MATHLETICS

Surface Area and Volume

Student Book - Series J-1

Mathletics Instant Workbooks

Surface area and volume
Student Book - Series J

Contents

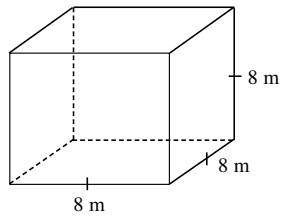
Author of The Topics and Topic Tests: AS Kalra

Surface area and volume

Topic 1: Surface area of a right prism

QUESTION **1** Find the surface area of each cube.

a



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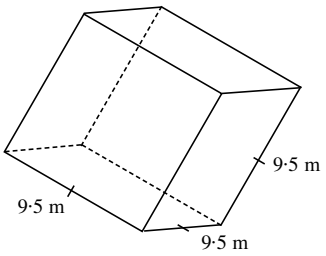
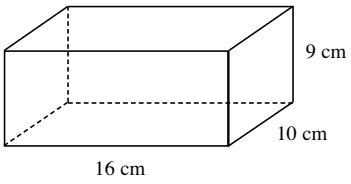


QUESTION **2** Find the surface area of each rectangular prism.

a



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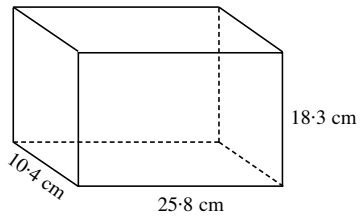
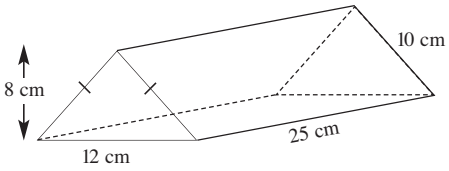


QUESTION **3** Find the surface area of each triangular prism.

a



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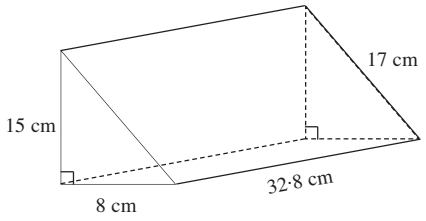
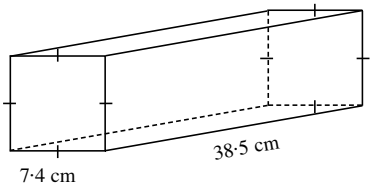


QUESTION **4** Find the surface area of each shape.

a



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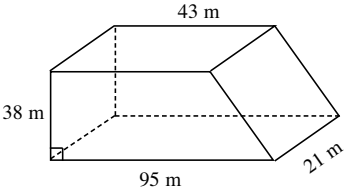


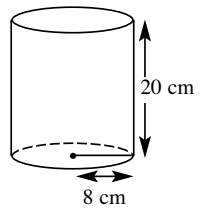
Surface area and volume

Topic 2: Surface area of a right cylinder

QUESTION **1** For each cylinder, find the following correct to two decimal places.

i the area of a circular base **ii** the area of the curved surface

a



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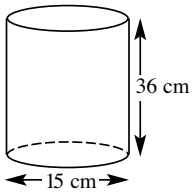
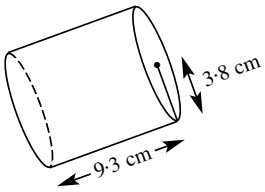


_____ _____

_____ _____

QUESTION **2** Find the curved surface area of each cylinder in terms of π.

a



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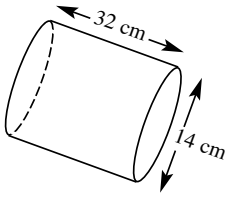


_____ _____

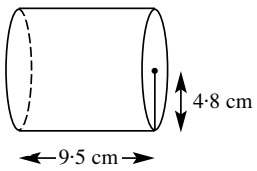
_____ _____

QUESTION **3** For each cylinder, find the following correct to three significant figures.

i the combined area of the two circular ends **ii** the area of the curved surface

iii the total surface area

a



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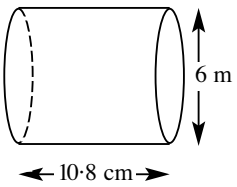


_____ _____

_____ _____

QUESTION **4** Find the total surface area of the outside of a pipe 20 m long with an outer radius 0·75 m (a pipe does not have any ends). Give your answer correct to one decimal place.

