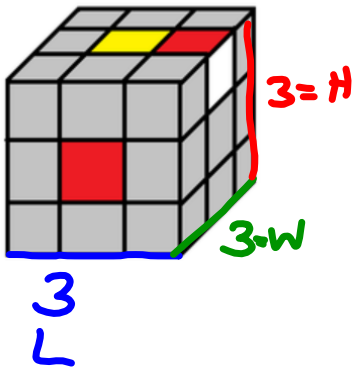
Chapter 6

Geometry & Measurement

Lesson 9

Day 2

1) a)Find the volume of the following rubric cube



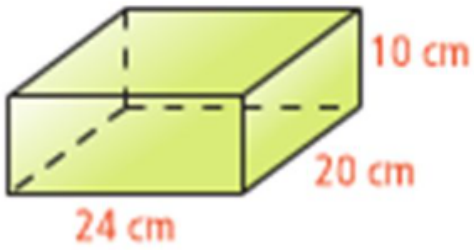
$V = L \times w \times H$

$= 3 \times 3 \times 3$

$= 9 \times 3$

$= 27 \text{ unit}^3$

b) Find the volume of the following



$V = L \times w \times H$

$= 24\text{cm} \times 20\text{cm} \times 10\text{cm}$

$= 480\text{cm}^2 \times 10\text{cm}$

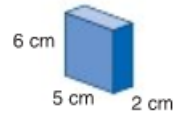
$= 4800\text{cm}^3$

Practice

TIP

1. Find the volume of each rectangular prism.

a)

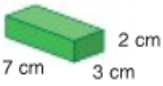


V= L x W x H

= 5cm x 2 cm x 6cm

= 60 cm^3

b)

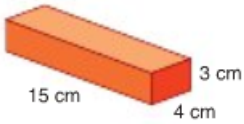


V= L x W x H

= 7cm x 3 cm x 2cm

= 42 cm^3

c)



V= L x W x H

= 15cm x 4 cm x 3cm

= 180 cm^3

2. Estimate, then calculate, the volume of a rectangular prism with these dimensions.

	Length (cm)	Width (cm)	Height (cm)
a)	6	2	2
b)	9	4	7
c)	18	9	12
d)	30	15	6

2a) V= L x W x H

= 6cm x 2 cm x 2cm

= 24 cm^3

2b) V= L x W x H

= 9cm x 4 cm x 7cm

= 252 cm^3

2c) V= L x W x H

= 18cm x 9 cm x 12cm

= 1944 cm^3

2d) V= L x W x H

= 30cm x 15cm x 6cm

= 2700 cm^3

3. A dog box is built to fit in the back of a pick-up truck. It is used to transport sled dogs and supplies to a race. A dog box that holds 3 dogs is 117 cm long, 97 cm wide, and 61 cm tall. Each dog compartment is 38 cm long, 97 cm wide, and 46 cm tall.
   a) What is the volume of each dog compartment?
   b) What is the volume of the dog box that is not used to hold dogs? How did you find out?

a) Compartment

V = L x W x H

= 38cm X 97 cm X 46 cm

= 169 556 cm^3

x 3

= 508 668 cm^3

b) Total box volume

V = L x W x H

= 117cm X 97 cm X 61 cm

= 692 289 cm^3

692 289 cm^3 - 508 668 cm^3

= 183 621 cm^3

118 621 cm^3 is the volume of the box that does not hold dogs

Recall **Volume of Rectangular Prism**

Volume is the amount of space inside a 3D object

(How much to fill up a box)

- it is measured in cubic units

example) mm^3, cm^3, m^3, km^3

Volume of rectangular Prism = L x W X H

Demonstrate with paper stack

Volume of rectangular Prism = $\underbrace{L \times W}$ X H

area of the base x Height

Height = Volume ÷ area of base

Area of base = Volume ÷ Height

1) If a box has a volume of 60 cm^3 and the dimensions of the base is 5 cm by 4 cm , what is the height of the box?

L = 5 cm, w = 4 cm

$V = 60\ cm^3$

$L = 5\ cm$

$w = 4\ cm$

$H = ?$

$V = L \times w \times H$

$60\ cm^3 = 5\ cm \times 4\ cm \times H$

$60\ cm^3 = 20\ cm^2 \times H$

$H = 3\ cm$

$H = V \div A_{base}$

$= 60\ cm^3 \div (5 \times 4)$

$= 60\ cm^3 \div 20\ cm^2$

$H = 3\ cm$

A of base = $4\ cm \times 5\ cm = 20\ cm^2$

2) If a box has a volume of 84 m^3 and the dimensions of the base is 3 m by 7 m , what is the height of the box?

