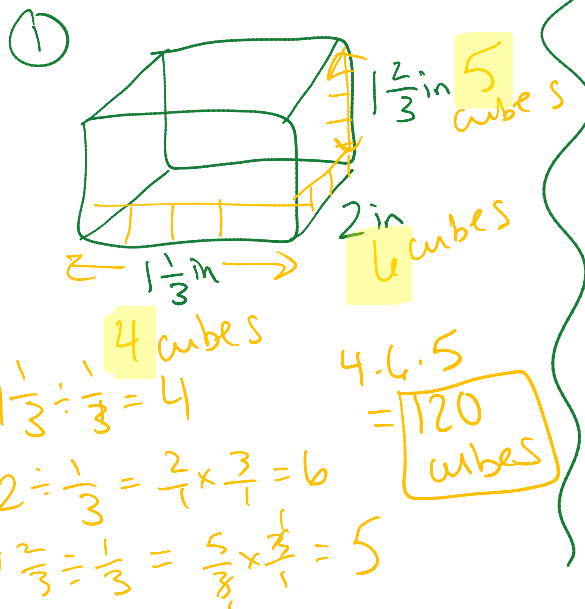


# Volume of Prisms Using Cubes

- 1) A right rectangular prism has edge lengths  $1\frac{1}{3}$ " , 2" , and  $1\frac{2}{3}$ " . How many cubes with edge lengths  $\frac{1}{3}$ " would be needed to fill the prism? What is the volume of the prism?

Suppose each cube is  $\frac{1}{3}$ " in length. How many cubes would you need for each dimension?



②

$$V = Bh$$

$$= \frac{4}{3} \cdot \frac{2}{1} \cdot \frac{5}{3} = \frac{40}{9}$$

$$= 4\frac{4}{9} \text{ in}^3$$

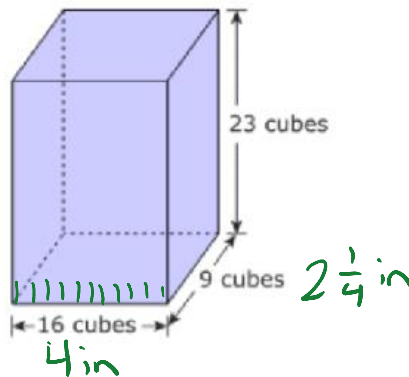
- 2) A right rectangular prism is packed with identical cubes. The dimension of the prism are given in terms of the number of cubes needed to fill the prism.

60

$$\begin{array}{r} \times 51 \\ 64 \overline{) 3312051} \\ \underline{320} \phantom{0} \\ 112 \phantom{0} \\ \underline{-64} \phantom{0} \\ 48 \phantom{0} \end{array}$$

$48 \div 16 = 3$   
 $64 \div 16 = 4$

$51\frac{3}{4}$



$V_{\text{one cube}} = \left(\frac{1}{4}\right)^3 = \frac{1}{64}$

$23 \times 9 \times 16 = 3312$  cubes

$\frac{3312}{1} \times \frac{1}{64} = \frac{3312}{64}$

The side length of each cube is  $\frac{1}{4}$  inch. What is the volume, in cubic inches, of the right rectangular prism?

$\frac{16}{1} \times \frac{1}{4} = 4$  in

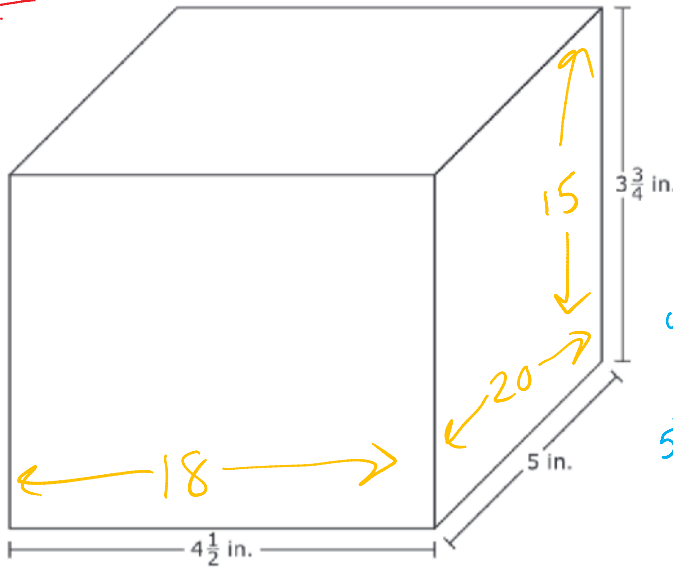
$\frac{9}{1} \times \frac{1}{4} = \frac{9}{4} = 2\frac{1}{4}$

$\frac{23}{1} \times \frac{1}{4} = \frac{23}{4} = 5\frac{3}{4}$

$\frac{4}{1} \times \frac{9}{4} \times \frac{23}{4} = \frac{207}{4} = 51\frac{3}{4}$

$51\frac{3}{4} \text{ in}^3$

- 3) Small cubes with edge lengths of  $\frac{1}{4}$  inch will be packed into the right rectangular prism shown.



$$V_{\text{rect.}} = \frac{9}{2} \times \frac{5}{1} \times \frac{15}{4} = \frac{675}{8}$$

$$\begin{array}{r} 245 \\ \times 15 \\ \hline 225 \\ + 450 \\ \hline 675 \end{array}$$

$$\begin{array}{r} 44 \\ 675 \\ \times 8 \\ \hline 5400 \end{array}$$

$$V_{\text{cube}} = \frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{64}$$

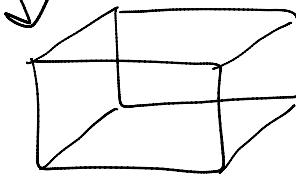
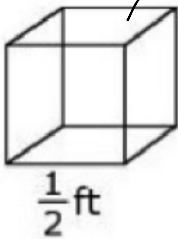
$$\frac{675}{8} \div \frac{1}{64} = \frac{675}{8} \times \frac{64}{1}$$

$$\boxed{5400 \text{ cubes}}$$

How many small cubes are needed to completely fill the right rectangular prism?

