

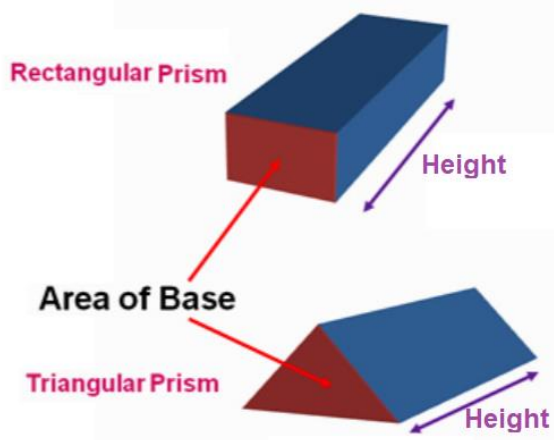
Chapter 10 VOLUME and SURFACE AREA

Revision Questions and Answers (Mousa Bin Nusair)

VOLUME

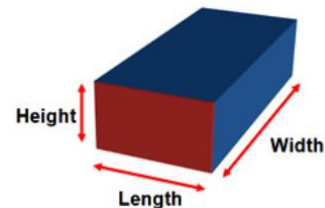
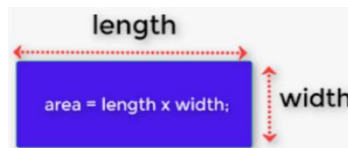
The formula for the **volume** of a **prism** is $V = Bh$

Volume of Prism = Area of Base x Height



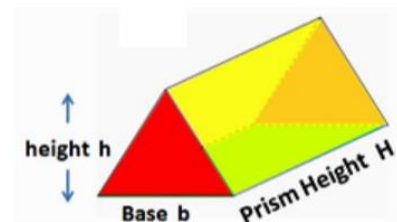
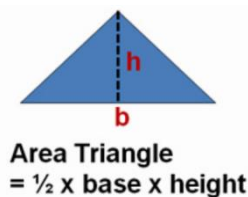
Volume of the **Rectangular prism** or cuboid.

$$\text{Volume} = l \times w \times h$$



Volume of the **Triangular prism**.

$$\text{Volume} = \frac{1}{2} \times b \times h \times H$$



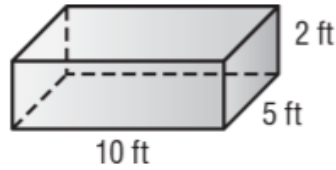
1. Find the volume of the rectangular prism.

Method 1

$$V = \ell wh.$$

$$V = 10 \times 5 \times 2$$

$$V = 100$$



The volume is 100 ft³.

Method 2

$$V = Bh.$$

$$V = 50 \times 2$$

$$V = 100$$

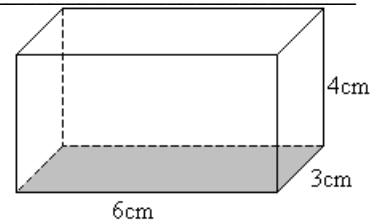
The volume is 100 ft³.

2. Find the volume of the following rectangular prism or cuboid.

$$\text{Volume} = l \times w \times h$$

$$= 6 \text{ cm} \times 3 \text{ cm} \times 4 \text{ cm}$$

$$= 72 \text{ cm}^3$$

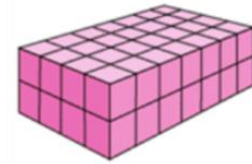


3. Find the volume of the following rectangular prism.

$$\text{Volume} = l \times w \times h$$

$$= 7 \times 4 \times 2$$

$$= 56$$



4. Find the missing dimension of the given prism.

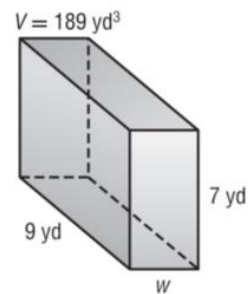
$$\text{Volume} = l \times w \times h$$

$$189 = 9 \times w \times 7$$

$$189 = 63 w$$

$$\div \text{ by } 63 \text{ both sides, } \frac{189}{63} = \frac{63 w}{63}$$

$$w = 3$$



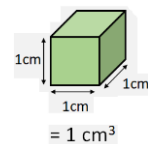
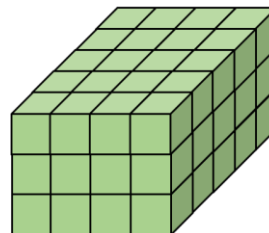
5. Find the volume (in cm³) of the following solid shape.

