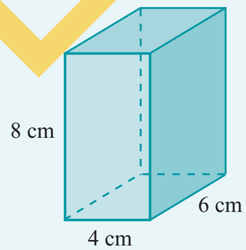
2 The area of this shape is closest to:

A 5.85 m^2 **B** 9.02 m^2
C 13.41 m^2 **D** 14.8 m^2



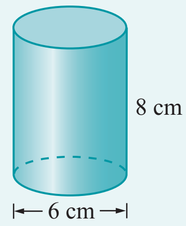
3 The surface area of this prism is:

A 104 cm^2 **B** 184 cm^2
C 192 cm^2 **D** 208 cm^2



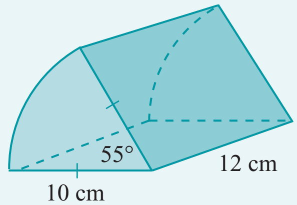
4 The surface area of this closed cylinder is:

A 150.8 cm^2 **B** 207.3 cm^2
C 226.2 cm^2 **D** 179.1 cm^2

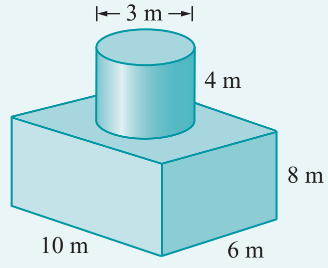


5 The volume of this solid is:

A 576 cm^3 **B** 144 cm^3
C 115 cm^3 **D** 58 cm^3



Use this diagram for questions **6** and **7**.



6 The volume of this composite solid is:

A 593.1 cm^3 **B** 555.4 cm^3
C 517.7 cm^3 **D** 508.3 cm^3

7 The surface area of the solid is:

A 225.7 cm^2 **B** 232.8 cm^2
C 413.7 cm^2 **D** 420.8 cm^2

8 A lidded wooden box, 15 cm × 8.5 cm × 6 cm, is to be lacquered inside and out with two coats of lacquer. Ignoring the thickness of the wood, the total area to be lacquered is:

A 537 cm² **B** 2148 cm² **C** 1074 cm² **D** 2685 cm²

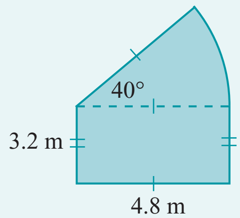
If you have any difficulty with these questions, refer to the examples and questions in the sections listed in the table.

