



The National
Orthodox School
Shmaisani

Key answer worksheet 5

Name:

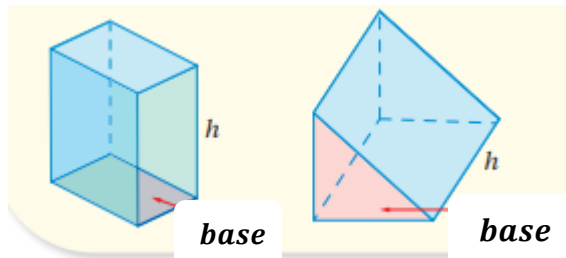
Worksheet (5) total surface area of prisms and cylinders

Grade:8(A, B)

Subject : Math (Unit (7):Mensuration of planes and solids)

Date :

Objective: Find the total surface area of prisms and cylinders



Total surface area of the prism
= lateral surface area + 2 × area of the base

lateral surface area **مساحة السطح الجانبي** **الارتفاع**
= perimeter of the base × height(h)

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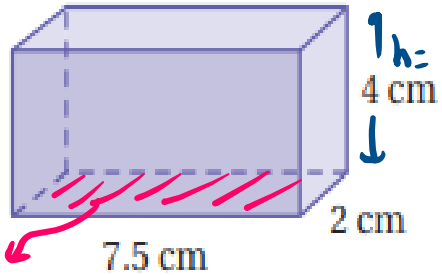
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Exercise 1: find the total surface area of the following solids:

1



base

Total S.A

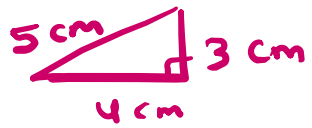
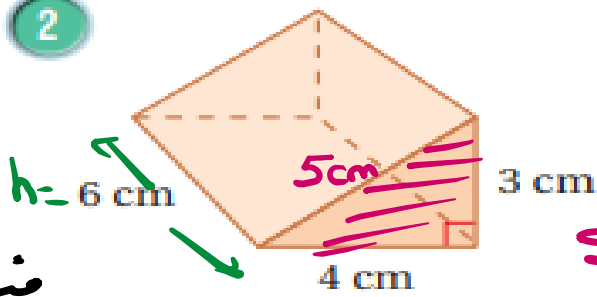


$$\begin{aligned}
 \text{L.S.A} &= P_{\text{base}} \times h_{\text{prism}} \\
 &= (7.5 + 2 + 7.5 + 2) \times 4 \\
 &= 19 \times 4 \\
 &= 76 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 2 \times A_{\text{base}} &= 2 \times (7.5 \times 2) \\
 &= 2 \times 15 \\
 &= 30 \text{ cm}^2
 \end{aligned}$$

$$\text{T.S.A.} = 76 + 30 = \boxed{106 \text{ cm}^2}$$

2



T.S.A

$$\begin{aligned}
 \text{S.A.} &= P_{\text{base}} \times h \\
 &= (4 + 3 + 5) \times 6 \\
 &= 12 \times 6 \\
 &= (72) \text{ cm}^2
 \end{aligned}$$

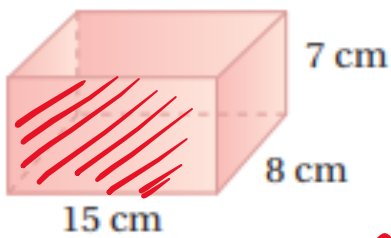
$$\begin{aligned}
 2 \times A_{\text{base}} &= 2 \times \left(\frac{1}{2} \times 4 \times 3 \right) \\
 &= 2 \times \frac{1}{2} \times 4 \times 3 \\
 &= (12) \text{ cm}^2
 \end{aligned}$$

$$\text{T.S.A.} = 72 + 12 = \boxed{(84) \text{ cm}^2}$$

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$$\begin{aligned}
 (3)^2 + (4)^2 \\
 9 + 16 = 25 \\
 \sqrt{25} = \boxed{5} \text{ cm}
 \end{aligned}$$

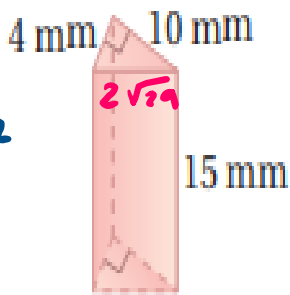
3



$$\begin{aligned}
 \text{L.S.A} &= P_{\text{base Prism}} \times h \\
 &= (15 + 7 + 15 + 7) \times 8 \\
 &= 44 \times 8 = (352) \text{ cm}^2
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} 2 \times A_{\text{base}} \\ 2 \times 15 \times 7 \\ = (210) \text{ cm}^2 \end{array}$$

$$\text{T.S.A} = 352 + 210 = (562) \text{ cm}^2$$

4



T.S.A.