Assume the cubes making up the shapes each have a volume of 1 cm³.

$$\text{Volume} = l \times w \times h$$

$$= 4 \text{ cm} \times 5 \text{ cm} \times 3 \text{ cm}$$

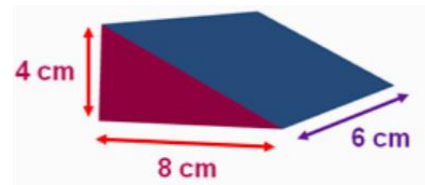
$$= 60 \text{ cm}^3$$



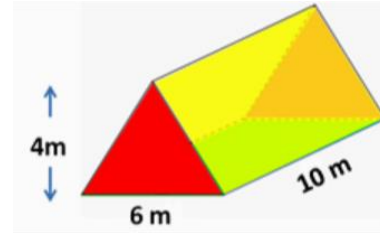
VOLUME of TRIANGULAR PRISM

Volume of the Triangular prism.

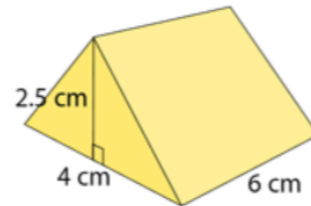
$$\begin{aligned}\text{Volume} &= \frac{1}{2} \times b \times h \times H \\ &= \frac{1}{2} \times 8 \times 4 \times 6 \\ &= 96 \text{ cm}^2\end{aligned}$$



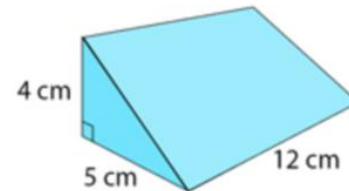
$$\begin{aligned}\text{Volume} &= \frac{1}{2} \times b \times h \times H \\ &= \frac{1}{2} \times 6 \times 4 \times 10 \\ &= 120 \text{ m}^2\end{aligned}$$



$$\begin{aligned}\text{Volume} &= \frac{1}{2} \times b \times h \times H \\ &= \frac{1}{2} \times 4 \times 2.5 \times 6 \\ &= 60 \text{ cm}^2\end{aligned}$$



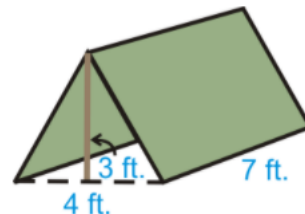
$$\begin{aligned}\text{Volume} &= \frac{1}{2} \times b \times h \times H \\ &= \frac{1}{2} \times 5 \times 4 \times 12 \\ &= 120 \text{ cm}^2\end{aligned}$$



You have a small, triangular prism shaped tent. How much volume does it have, once it is set up?

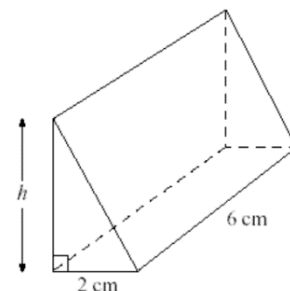
$$\text{Area of the base } B = \frac{1}{2}(3)(4) = 6 \text{ ft}^2.$$

$$\text{Volume } V = BH = 6 \times 7 = 42 \text{ ft}^3.$$



The volume of this triangular prism is 42 cm^3 . Find the height.

$$\begin{aligned}\text{Volume} &= \frac{1}{2} \times b \times h \times H \\ 42 &= \frac{1}{2} \times 2 \times h \times 6 \\ 42 &= 6h \\ h &= 7 \text{ cm}\end{aligned}$$

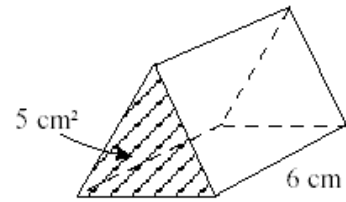


Calculate the volume of the triangular prisms.