_____

_____

_____

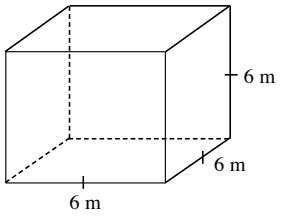
_____

Surface area and volume

Topic 3: Volume of a right prism

QUESTION **1** Find the volume of each cube.

a



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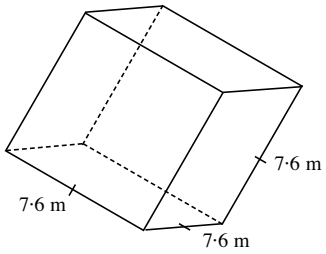
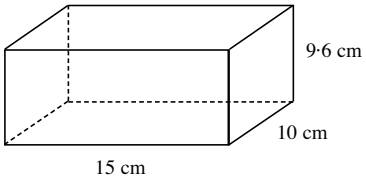


QUESTION **2** Find the volume of each rectangular prism.

a



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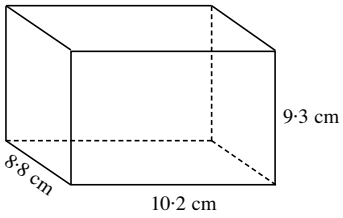
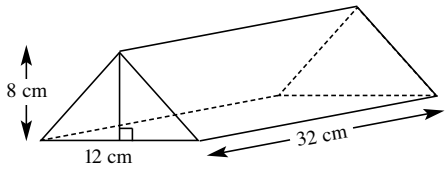


QUESTION **3** Find the volume of each triangular prism.

a



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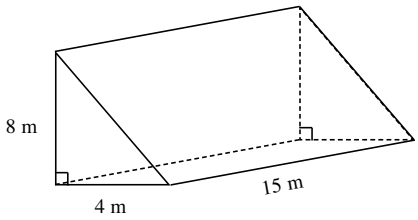
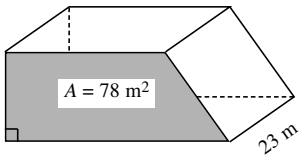


QUESTION **4** Find the volume of each prism, given the area of the shaded face.

a



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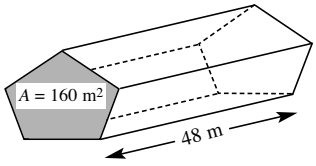


Surface area and volume

Topic 4: Volume of a right cylinder

QUESTION **1** Find the volume of each cylinder correct to two significant figures.

a radius 6 cm and height 20 cm _____

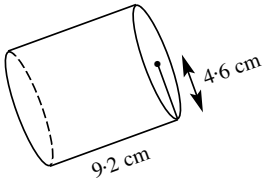
b radius 9·6 cm and height 18 cm _____

c radius 20·8 cm and height 30·4 cm _____

d radius 4·6 m and height 15·6 m _____

QUESTION **2** Find the volume of each correct to two decimal places.

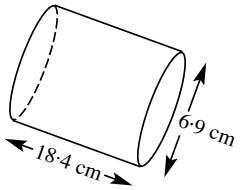
a



_____

_____

b



_____

_____

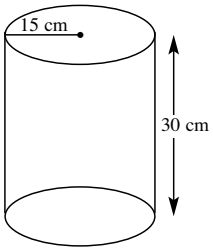
QUESTION **3** Find the volume in cubic centimetres correct to one decimal place of a soft drink can with height 115 mm and radius 30 mm.

_____

_____

QUESTION **4** Which of the following cylinders has the larger volume?

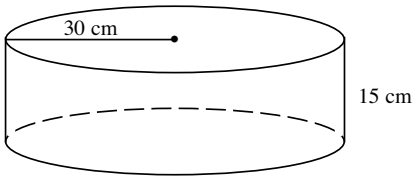
a



_____

_____

b



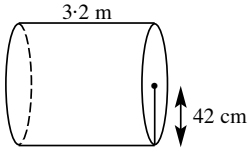
_____

_____

QUESTION **5** Find the volume of this cylinder in cubic metres correct to three significant figures.

