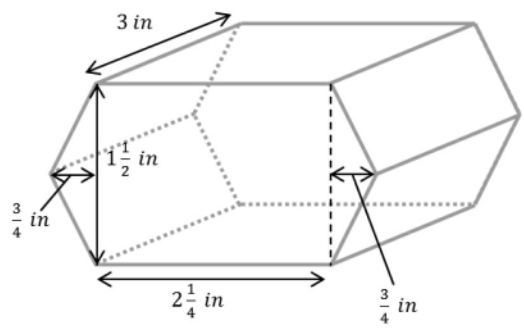
Name ____ Date ____________________

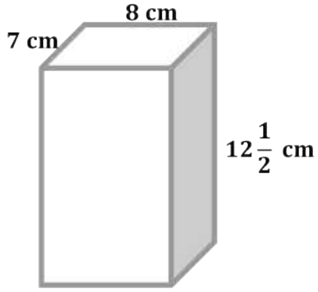
The Volume of a Right Prism

The base of the right prism is a hexagon composed of a rectangle and two triangles. Find the volume of the right hexagonal prism using the formula $V = Bh$.



1. Calculate the volume of each solid using the formula $V = Bh$ (all angles are 90 degrees).

a.



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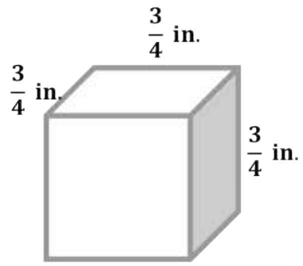

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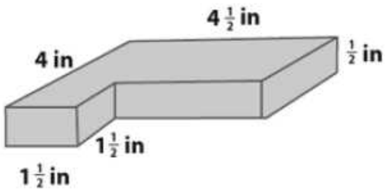

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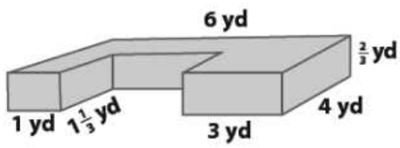

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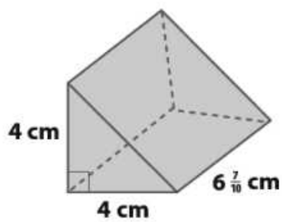

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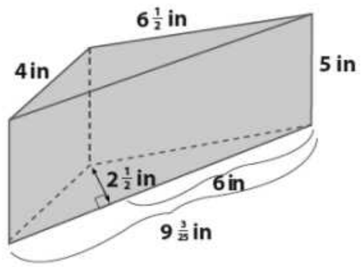

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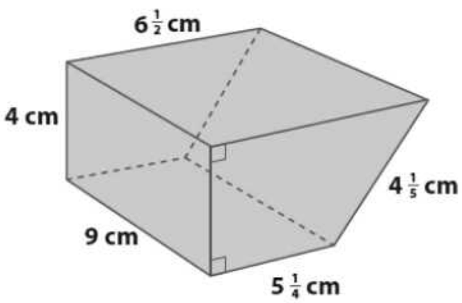

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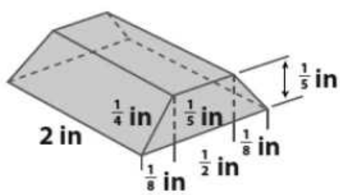


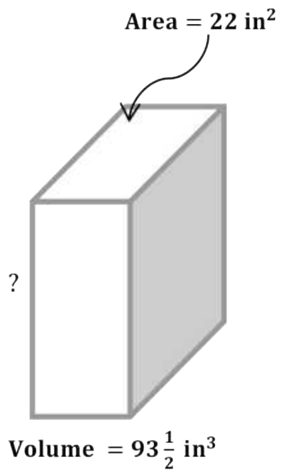
2. Let l represent length, w the width, and h the height of a right rectangular prism. Find the volume of the prism when:

   a. $l = 3 \text{ cm}$, $w = 2\frac{1}{2} \text{ cm}$, and $h = 7 \text{ cm}$.

   b. $l = \frac{1}{4} \text{ cm}$, $w = 4 \text{ cm}$, and $h = 1\frac{1}{2} \text{ cm}$.

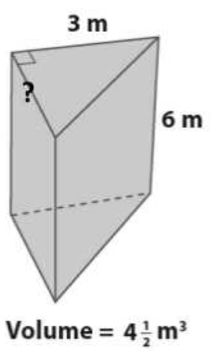
3. Find the length of the edge indicated in each diagram.

   a.