$$\begin{aligned}
 \text{L.S.A} &= P_{\text{base Prism}} \times h_{\text{prism}} \\
 &= (4 + 10 + 2\sqrt{29}) \times 15 \\
 &= (14 + 2\sqrt{29}) \times 15 \\
 &= (210 + 30\sqrt{29}) \text{ mm}^2
 \end{aligned}
 \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} 2 \times A_{\text{bases}} \\ 2 \times \left(\frac{1}{2} \times 10 \times 4\right) \\ (40) \text{ mm}^2 \end{array}$$

$$\begin{aligned}
 \text{T.S.A} &= \underline{210} + 30\sqrt{29} + \underline{40} \\
 &= (250 + 30\sqrt{29}) \text{ mm}^2
 \end{aligned}$$

مستطوعايس

$$(4)^2 + (10)^2$$

$$= 116$$

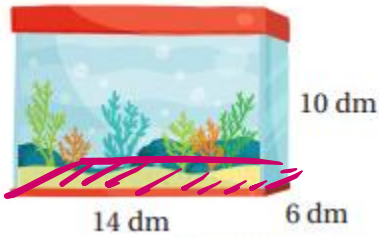
$$\sqrt{116} =$$

$$= 2\sqrt{29}$$

$$\begin{array}{r}
 2 \sqrt{116} \\
 \underline{2 \quad 58} \\
 29 \quad 29 \\
 \hline
 \text{stop}
 \end{array}$$

stop

5



base \square 6 dm

14 dm
T.S.A

$$\begin{aligned} \text{L.S.A} &= P_{\text{base}} \times h \\ &= (14 + 6 + 14 + 6) \times 10 \\ &= 40 \times 10 = (400) \text{ dm}^2 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 2 \times A_{\text{base}} \\ 2 \times 6 \times 14 \\ = (168) \text{ dm}^2 \end{array}$$

$$\begin{aligned} \Rightarrow \text{T.S.A} &= 400 + 168 \\ &= (568) \text{ dm}^2 \end{aligned}$$

6

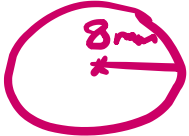


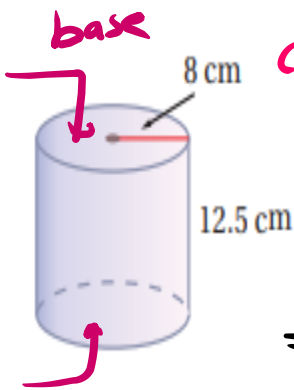
10 mm
T.S.A

$$\begin{aligned} \text{L.S.A} &= P_{\text{base}} \times h_{\text{prism}} \\ &= (10 + 13 + 13) \times 14 \\ &= 36 \times 14 \\ &= (504) \text{ mm}^2 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \begin{array}{l} 2 \times A_{\text{base}} \\ 2 \times \left(\frac{1}{2} \times 10 \times 12 \right) \\ = 2 \times \frac{1}{2} \times 10 \times 12 \\ = (120) \text{ mm}^2 \end{array}$$

$$\Rightarrow \text{T.S.A} = 504 + 120 = (624) \text{ mm}^2$$

7

T.S.A  base



$$\text{Curved S.A} = P_{\text{base}} \times h_{\text{cylinder}}$$

$$= (2\pi r) \times h$$

$$= (2\pi \times 8) \times 12.5$$

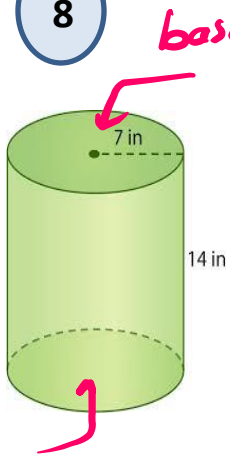
$$= 16\pi \times 12.5 = \boxed{(200\pi) \text{ cm}^2}$$

$$\begin{aligned} 2 \times A_{\text{base}} &= 2 \times \pi r^2 \\ &= 2 \times \pi (8)^2 \\ &= 2 \times \pi \times 64 \\ &= \boxed{128\pi} \text{ cm}^2 \end{aligned}$$

$$\Rightarrow \text{T.S.A} = 200\pi + 128\pi = \boxed{328\pi} \text{ cm}^2$$

8

T.S.A  base



$$\text{Curved S.A} = P_{\text{base}} \times h_{\text{cylinder}}$$

$$= (2\pi \times r) \times h_{\text{cylinder}}$$

$$= (2\pi \times 7) \times 14$$

$$= 14\pi \times 14$$

$$= \boxed{(196\pi) \text{ in}^2}$$

$$\begin{aligned} 2 \times A_{\text{base}} &= 2 \times (\pi r^2) \\ &= 2 \times \pi (7)^2 \\ &= 2 \times \pi \times 49 \\ &= \boxed{(98\pi) \text{ in}^2} \end{aligned}$$

$$\begin{aligned} \text{T.S.A} &= 196\pi + 98\pi \\ &= \boxed{(294\pi) \text{ in}^2} \end{aligned}$$

Exercise (2): The curved surface area of a cylinder is 220cm². If the height is 5 cm. calculate its diameter.