OR  $4\frac{1}{2} = \frac{9}{2} = \frac{18}{4}$   $18 \cdot 20 \cdot 15 = 5400 \text{ cubes}$   
 $5 = \frac{5}{1} = \frac{20}{4}$   
 $3\frac{3}{4} = \frac{15}{4} = \frac{15}{4}$

- 4) Alex has 64 cubes, with dimensions in feet (ft), like the one shown.



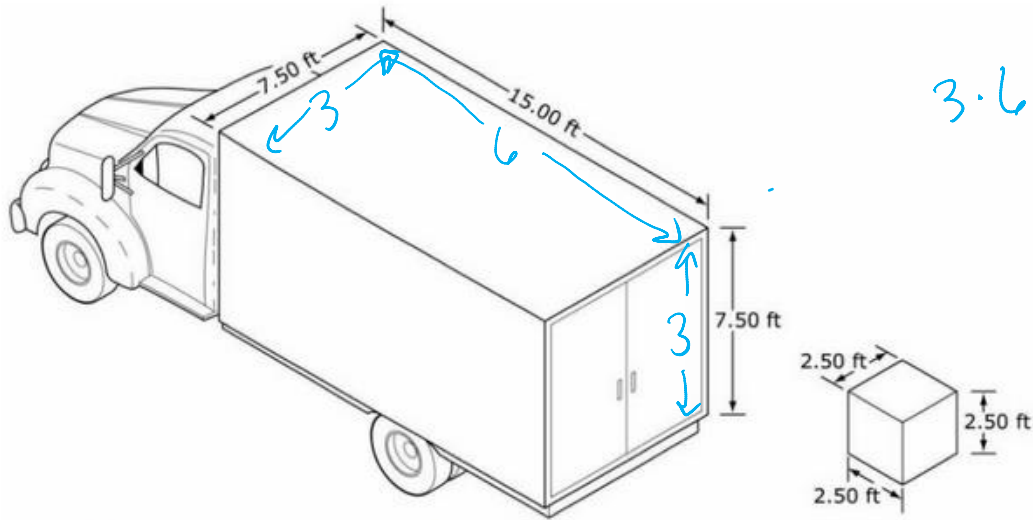
He uses all the cubes to fill a box shaped like a larger rectangular prism. There are no gaps between the cubes.

- A. What is the volume of the larger rectangular prism?  
 B. What are the possible dimensions of the larger rectangular prism?

(A)  $V_{\text{cube}} = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{8} \text{ ft}^3$   
 $\frac{1}{8} \times \frac{64}{1} = \boxed{8 \text{ ft}^3}$

(B)  $2 \cdot 2 \cdot 2 = 8$   
 2 ft by 2 ft by 2 ft  
 1 ft by 1 ft by 8 ft  
 4 ft by 2 ft by 1 ft

- 5) Cube-shaped boxes will be loaded into the cargo hold of a truck. The cargo hold of the truck is in the shape of a rectangular prism. The edges of each box measure 2.50 feet and the dimensions of the cargo hold are 7.50 feet by 15.00 feet by 7.50 feet, as shown below.



$$3 \cdot 6 \cdot 3 = 54 \text{ boxes}$$

What is the volume, in cubic feet, of each box?

Determine the number of boxes that will completely fill the cargo hold of the truck. Use words and/or numbers to show how you determined your answer.

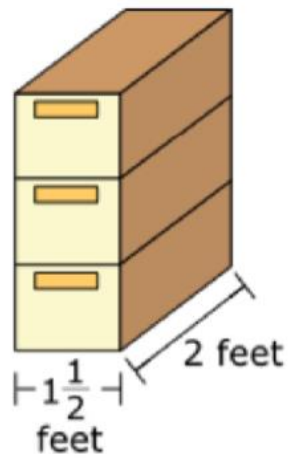
$$V_{\text{boxes}} = \frac{5}{2} \cdot \frac{5}{2} \cdot \frac{5}{2} = \frac{125}{8}$$

$$\begin{array}{r} \times 15 \\ 8 \overline{) 125} \\ \underline{-8} \phantom{0} \\ 45 \\ \underline{-40} \\ 5 \end{array}$$

$$15 \frac{5}{8} \text{ ft}^3$$

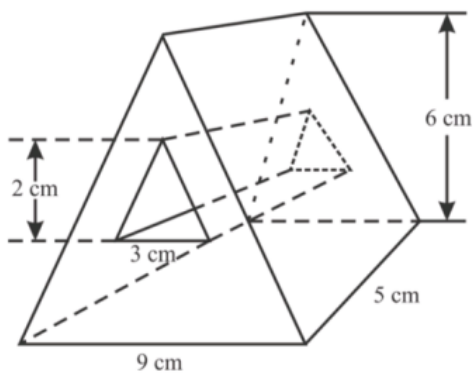
$$15.625 \text{ ft}^3$$

**Q4:** Denzel has two stacks of identical shortage boxes in his room. One stack has 3 boxes and the other stack has 5 boxes. The volume of the stack of 3 storage boxes is  $11\frac{1}{4}$  cubic feet. The drawing shows the stack of 3 storage boxes.



- What is the height, in feet, of 1 storage box?
- What is the volume, in cubic feet, of the stack of 5 storage boxes?

: A triangular prism has a triangular hole cut in it.



Find the volume of the prism after the hole has been cut out.