   What are possible dimensions of the base?

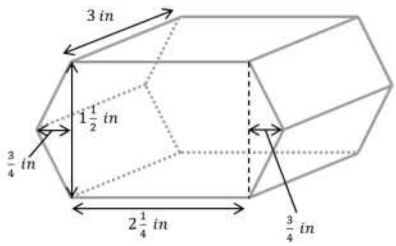
   b.



4. The volume of a cube is $3\frac{3}{8}\text{ in}^3$. Find the length of each edge of the cube.

5. Given a right rectangular prism with a volume of $7\frac{1}{2}\text{ ft}^3$, a length of 5 ft., and a width of 2 ft., find the height of the prism.

The base of the right prism is a hexagon composed of a rectangle and two triangles. Find the volume of the right hexagonal prism using the formula $V = Bh$.



The area of the base is the sum of the areas of the rectangle and the two triangles.

$$B = A_{\text{rectangle}} + 2 \cdot A_{\text{triangle}}$$

$A_{\text{rectangle}} = lw$

$A_{\text{rectangle}} = 2\frac{1}{4}\text{ in.} \cdot 1\frac{1}{2}\text{ in.}$

$A_{\text{rectangle}} = \left(\frac{9}{4} \cdot \frac{3}{2}\right)\text{ in}^2$

$A_{\text{rectangle}} = \frac{27}{8}\text{ in}^2$

$A_{\text{triangle}} = \frac{1}{2}lw$

$A_{\text{triangle}} = \frac{1}{2}\left(1\frac{1}{2}\text{ in.} \cdot \frac{3}{4}\text{ in.}\right)$

$A_{\text{triangle}} = \left(\frac{1}{2} \cdot \frac{3}{2} \cdot \frac{3}{4}\right)\text{ in}^2$

$A_{\text{triangle}} = \frac{9}{16}\text{ in}^2$

$B = \frac{27}{8}\text{ in}^2 + 2\left(\frac{9}{16}\text{ in}^2\right)$

$B = \frac{27}{8}\text{ in}^2 + \frac{9}{8}\text{ in}^2$

$B = \frac{36}{8}\text{ in}^2$

$B = \frac{9}{2}\text{ in}^2$

$V = Bh$

$V = \left(\frac{9}{2}\text{ in}^2\right) \cdot 3\text{ in.}$

$V = \frac{27}{2}\text{ in}^3$

$V = 13\frac{1}{2}\text{ in}^3$

The volume of the hexagonal prism is $13\frac{1}{2}\text{ in}^3$.

1. Calculate the volume of each solid using the formula $V = Bh$ (all angles are 90 degrees).

a. $V = Bh$

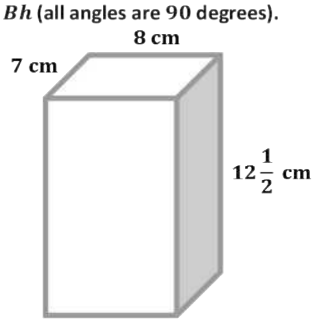
$V = (8\text{ cm} \cdot 7\text{ cm}) \cdot 12\frac{1}{2}\text{ cm}$

$V = \left(56 \cdot 12\frac{1}{2}\right)\text{ cm}^3$

$V = 672\text{ cm}^3 + 28\text{ cm}^3$

$V = 700\text{ cm}^3$

The volume of the solid is 700 cm^3.



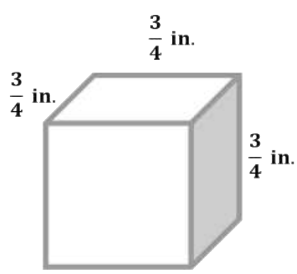
b. $V = Bh$

$V = \left(\frac{3}{4}\text{ in.} \cdot \frac{3}{4}\text{ in.}\right) \cdot \frac{3}{4}\text{ in.}$

$V = \left(\frac{9}{16}\right) \cdot \frac{3}{4}\text{ in}^3$

$V = \frac{27}{64}\text{ in}^3$

The volume of the cube is $\frac{27}{64}\text{ in}^3$.