$V = 84\ m^3$

$L = 3\ m$

$w = 7\ m$

$H = ?$

$A_{base} = L \times w$

$= 3\ m \times 4\ m$

$= 21\ m^2$

$V = A_{bas} \times H$

$84\ m^3 = 21\ m^2 \times H$

$H = V \div A_{base}$

$= 84\ m^3 \div 21\ m$

$H = 4\ m$

3) A box has the area of the base as 36 cm^2 and the height 5cm, what is its volume?

$A_{base} = 36cm^2$

$H = 5\,cm$

$V = ?$

$V = L \times w \times H$

$V = A_{base} \times H$

$= 36cm^2 \times 5\,cm$

$V = 180cm^3$

4) If the volume of a box is 140 m^3, and the height is 7 m, then what is the area of the base?

$V = 140\,m^3$

$H = 7m$

$A_{base} = ?$

$V = L \times w \times H$

$V = A_{base} \times H$

$140\,m^3 = ? \times 7m$

$20m^2$

$A_{base} = V \div H$

$= 140m^3 \div 7m$

$A_{base} = 20m^2$

maybe **Class/Homework**

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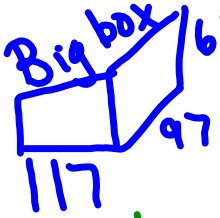
#3, #4, #5, #6a ~~7ab~~ 8

$H = V \div A_{base}$ $A_{base} = V \div H$

$V = L \times w \times H$

$V = A_{base} \times H$

#3 Big box

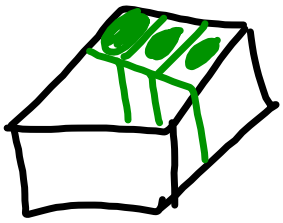


V=

1 compartment

V=

3 of these



V of 1 compartment

$V = L \times w \times H$

$= 38\,cm \times 97\,cm \times 46\,cm$

$= 169\,556\,cm^3$

$\times 3$

$508\,668\,cm^3$

b) $V_{truck\ box}$

$= L \times w \times H$

$= 117\,cm \times 97\,cm \times 61\,cm$

$= 692\,289\,cm^3$

$692\,289\,cm^3$

$-\ 508\,668\,cm^3$

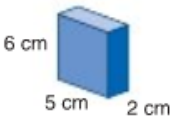
$183\,621\,cm^3$ → left over

Practice

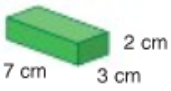
TIP

1. Find the volume of each rectangular prism.

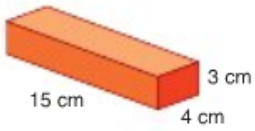
a)



b)



c)



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   a) What is the volume of each dog compartment?
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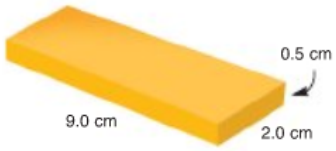
4. During the buffalo hunt, the Métis used a Red River cart to carry buffalo meat and fur. The cart was made of wood and was usually pulled by oxen. The top of this cart has the shape of a rectangular prism with volume 1 350 000 cm^3. The area of its base is about 13 500 cm^2. About how high is the top of the cart? Which strategy did you use to find out?

5. A rectangular prism has volume 90 cm^3. The prism has length 9 cm and width 5 cm. What is its height? How do you know?

6. A rectangular prism has volume 192 cm^3.
   a) The prism is 16 cm high. What is the area of its base? How do you know?
   b) What other possible measurements of height and base area could the rectangular prism have? What strategy did you use to find out?

7. Canada's Food Guide recommends that we eat 2 to 4 servings of dairy products every day.
   a) This piece of cheese is 1 serving of dairy products. What is its volume?



   b) Is the block of cheese at the right more or less than 1 serving? How do you know?

8. Each block in a child's set of building blocks is 15 cm long, 10 cm wide, and 5 cm high. Suppose you put the blocks in a box that is 50 cm long, 35 cm wide, and 30 cm high.

   a) What is the volume of each block? Of the box?
   b) Suppose you only consider the volume. How many blocks would you expect to fit in the box?
   c) Suppose you arrange the blocks neatly in layers. How many different ways can you layer the blocks? How many blocks fit in the box each way?
   d) Compare your answers to parts b and c. Explain any differences.
   e) Which is the best way to pack the blocks? Why?