_____

_____

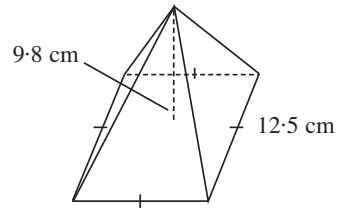


Surface area and volume

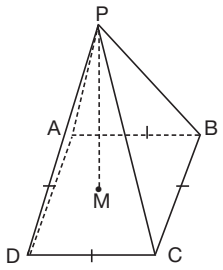
Topic 5: Volume of a pyramid

QUESTION **1** Calculate the volume of the following square pyramids correct to one decimal place.

a



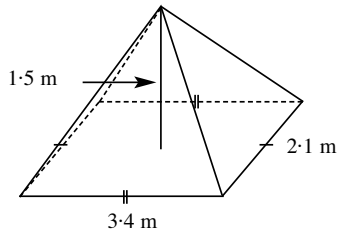
b



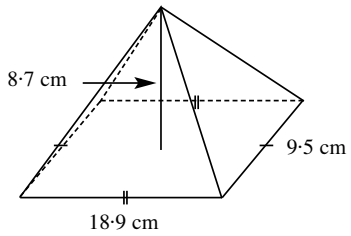
BC = 6·4 cm
DC = 6·4 cm
PM = 8·2 cm

QUESTION **2** Calculate the volume of the following rectangular pyramids correct to two decimal places.

a

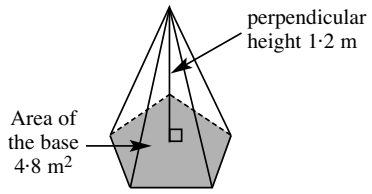


b

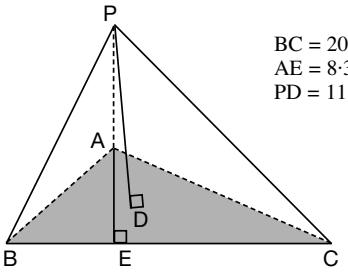


QUESTION **3** Calculate the volume of the following pyramids correct to one decimal place.

a



b



BC = 20 cm
AE = 8·3 cm
PD = 11·8 cm

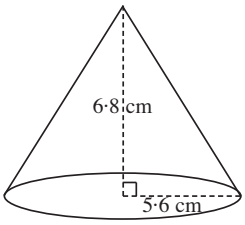
QUESTION **4** The area of the base of an octagonal pyramid is 225 cm^2 and its height is 16·4 cm. Find its volume.

Surface area and volume

Topic 6: Volume of a right cone

QUESTION **1** Find the volume of the following cones correct to one decimal place.

a



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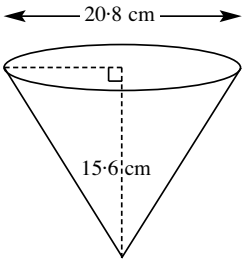
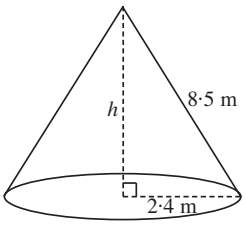


QUESTION **2** Find the volume of the following cones correct to two decimal places.

a



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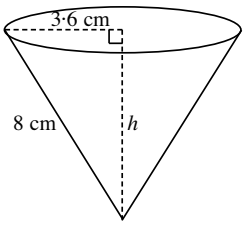


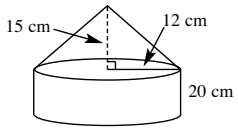
QUESTION **3**

a A cone has a base radius of 12 cm and a height of 20 cm. Find its volume.

b Find the volume of a cone of height 8·4 cm and base diameter 6·2 cm.

c Find the volume of a cone that has a slant height of 17 cm and base diameter of 16 cm.

QUESTION **4** Find the volume of the solid.