Question	1–3	4	5	6	7	8
Section	A	B	C	D	E	F

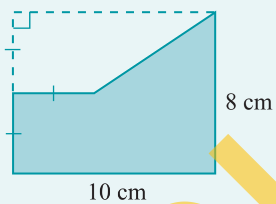
2A Review set

1 Calculate the shaded areas correct to 1 decimal place.

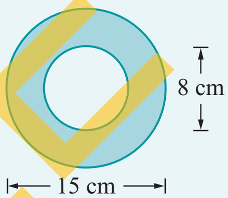
a



b

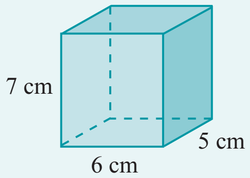


c

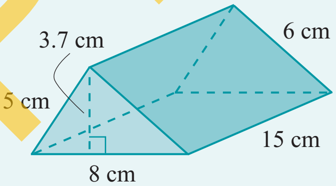


2 Calculate the surface area of each prism.

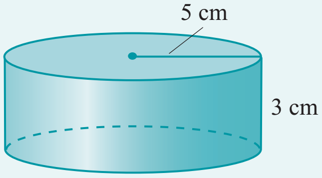
a



b

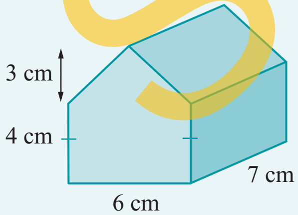


3 Calculate the surface area and volume of this closed cylinder.

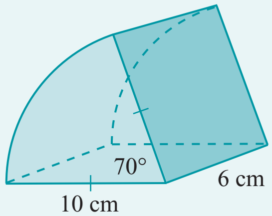


4 Calculate the volumes of the following solids.

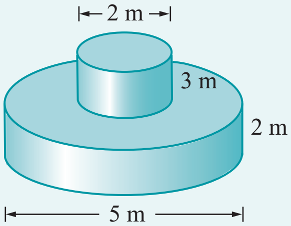
a



b



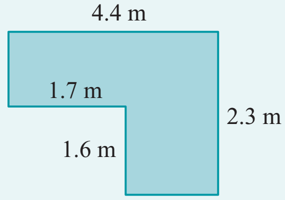
5 Calculate the surface area and volume of this solid.



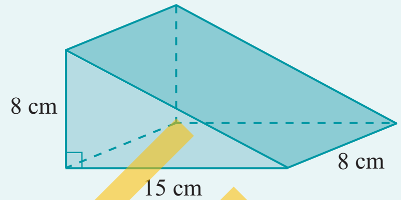
MEASUREMENT & GEOMETRY

2B Review set

1 Deborah's family room is shown opposite. Calculate the cost of carpet-tiling the room if the carpet tiles costs $119.80 per square metre.

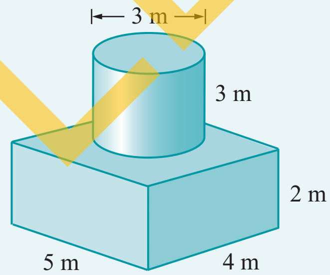


2 A door wedge shaped as shown is to be painted. What is the total area to be painted?

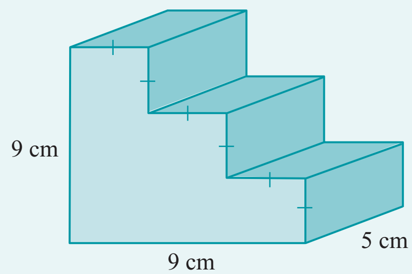


3 Calculate the surface area and volume of a closed cylinder with diameter 2.4 m and height 1.8 m.

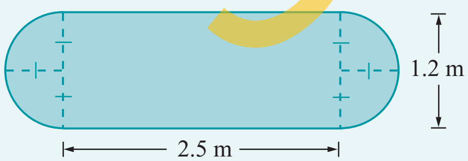
4 Calculate the surface area of this solid.

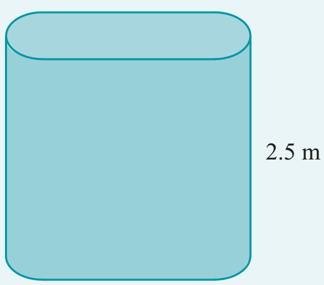


5 Calculate the volume of this solid.



6 The cross-section of this rainwater tank is shown beside it.





a Calculate the area of this cross-section.

b Hence calculate the volume of the tank.

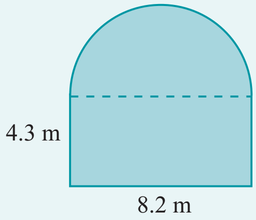
c What is the capacity of the tank if 1 m^3 holds 1000 L?

d The tank was made from sheet steel that costs $45/$m^2$. What was the cost, to the nearest dollar, of the steel used to make this tank?