c. $V = Bh$

$B = A_{\text{rectangle}} + A_{\text{square}}$

$B = lw + s^2$

$B = \left(2\frac{1}{2}\text{ in.}\cdot 4\frac{1}{2}\text{ in.}\right) + \left(1\frac{1}{2}\text{ in.}\right)^2$

$B = \left(10\text{ in}^2 + 1\frac{1}{4}\text{ in}^2\right) + \left(1\frac{1}{2}\text{ in.}\cdot 1\frac{1}{2}\text{ in.}\right)$

$B = 11\frac{1}{4}\text{ in}^2 + \left(1\frac{1}{2}\text{ in}^2 + \frac{3}{4}\text{ in}^2\right)$

$B = 11\frac{1}{4}\text{ in}^2 + \frac{3}{4}\text{ in}^2 + 1\frac{1}{2}\text{ in}^2$

$B = 12\text{ in}^2 + 1\frac{1}{2}\text{ in}^2$

$B = 13\frac{1}{2}\text{ in}^2$

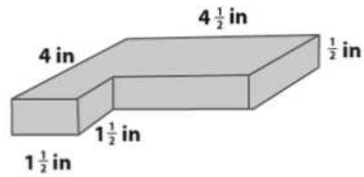
$V = Bh$

$V = 13\frac{1}{2}\text{ in}^2\cdot\frac{1}{2}\text{ in.}$

$V = \frac{13}{2}\text{ in}^3 + \frac{1}{4}\text{ in}^3$

$V = 6\text{ in}^3 + \frac{1}{2}\text{ in}^3 + \frac{1}{4}\text{ in}^3$

$V = 6\frac{3}{4}\text{ in}^3$



The volume of the solid is $6\frac{3}{4}\text{ in}^3$.

d. $V = Bh$

$B = (A_{\text{lg rectangle}}) - (A_{\text{sm rectangle}})$

$B = (lw)_1 - (lw)_2$

$B = (6\text{ yd.}\cdot 4\text{ yd.}) - \left(1\frac{1}{3}\text{ yd.}\cdot 2\text{ yd.}\right)$ $V = Bh$

$B = 24\text{ yd}^2 - \left(2\text{ yd}^2 + \frac{2}{3}\text{ yd}^2\right)$

$B = 24\text{ yd}^2 - 2\text{ yd}^2 - \frac{2}{3}\text{ yd}^2$

$B = 22\text{ yd}^2 - \frac{2}{3}\text{ yd}^2$

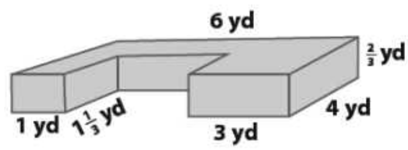
$B = 21\frac{1}{3}\text{ yd}^2$

$V = \left(21\frac{1}{3}\text{ yd}^2\right)\cdot\frac{2}{3}\text{ yd.}$

$V = 14\text{ yd}^3 + \left(\frac{1}{3}\text{ yd}^2\cdot\frac{2}{3}\text{ yd.}\right)$

$V = 14\text{ yd}^3 + \frac{2}{9}\text{ yd}^3$

$V = 14\frac{2}{9}\text{ yd}^3$



The volume of the solid is $14\frac{2}{9}\text{ yd}^3$.

e. $V = Bh_{\text{prism}}$

$B = \frac{1}{2}bh_{\text{triangle}}$

$B = \frac{1}{2}\cdot 4\text{ cm}\cdot 4\text{ cm}$

$B = 2\cdot 4\text{ cm}^2$

$B = 8\text{ cm}^2$

$V = Bh$

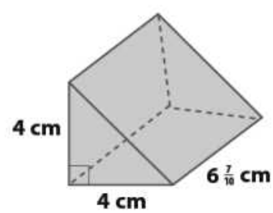
$V = 8\text{ cm}^2\cdot 6\frac{7}{10}\text{ cm}$

$V = 48\text{ cm}^3 + \frac{56}{10}\text{ cm}^3$

$V = 48\text{ cm}^3 + 5\text{ cm}^3 + \frac{6}{10}\text{ cm}^3$

$V = 53\text{ cm}^3 + \frac{3}{5}\text{ cm}^3$

$V = 53\frac{3}{5}\text{ cm}^3$



The volume of the solid is $53\frac{3}{5}\text{ cm}^3$.