Volume = Area of Base x height = Bh

$$= 5 \times 6$$

$$= 30 \text{ cm}^2$$



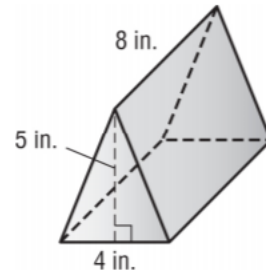
Find the volume of the triangular prism.

The area of the triangle = $\frac{1}{2} \times 4 \times 5 = 10 \text{ in}^2$

Volume of Prism = Base area x height

$$V = Bh$$

Volume of a prism = $10 \times 8 = 80 \text{ in}^3$



A model house is made by sticking a triangular prism on top of a rectangular block, as shown.

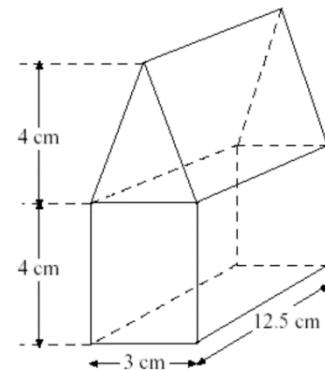
$$\begin{aligned} \text{Volume of triangular prism} &= \frac{1}{2} \times b \times h \times L \\ &= \frac{1}{2} \times 3 \times 4 \times 12.5 \\ &= 75 \text{ cm}^3 \end{aligned}$$

Volume of the Rectangular prism = $l \times w \times h$

$$= 3 \times 12.5 \times 4$$

$$= 150 \text{ cm}^3$$

Total volume of the model house = $75 + 150 = 225 \text{ cm}^3$



A model house is shown in figure.

Find the Volume of the Ground Floor.

$$\begin{aligned} \text{Volume of Ground Floor} &= l \times w \times h \\ &= 20 \times 45 \times 10 \\ &= 9000 \text{ cm}^3 \end{aligned}$$

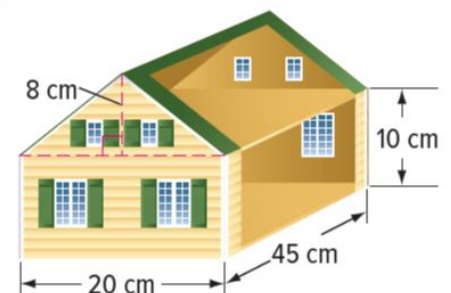
Find the Volume of the Attic?

The area of the triangle = $\frac{1}{2} \times 20 \times 8 = 80 \text{ cm}^2$

Volume of Prism = Base area x height

$$V = Bh$$

Volume of the Attic = $80 \times 45 = 3600 \text{ cm}^3$

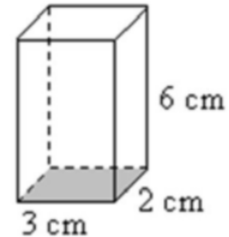


SURFACE AREA

$$\text{RECTANGULAR PRISM} = 2(lw) + 2(wh) + 2(lh)$$

Find the surface area of the rectangular prism.

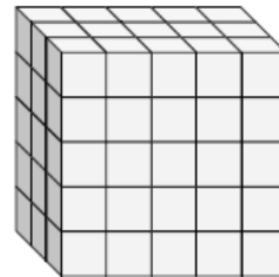
$$\begin{aligned}\text{Surface area of a rectangular prism} &= 2(lw) + 2(wh) + 2(lh) \\ &= 2(3 \times 2) + 2(2 \times 6) + 2(3 \times 6) \\ &= 2(6) + 2(12) + 2(18) \\ &= 12 + 24 + 36 \\ &= 72 \text{ cm}^2\end{aligned}$$



Find the length, width and height of the following rectangular prism. Then find its surface area.