(Take $\pi = \frac{22}{7}$)

$$\text{Curved S.A} = P_{\text{base}} * h$$

$$\text{C.S.A} = 2\pi r * h$$

$$220 = 2 * \pi * r * 5$$

$$\frac{220}{10\pi} = \frac{10\pi r}{10\pi}$$

$$r = \frac{220}{10\pi} = \left(\frac{22}{\pi}\right)$$

$$\text{Take } \pi = \frac{22}{7}$$

$$r = 22 \div \frac{22}{7}$$

$$= 22 \div \frac{22}{7}$$

$$r = 22 \times \frac{7}{22} = (7) \text{ cm}$$

⇒ diameter = 2 * 7 = 14 cm

Exercise (3):

A Cube has a lateral surface area of 121m²

a) What is the area of one face?

b) What is the length of each side?

a)

$$\text{L.S.A} = 4 * A_{\text{face}}$$

Cube

$$\frac{121}{4} = \frac{4 * A_{\text{face}}}{4}$$

$$A_{\text{face}} = \frac{121}{4} \text{ m}^2$$

b) $A_{\text{face}} = (\text{Side length})^2$

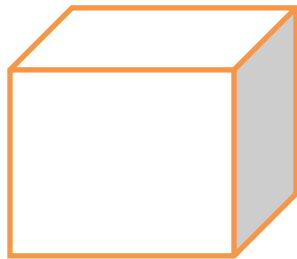
$$\sqrt{\frac{121}{4}} = \sqrt{(\text{Side length})^2}$$

$$\text{Side length} = \frac{11}{2} \text{ m}$$

$$= (5.5) \text{ m}$$

Exercise (4): find the missing dimension in each of the following solids:

cube



$x = ??$

Total surface area = 150 cm^2

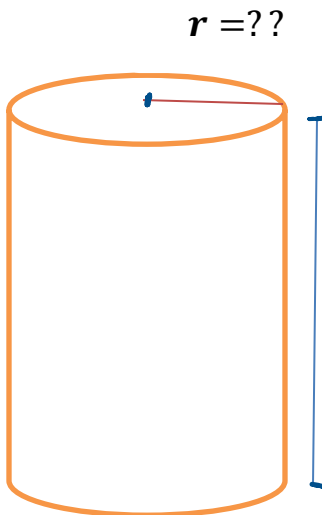
$$\text{T.S.A.}_{\text{cube}} = 6 \times A_{\text{face}}$$

$$150 = 6 \times A_{\text{face}}$$

$$A_{\text{face}} = 25 \text{ cm}^2$$

$$x = \sqrt{25} = 5 \text{ cm}$$

cylinder



$r = ??$

height = 40 m

$$\text{C.S.A.} = P_{\text{base}} \times h$$

$$3520 = 2\pi r \times 40$$

$$3520 = 80\pi r$$

curved surface area = 3520 m^2

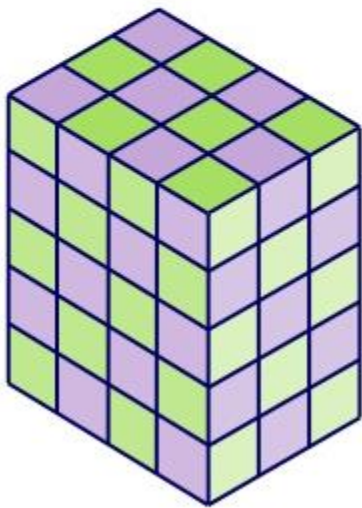
(Take $\pi = \frac{22}{7}$)

$$r = 44 \div \pi = 44 \div \frac{22}{7} = 44 \times \frac{7}{22} = 14 \text{ m}$$

Exercise (5):

Chequered cuboid problem

This cuboid is made from alternate purple and green centimetre cubes.



What is its surface area?

Surface area

$$= 2 \times 3 \times 4 + 2 \times 3 \times 5 + 2 \times 4 \times 5$$

$$= 24 + 30 + 40$$

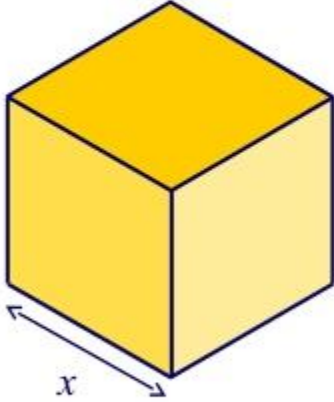
$$= 94 \text{ cm}^2$$

How much of the surface area is green?

$$48 \text{ cm}^2$$

Surface area of a cube

How can we find the surface area of a cube of length x ?



All six faces of a cube have the same area.

The area of each face is $x \times x = x^2$

Therefore,

$$\text{Surface area of a cube} = 6x^2$$

$$\begin{aligned} \text{Lateral surface area of a cube} &= 4 \times \text{area of one face} \\ &= 4(\text{side length})^2 \end{aligned}$$

$$\begin{aligned} \text{Total surface area of a cube} &= 6 \times \text{area of one face} \\ &= 6(\text{side length})^2 \end{aligned}$$