Surface area and volume

Topic 7: Volume of a sphere

QUESTION **1** Find the volume, correct to one decimal place, of a sphere with the following.

a radius 7 cm

b diameter 18 cm

c radius 25 mm

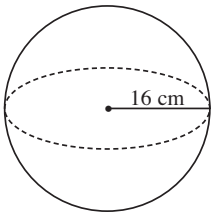
d diameter 28 m

e diameter 63 cm

f radius 12·4 km

QUESTION **2** Calculate the volume of the following spheres correct to one decimal place.

a



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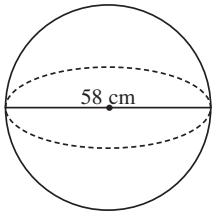
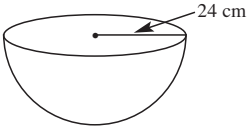
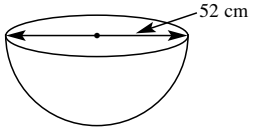


QUESTION **3** Calculate the volume of the following hemispheres correct to one decimal place.

a

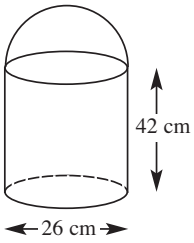


b

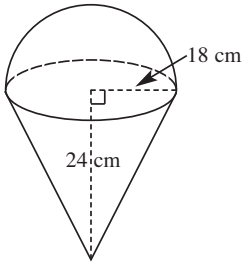


QUESTION **4** Calculate the volume of the following solids correct to one decimal place.

a



b



Surface area and volume

Topic 8: Applications of area and volume

QUESTION **1** Complete the following.

a 1 cm^3 = _____ mL **b** 1000 cm^3 = _____ L **c** 1 m^3 = _____ L

QUESTION **2** A pot has a volume of 15 000 cm^3. How many litres of water can it hold?

_____

_____

QUESTION **3** The radius of the earth is approximately 6400 km.

a Given that the surface area of a sphere is $4\pi r^2$, find the surface area in square kilometres.

_____

_____

_____

b Calculate the volume correct to four significant figures.

_____

_____

_____

QUESTION **4** A rectangular roof is 28 m long and 12 m wide.

a What volume of water will fall on the roof if we receive 20 mm of rain?

_____

_____

b A tank catches all the rain that falls on the roof. How many litres of water will flow into the tank from 20 mm of rain?

_____

_____

c The tank holds 35 000 litres. How much rain would need to fall to fill the tank if it is empty and only catches rain from the above roof?

_____

_____

QUESTION **5** A rectangular swimming pool with uniform depth is 30 metres long, 8 metres wide and 2·8 metres deep. It is to be tiled. Calculate the following.

a the cost of tiling it at $53 per square metre

_____

_____

_____

b its capacity in litres

_____

_____

_____

Surface area and volume

Topic Test — PART A

Time allowed: 15 minutes **Total marks = 15**

Marks

1 The diameter and radius of a circle are related as
Ⓐ $rd = 2$ Ⓑ $r = 2d$ Ⓒ $d = 2r$ Ⓓ $\frac{r}{d} = 2$ [1]

2 The circumference of a circle is given by the formula
Ⓐ $C = \frac{2\pi}{r}$ Ⓑ $C = 2\pi r$ Ⓒ $C = 2\pi d$ Ⓓ $C = \frac{2\pi}{d}$ [1]

3 The area of a circle is given by the formula
Ⓐ $A = \frac{\pi}{r^2}$ Ⓑ $A = \frac{\pi}{d^2}$ Ⓒ $A = \pi r^2$ Ⓓ $A = \pi d^2$ [1]

4 The volume of a cylinder with radius r and height h equals
Ⓐ $V = \pi^2 rh$ Ⓑ $V = \pi r h^2$ Ⓒ $V = \frac{1}{3}\pi r^2 h$ Ⓓ $V = 2\pi rh$ [1]

5 A semi-circle equals
Ⓐ a full circle Ⓑ half a circle Ⓒ a quarter of a circle Ⓓ a third of a circle [1]

6 A quadrant is
Ⓐ $\frac{3}{4}$ of a circle Ⓑ $\frac{1}{2}$ of a circle Ⓒ $\frac{1}{3}$ of a circle Ⓓ $\frac{1}{4}$ of a circle [1]

