

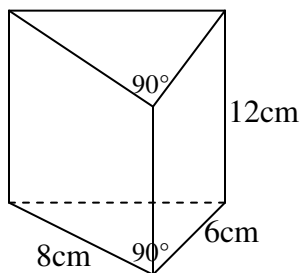
Notes for Lesson 12-1: Surface Area and Volume of Prisms

Prism: a 3-D shape made up of two identical bases and rectangular sides

Surface area is defined as the area the entire surface a 3-D object takes up.

Lateral Area: lateral area is the area of all the sides (*not* including the two bases) and is found with the formula: **LA = ph** where p = the perimeter of the base and h is the height of the prism (distance between the bases).

Ex. 1: Find the lateral area of the following prism.



Step 1: find the third side of the triangular base

$$\begin{aligned} 6^2 + 8^2 &= c^2 \\ 36 + 64 &= c^2 \\ 100 &= c^2 \\ 10 &= c \end{aligned}$$

Step 2: Find the perimeter of the base (p)

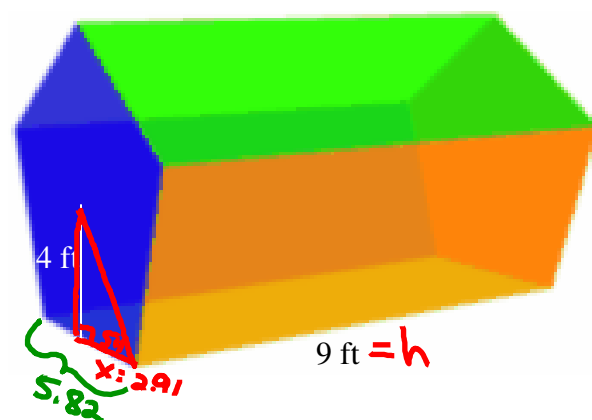
$$p = 8 + 6 + 10 = 24$$

Step 3: find the lateral area

$$\begin{aligned} LA &= ph \\ LA &= (24)(12) \\ LA &= 288 \text{ cm}^2 \end{aligned}$$

Find the lateral area of the following:

1)



$$\tan 54 = \frac{4}{x}$$

$$\frac{x \tan 54 = 4}{\tan 54 \quad \tan 54}$$

$$x = 2.91$$

$$P = (5.82)(5) = 29.1$$

$$LA = P \cdot h$$

$$= (29.1)(9) = 261.9 \text{ ft}^2$$

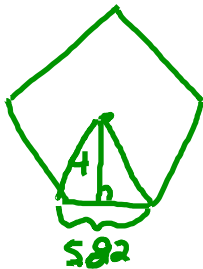
Total surface area: the area of *all* the sides *including* the two bases and is found with the formula: $TA = LA + 2B$ where B = the area of the base.

Ex 2: Use example 1 and find its total surface area.

Step 1: Find the area of the base	Step 2: find the TA
$A \text{ of } \Delta = \frac{1}{2}bh$	$TA = LA + 2B$
$A = \frac{1}{2}(6)(8)$	$TA = 288 + 2(24)$
$A = 24$	$TA = 336 \text{ cm}^2$

Find the total surface area of the two problems on the front.

1)



$$A_{\Delta} = \frac{1}{2}(5.82)(4) = 11.64$$

$$A_{\text{pent}} = (11.64)(5) = 58.2$$

$$TA = LA + 2B = 261.9 + 2(58.2) = 378.3 \text{ ft}^2$$

Volume is defined as the total space inside a shape. Volume is a three dimensional measurement so we use cubic units (like cm^3) when we label our answers. The formula for the volume of any prism is: $V = (B)(h)$ where B is the area of the base and h is the height (the distance between the two bases).

Ex 3: Use example 1 and find its volume.

Step 1: find the volume
$V = Bh$
$V = (24)(12)$
$V = 288 \text{ cm}^3$

Find the volume of the two problems on the front.

1)

$$V = B \cdot h$$

$$V = (58.2)(9)$$

$$= 523.8 \text{ ft}^3$$