f. $V = Bh_{prism}$

$B = \frac{1}{2}bh_{\text{triangle}}$

$B = \frac{1}{2} \cdot 9\frac{3}{25} \text{ in.} \cdot 2\frac{1}{2} \text{ in.}$

$B = \frac{1}{2} \cdot 2\frac{1}{2} \text{ in.} \cdot 9\frac{3}{25} \text{ in.}$

$B = \left(1\frac{1}{4}\right) \cdot \left(9\frac{3}{25}\right) \text{in}^2$

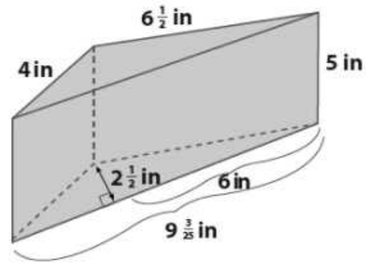
$B = \left(\frac{5}{4} \cdot \frac{228}{25}\right) \text{in}^2$

$B = \frac{57}{5} \text{ in}^2$

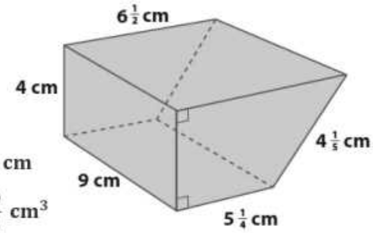
$V = Bh$

$V = \left(\frac{57}{5} \text{ in}^2\right) \cdot 5 \text{ in.}$

$V = 57 \text{ in}^3$



The volume of the solid is 57 in^3.



g. $V = Bh$

$B = A_{\text{rectangle}} + A_{\text{triangle}}$

$B = lw + \frac{1}{2}bh$

$B = \left(5\frac{1}{4} \text{ cm} \cdot 4 \text{ cm}\right) + \frac{1}{2}\left(4 \text{ cm} \cdot 1\frac{1}{4} \text{ cm}\right)$

$B = (20 \text{ cm}^2 + 1 \text{ cm}^2) + \left(2 \text{ cm} \cdot 1\frac{1}{4} \text{ cm}\right)$

$B = 21 \text{ cm}^2 + 2 \text{ cm}^2 + \frac{1}{2} \text{ cm}^2$

$B = 23 \text{ cm}^2 + \frac{1}{2} \text{ cm}^2$

$B = 23\frac{1}{2} \text{ cm}^2$

$V = Bh$

$V = 23\frac{1}{2} \text{ cm}^2 \cdot 9 \text{ cm}$

$V = 207 \text{ cm}^3 + \frac{9}{2} \text{ cm}^3$

$V = 207 \text{ cm}^3 + 4 \text{ cm}^3 + \frac{1}{2} \text{ cm}^3$

$V = 211\frac{1}{2} \text{ cm}^3$

The volume of the solid is $211\frac{1}{2} \text{ cm}^3$.

h. $V = Bh$

$B = A_{\text{rectangle}} + 2A_{\text{triangle}}$

$B = lw + 2 \cdot \frac{1}{2}bh$

$B = \left(\frac{1}{2} \text{ in.} \cdot \frac{1}{5} \text{ in.}\right) + \left(1 \cdot \frac{1}{8} \text{ in.} \cdot \frac{1}{5} \text{ in.}\right)$

$B = \frac{1}{10} \text{ in}^2 + \frac{1}{40} \text{ in}^2$

$B = \frac{4}{40} \text{ in}^2 + \frac{1}{40} \text{ in}^2$

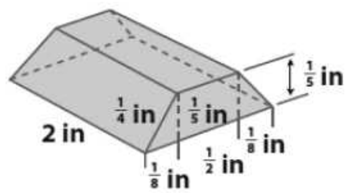
$B = \frac{5}{40} \text{ in}^2$

$B = \frac{1}{8} \text{ in}^2$

$V = Bh$

$V = \frac{1}{8} \text{ in}^2 \cdot 2 \text{ in.}$

$V = \frac{1}{4} \text{ in}^3$



The volume of the solid is $\frac{1}{4} \text{ in}^3$.

2. Let l represent length, w the width, and h the height of a right rectangular prism. Find the volume of the prism when:

a. $l = 3 \text{ cm}$, $w = 2\frac{1}{2} \text{ cm}$, and $h = 7 \text{ cm}$.

