L8-4 Volume of Prisms

Vocabulary Start-Up

Recall that a prism is a polyhedron with two parallel, congruent bases. The bases of a *rectangular prism* are rectangles, and the bases of a *triangular prism* are triangles.

Write *rectangular prism* or *triangular prism* on the line below each figure.

1. 

rectangular prism

2. 

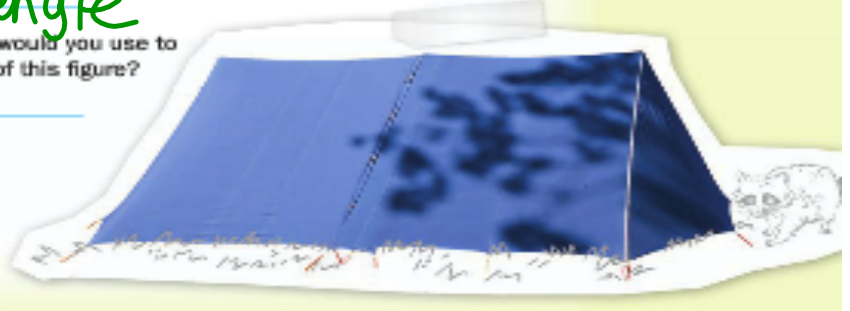
triangular prism

Real-World Link

1. Suppose you observed the camping tent shown from directly above. What geometric figure would you see?

rectangle

2. What formula would you use to find the area of this figure?



Area

- amount of space an object takes up

carpeting
rearranging furniture
painting

Volume

- how much "stuff" something hold

putting things in a box
cooking

Prisms (general formula)

Volume = $B \cdot h$

B = area of base
h = height of prism / cylinder

Quadrilateral

$A = b \cdot h$
$= l \cdot w$

Rectangular Prism

$V = Bh$
$= (b \cdot h)h$ → height of prism
area of base

Triangle

$A = \frac{bh}{2}$

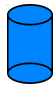
Triangular Prism

$V = Bh$
$= \left(\frac{bh}{2}\right)h$
area of base → height of prism

Circle

$A = \pi r^2$

Cylinder



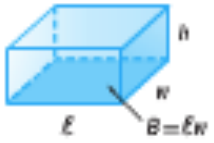
$V = Bh$
$= (\pi r^2)h$

Volume of a Rectangular Prism

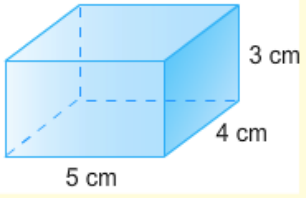
Words The volume V of a rectangular prism is the product of the length ℓ, the width w, and the height h. It is also the area of the base B times the height h.

Symbols $V = \ell wh$ or $V = Bh$

Model



1. **Find the volume of the rectangular prism.**



$B = 4 \cdot 5 = 20\ cm^2$

$h = 3\ cm$

$V = Bh = (b \cdot h)h$

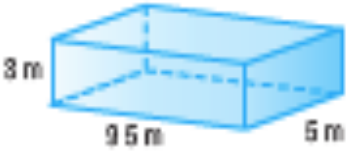
$= (4 \cdot 5) \cdot 3$

$= 20 \cdot 3$

$= 60\ cm^3$

Got It? Do this problem to find out.

a. Find the volume of the rectangular prism shown below.



$V = Bh = (b \cdot h)h$

$= 9.5 \cdot 5 \cdot 3$

$= 142.5 \text{ m}^3$

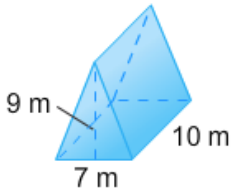
Volume of a Triangular Prism

Words The volume V of a triangular prism is the area of the base B times the height h.

Symbols $V = Bh$, where B is the area of the base.

Model

Find the volume of the triangular prism.



$V = B \cdot h$

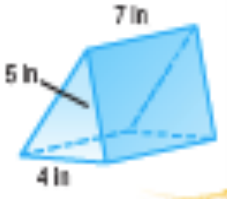
$= \left(\frac{b \cdot h}{2}\right) l$

$= \left(\frac{9 \cdot 7}{2}\right) 10$

$= 310 \text{ m}^3$

Got It? Do this problem to find out.

b. Find the volume of the triangular prism.



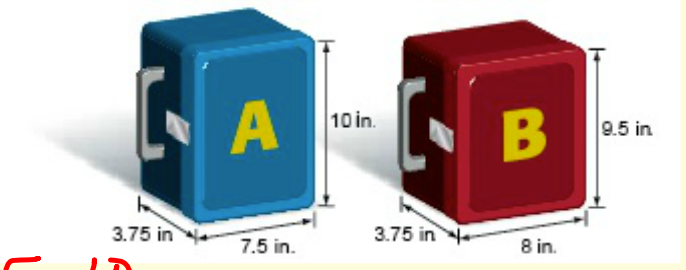
$V = B \cdot h$

$= \left(\frac{bh}{2}\right) h$

$= \left(\frac{4 \cdot 5}{2}\right) \cdot 7$

$= 10 \cdot 7 = 70 \text{ in}^3$

3. Which lunch box holds more food?



$V = 3.75 \cdot 7.5 \cdot 10$

$= 281.25 \text{ in}^3$

$V = 9.5 \cdot 3.75 \cdot 8$

$= 285 \text{ in}^3$

3. One cabinet measures 3 feet by 2.5 feet by 5 feet. A second measures 4 feet by 3.5 feet by 4.5 feet. Which volume is greater? Explain. (Example 3)

Cabinet #1 = $3 \cdot 2.5 \cdot 5 = 37.5 \text{ ft}^3$

Cabinet #2 = $4 \cdot 3.5 \cdot 4.5 = 63 \text{ ft}^3$

greater volume

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