The length, width and height are $l = 5$; $w = 5$; $h = 3$

$$\begin{aligned}\text{The surface area} &= 2lw + 2wh + 2lh \\ &= (2 \times 5 \times 5) + (2 \times 5 \times 3) + (2 \times 5 \times 3) \\ &= 50 + 30 + 30 \\ &= 110 \text{ square units}\end{aligned}$$



A gift box in the shape of a rectangular prism has 20 centimeters length, 14 centimeters width and 10 centimeters height. How much the paper will you need to wrap the gift box?

The length, width and height are $l = 20$; $w = 14$; $h = 10$

$$\begin{aligned}\text{The surface area} &= 2lw + 2wh + 2lh \\ &= (2 \times 20 \times 14) + (2 \times 14 \times 10) + (2 \times 20 \times 10) \\ &= 560 + 280 + 400 \\ &= 1240 \text{ cm}^2\end{aligned}$$

A cube has a surface area of 96 square feet. What is the area of one face?

Cube is a rectangular prism with 6 sides.

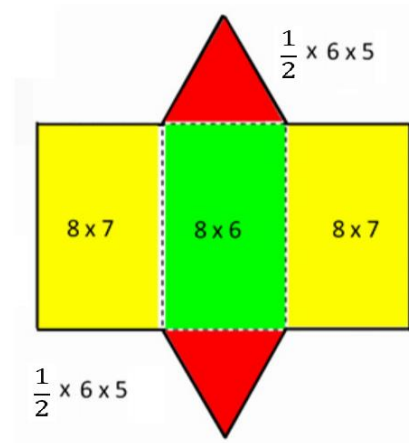
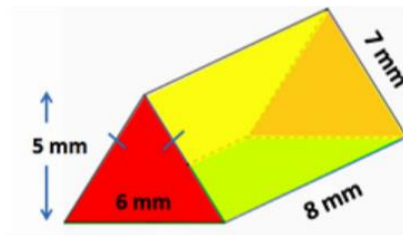
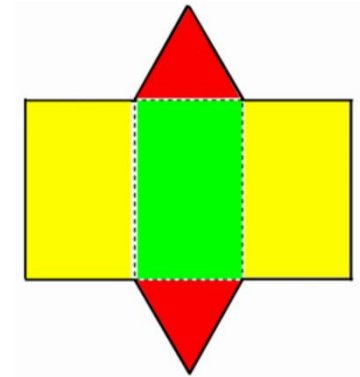
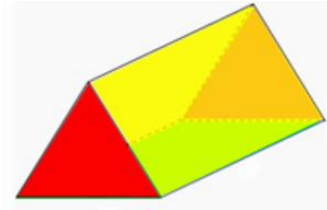
Therefore, area of 1 face = $96 \div 6 = 16$ square feet.



SURFACE AREA

TRIANGULAR PRISM = Area of 2 triangles + Area of 3 Rectangles

A triangular prism has 2 identical triangles and 3 rectangles



$$\begin{aligned}\text{Area of Triangle} &= \frac{1}{2} \times b \times h \\ &= \frac{1}{2} \times 6 \times 5 \\ &= 15 \text{ mm}^2\end{aligned}$$

$$\text{Area of Rectangle 1} = 8 \times 7 = 56 \text{ mm}^2$$

$$\text{Area of Rectangle 2} = 8 \times 6 = 48 \text{ mm}^2$$

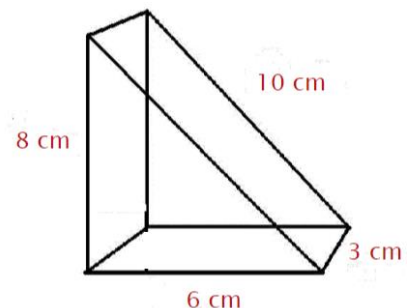
$$\text{Area of Rectangle 3} = 8 \times 7 = 56 \text{ mm}^2$$