7 The shaded area in the figure is called a 
Ⓐ semi-circle Ⓑ segment Ⓒ chord Ⓓ sector [1]

8 How many square centimetres are there in one square metre?
Ⓐ 100 Ⓑ 1000 Ⓒ 10 000 Ⓓ 100 000 [1]

9 A rectangular prism is 10 cm long, 8 cm wide and 4 cm high. Its surface area is
Ⓐ 152 cm^2 Ⓑ 304 cm^2 Ⓒ 320 cm^2 Ⓓ 640 cm^2 [1]

10 Give the total surface area in cm^2 correct to one decimal place of a closed cylinder with dimensions of radius 6 cm and height 15 cm.
Ⓐ 226·2 cm^2 Ⓑ 565·5 cm^2 Ⓒ 791·7 cm^2 Ⓓ 678·6 cm^2 [1]

11 A cube has a volume of 729 cm^3. Find the length of each side of the cube.
Ⓐ 6 cm Ⓑ 9 cm Ⓒ 18 cm Ⓓ 27 cm [1]

12 A cylinder has height 9 m and radius 6 m. Its volume is closest to
Ⓐ 113 m^3 Ⓑ 452 m^3 Ⓒ 2036 m^3 Ⓓ 1018 m^3 [1]

13 The volume of a rectangular pyramid with base area of 75 cm^2 and vertical height of 8 cm is
Ⓐ 200 cm^3 Ⓑ 400 cm^3 Ⓒ 600 cm^3 Ⓓ 800 cm^3 [1]

14 The volume of a cone with diameter 12 cm and height 8·5 cm is closest to
Ⓐ 320 cm^3 Ⓑ 961 cm^3 Ⓒ 1282 cm^3 Ⓓ 3845 cm^3 [1]

15 The volume of a sphere of diameter 24 cm is closest to
Ⓐ 1810 cm^3 Ⓑ 7238 cm^3 Ⓒ 14 476 cm^3 Ⓓ 57 906 cm^3 [1]

Total marks achieved for PART A [15]

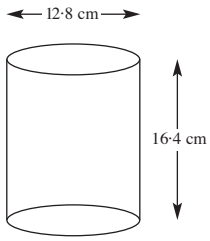
Surface area and volume

Topic Test — PART B

Time allowed: 15 minutes **Total marks = 15**

Marks

Question 1 For this closed cylinder, find the following correct to two decimal places.



a the area of a circular base _____ 1

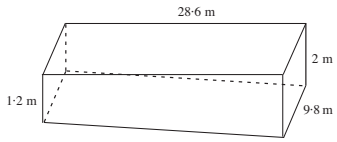
b the area of both the circular bases _____ 1

c the area of its curved surface _____ 1

d the total surface area _____ 1

e the volume of this closed cylinder _____ 1

Question 2 A swimming pool has the shape of a trapezoidal prism as shown.



a Find the volume of the pool in m^3. _____ 1

b What is the capacity of the pool in kilolitres? _____ 1

c The mass of 1 kL of water is 1 t. How many tonnes of water are in the pool? _____ 1

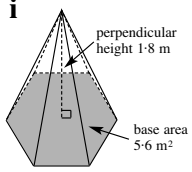
d Tom treats this pool with a chlorine product to prevent the growth of algae. The recommended dose is 4 g of chlorine for each 100 L of water. How much chlorine must Tom place in the pool? _____ 1

e Over a period of hot weather, the level of the pool dropped by 50 cm, The pool was originally full. What volume of water, in litres, evaporated? _____ 1

Question 3

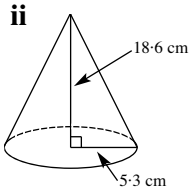
a Find the volume of each of the following correct to two decimal places.

i



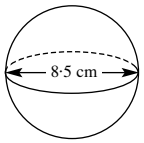
_____ 1

ii



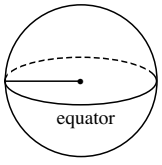
_____ 1

iii



_____ 1

b The circumference of the earth at the equator is about 40 000 km.



i Use the formula $C = 2\pi r$ to find the radius of the earth correct to the nearest 100 km. _____ 1

ii Use this radius to find the volume of the earth correct to two significant figures. Write your answer in scientific notation. _____ 1

Total marks achieved for PART B 15