$V = lwh$

$V = 3 \text{ cm} \cdot 2\frac{1}{2} \text{ cm} \cdot 7 \text{ cm}$

$V = 21 \cdot \left(2\frac{1}{2}\right) \text{ cm}^3$

$V = 52\frac{1}{2} \text{ cm}^3$ *The volume of the prism is* $52\frac{1}{2} \text{ cm}^3$.

b. $l = \frac{1}{4} \text{ cm}$, $w = 4 \text{ cm}$, and $h = 1\frac{1}{2} \text{ cm}$.

$V = lwh$

$V = \frac{1}{4} \text{ cm} \cdot 4 \text{ cm} \cdot 1\frac{1}{2} \text{ cm}$

$V = 1\frac{1}{2} \text{ cm}^3$ *The volume of the prism is* $1\frac{1}{2} \text{ cm}^3$.

3. Find the length of the edge indicated in each diagram.

a. $V = Bh$ *Let* h *represent the number of inches in the height of the prism.*

$93\frac{1}{2} \text{ in}^3 = 22 \text{ in}^2 \cdot h$

$93\frac{1}{2} \text{ in}^3 = 22h \text{ in}^2$

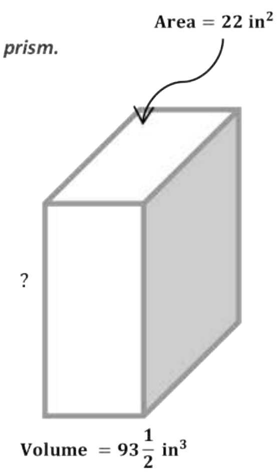
$22h = 93.5 \text{ in.}$

$h = 4.25 \text{ in.}$

The height of the right rectangular prism is $4\frac{1}{4}$ in.

What are possible dimensions of the base?

11 in. *by* 2 in., *or* 22 in. *by* 1 in.



b. $V = Bh$ *Let* h *represent the number of meters in the height of the triangular base of the prism.*

$V = \left(\frac{1}{2} bh_{triangle}\right) \cdot h_{prism}$

$4\frac{1}{2} \text{ m}^3 = \left(\frac{1}{2} \cdot 3 \text{ m} \cdot h\right) \cdot 6 \text{ m}$

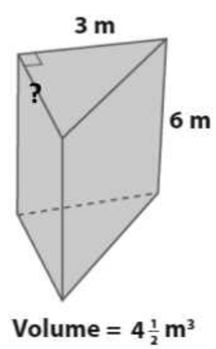
$4\frac{1}{2} \text{ m}^3 = \frac{1}{2} \cdot 18 \text{ m}^2 \cdot h$

$4\frac{1}{2} \text{ m}^3 = 9h \text{ m}^2$

$9h = 4.5 \text{ m}$

$h = 0.5 \text{ m}$

The height of the triangle is $\frac{1}{2}$ m.



4. **The volume of a cube is $3\frac{3}{8}\ \text{in}^3$. Find the length of each edge of the cube.**

$V = s^3$, and since the volume is a fraction, the edge length must also be fractional.

$$3\frac{3}{8}\ \text{in}^3 = \frac{27}{8}\ \text{in}^3$$

$$3\frac{3}{8}\ \text{in}^3 = \frac{3}{2}\ \text{in.} \cdot \frac{3}{2}\ \text{in.} \cdot \frac{3}{2}\ \text{in.}$$

$$3\frac{3}{8}\ \text{in}^3 = \left(\frac{3}{2}\ \text{in.}\right)^3$$

The lengths of the edges of the cube are $\frac{3}{2}\ \text{in.} = 1\frac{1}{2}\ \text{in.}$

5. **Given a right rectangular prism with a volume of $7\frac{1}{2}\ \text{ft}^3$, a length of $5\ \text{ft.}$, and a width of $2\ \text{ft.}$, find the height of the prism.**

$V = Bh$

$V = (lw)h$ *Let h represent the number of feet in the height of the prism.*

$$7\frac{1}{2}\ \text{ft}^3 = (5\text{ft.} \cdot 2\text{ft.}) \cdot h$$

$$7\frac{1}{2}\ \text{ft}^3 = 10\ \text{ft}^2 \cdot h$$

$$7.5\ \text{ft}^3 = 10h\ \text{ft}^2$$

$$h = 0.75\ \text{ft.}$$

The height of the right rectangular prism is $\frac{3}{4}\ \text{ft.}$ (or $9\ \text{in.}$).