$$\begin{aligned}\text{Surface area of Triangular Prism} &= \text{Area of 2 Triangles} + \text{Area of 3 Rectangles} \\ &= 15 + 15 + 56 + 48 + 56 = 190 \text{ mm}^2\end{aligned}$$

$$\text{Area of the triangle} = \frac{1}{2} \times b \times h = \frac{1}{2} \times 6 \times 8 = 24 \text{ cm}^2$$

$$\begin{aligned}\text{Areas of 3 rectangular sides} &= (10 \times 3) + (8 \times 3) + (6 \times 3) \\ &= 30 + 24 + 18\end{aligned}$$

$$\begin{aligned}\text{Surface Area of Triangular Prism} \\ &= 24 + 24 + 30 + 24 + 18 = 120 \text{ cm}^2\end{aligned}$$

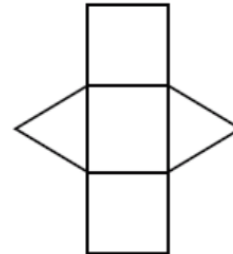


Which of the following statements are true?

- A. A triangular prism is a three-dimensional object with two triangular ends and three rectangular sides.
- B. A triangular prism is a three-dimensional object with two rectangular ends and three triangular sides.
- C. A triangular prism is a two-dimensional shape that is a triangle.
- D. A triangular prism has eight rectangular sides.

Identify the solid whose net is given below.

- A - Triangular pyramid
- B - Cone
- C - Rectangular prism
- D - Triangular prism



Find the surface area of the triangular prism.

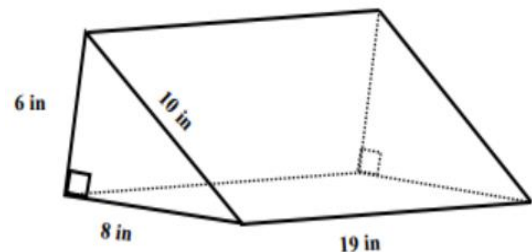
Area of triangle base = $\frac{1}{2} \times 8 \times 6 = 24 \text{ in}^2$

Area of 3 Rectangles

Area of Floor Rectangle 1 = $8 \times 19 = 152 \text{ in}^2$

Area of Wall Rectangle 2 = $6 \times 19 = 114 \text{ in}^2$

Area of Slant Rectangle 3 = $10 \times 19 = 190 \text{ in}^2$



Area of Triangular Prism = $24 + 24 + 152 + 114 + 190 = 504 \text{ in}^2$

Find the surface area of the following triangular prism.

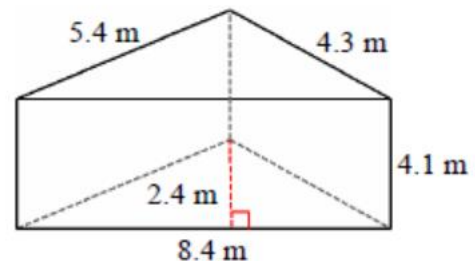
Area of triangle base = $\frac{1}{2} \times 8.4 \times 2.4 = 10.08 \text{ m}^2$

Area of 3 Rectangles

Area of Left Rectangle = $5.4 \times 4.1 = 22.14 \text{ m}^2$

Area of Right Rectangle = $4.3 \times 4.1 = 17.63 \text{ m}^2$

Area of Front Rectangle = $8.4 \times 4.1 = 34.44 \text{ m}^2$



Surface area of triangular prism =
 $= 10.08 + 10.08 + 22.14 + 17.63 + 34.44 = 94.37 \text{ m}^2$

Find the surface area of the chocolate:

Area of triangle base = $\frac{1}{2} \times 3 \times 2 = 3 \text{ cm}^2$

Area of 3 Rectangles

Area of Left Rectangle = $3 \times 10 = 30 \text{ cm}^2$

Area of Right Rectangle = $3 \times 10 = 30 \text{ cm}^2$

Area of Floor Rectangle = $3 \times 10 = 30 \text{ cm}^2$



Surface area of triangular prism chocolate =
 $= 3 + 3 + 30 + 30 + 30 = 96 \text{ cm}^2$