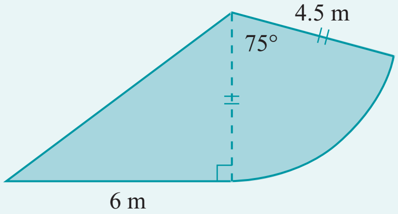
2C Review set

1 Calculate the area of each shape correct to 1 decimal place.

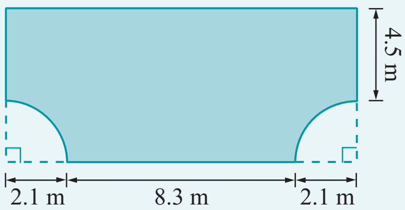
a



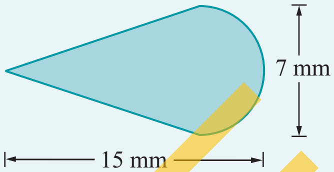
b



c

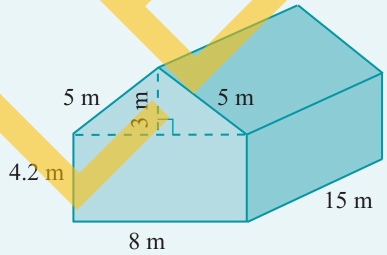


d

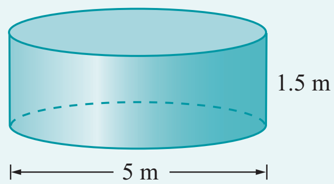


2 **a** The army shed shown is to be painted in camouflage colours. What area is to be camouflaged?

b Calculate the volume of the shed.

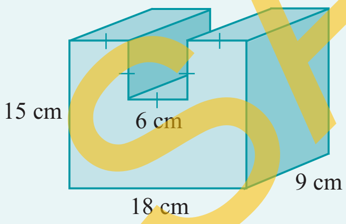


3 Calculate the surface area of this closed cylinder.

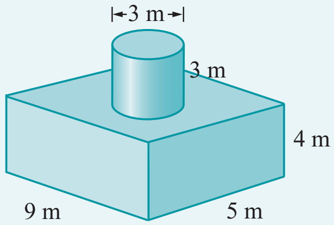


4 Calculate the surface area and volume of each solid.

a



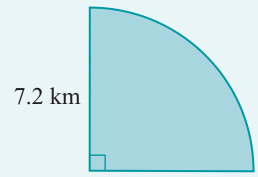
b



5 A hollow steel pipe is 5 m long. Its external diameter is 20 cm and it is 1.5 cm thick. Calculate the weight of the pipe to the nearest gram given that steel weighs 8.2 g/cm^3.

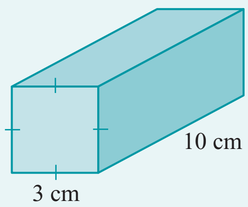
2D Review set

1 A river delta is shaped roughly like a quadrant, as shown. Calculate the population of the delta if 225 people per square kilometre live there.

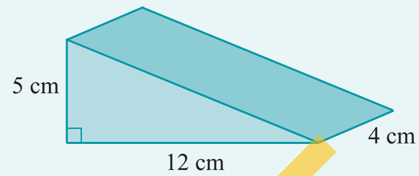


2 Calculate the surface area of each prism.

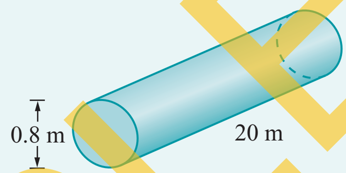
a



b

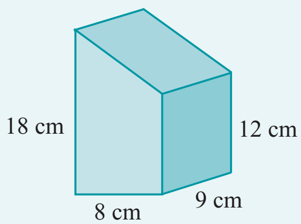


3 Calculate the surface area and volume of this open cylinder.

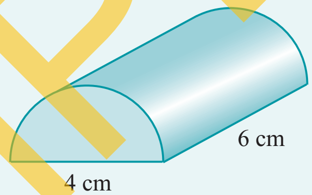


4 Calculate the surface area and volume of each closed solid.

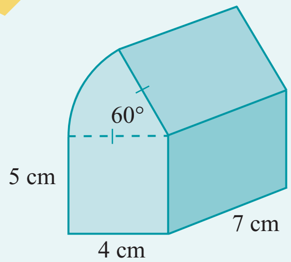
a



b



5 Calculate the surface area and volume of this solid.



6 A greenhouse with the dimensions shown is to be covered on the top and sides only (not the front and back) with shade cloth. The shade cloth comes in 15 m rolls and is 1.8 m wide.

a Calculate the number of linear metres of shade cloth needed.

b How many rolls will be needed?