EUREKA MATH² ™

Module 5 - Lesson 24:

Solve word problems involving volumes of right rectangular prisms.

CCSS Standard – 5.MD.C.5.c

Sprint: Multiply with Decimals

SPRINT: Students write the product to build fluency multiplying with decimals. (PAGE 247)

Write the product.

1.	$3 \times 8 = $ _____	**24**
2.	$0.3 \times 0.8 = $ _____	**.24**
3.	$0.3 \times 0.08 = $ _____	**.024**

I don't expect you to finish. Do as many problems as you can. Go for YOUR personal best.
Take your mark. Get set. Think!

Sprint: Multiply with Decimals

Sprint A – Page 248

Sprint A ⏱ 1 min

STOP!!

<u>**Underline the last problem that you did**</u>.

I am going to read the answers. If you got it right, call out "Yes!" If you made a mistake, circle the answer.

Count the number you got **correct** and write the number at the top of the page.

THIS WILL BE YOUR PERSONAL GOAL FOR SPRINT B

A

Number Correct: _____

Write the product.

#	Problem	Answer	#	Problem	Answer
1.	2 × 3 = _____	6	23.	6 × 7 = _____	42
2.	0.2 × 0.3 = _____	0.06	24.	0.6 × 0.8 = _____	0.48
3.	0.2 × 0.4 = _____	0.08	25.	0.6 × 0.09 = _____	0.054
4.	3 × 4 = _____	12	26.	7 × 7 = _____	49
5.	0.3 × 0.4 = _____	0.12	27.	0.7 × 0.8 = _____	0.56
6.	0.3 × 0.5 = _____	0.15	28.	0.7 × 0.09 = _____	0.063
7.	4 × 7 = _____	28	29.	8 × 7 = _____	56
8.	0.4 × 0.7 = _____	0.28	30.	0.8 × 0.8 = _____	0.64
9.	0.4 × 0.8 = _____	0.32	31.	0.8 × 0.09 = _____	0.072
10.	5 × 6 = _____	30	32.	9 × 7 = _____	63
11.	0.5 × 0.6 = _____	0.30	33.	0.9 × 0.8 = _____	0.72
12.	0.5 × 0.7 = _____	0.35	34.	0.9 × 0.09 = _____	0.081
13.	3 × 6 = _____	18	35.	2 × 8 = _____	16
14.	0.3 × 0.06 = _____	0.018	36.	2 × 9 = _____	18
15.	0.3 × 0.07 = _____	0.021	37.	0.6 × 0.11 = _____	0.066
16.	4 × 8 = _____	32	38.	0.12 × 0.6 = _____	0.072
17.	0.4 × 0.08 = _____	0.032	39.	0.7 × 0.11 = _____	0.077
18.	0.4 × 0.09 = _____	0.036	40.	0.12 × 0.7 = _____	0.084
19.	5 × 8 = _____	40	41.	0.8 × 0.11 = _____	0.088
20.	0.5 × 0.08 = _____	0.040	42.	0.12 × 0.8 = _____	0.096
21.	0.5 × 0.09 = _____	0.045	43.	0.9 × 0.11 = _____	0.099
22.	0.09 × 0.5 = _____	0.045	44.	0.12 × 0.9 = _____	0.108

Sprint: Multiply with Decimals

Sprint B – Page 250
Take your mark. Get set. Improve!

Sprint B ⏱ 1 min

STOP!!

Underline the last problem that you did.

I am going to read the answers. If you got it right, call out "Yes!" If you made a mistake, circle the answer.

Count the number you got **correct** and write the number at the top of the page.

Determine your improved score!

B

Number Correct: _____

Improvement: _____

Write the product.

1.	$2 \times 2 =$ _____	4		23.	$6 \times 6 =$ _____	36
2.	$0.2 \times 0.2 =$ _____	0.04		24.	$0.6 \times 0.7 =$ _____	0.42
3.	$0.2 \times 0.3 =$ _____	0.06		25.	$0.6 \times 0.08 =$ _____	0.048
4.	$3 \times 3 =$ _____	9		26.	$7 \times 6 =$ _____	42
5.	$0.3 \times 0.3 =$ _____	0.09		27.	$0.7 \times 0.7 =$ _____	0.49
6.	$0.3 \times 0.4 =$ _____	0.12		28.	$0.7 \times 0.08 =$ _____	0.056
7.	$4 \times 6 =$ _____	24		29.	$8 \times 6 =$ _____	48
8.	$0.4 \times 0.6 =$ _____	0.24		30.	$0.8 \times 0.7 =$ _____	0.56
9.	$0.4 \times 0.7 =$ _____	0.28		31.	$0.8 \times 0.08 =$ _____	0.064
10.	$5 \times 5 =$ _____	25		32.	$9 \times 6 =$ _____	54
11.	$0.5 \times 0.5 =$ _____	0.25		33.	$0.9 \times 0.7 =$ _____	0.63
12.	$0.5 \times 0.6 =$ _____	0.30		34.	$0.9 \times 0.08 =$ _____	0.072
13.	$3 \times 5 =$ _____	15		35.	$2 \times 7 =$ _____	14
14.	$0.3 \times 0.05 =$ _____	0.015		36.	$2 \times 8 =$ _____	16
15.	$0.3 \times 0.06 =$ _____	0.018		37.	$0.5 \times 0.11 =$ _____	0.055
16.	$4 \times 7 =$ _____	28		38.	$0.12 \times 0.5 =$ _____	0.060
17.	$0.4 \times 0.07 =$ _____	0.028		39.	$0.6 \times 0.11 =$ _____	0.066
18.	$0.4 \times 0.08 =$ _____	0.032		40.	$0.12 \times 0.6 =$ _____	0.072
19.	$5 \times 7 =$ _____	35		41.	$0.7 \times 0.11 =$ _____	0.077
20.	$0.5 \times 0.07 =$ _____	0.035		42.	$0.12 \times 0.7 =$ _____	0.084
21.	$0.5 \times 0.08 =$ _____	0.040		43.	$0.8 \times 0.11 =$ _____	0.088
22.	$0.08 \times 0.5 =$ _____	0.040		44.	$0.12 \times 0.8 =$ _____	0.096

Compare aquariums with different dimensions.

What do you notice about the two aquariums?

Is it possible that the two aquariums hold the same amount of water? Why?

What must be true for the aquariums to have the same volume?

Aquarium A

*The aquariums may have different lengths, widths, and heights that **could** multiply to the same volume.*

From this point of view, we can only see 2 of the 3 dimensions (edges). The third dimension (the depth) is not shown.

Aquarium B

Do you need a diagram of a right rectangular prism to determine its volume? Why?

No! If you are given the prism's length, width, and height, you can determine the volume using the formula V = l x w x h.

LEARN book page 251:

1. Kelly buys an aquarium that is shaped like a right rectangular prism. The aquarium is 20 centimeters long, 25 centimeters wide, and 30 centimeters tall on the inside.

   a. What is the volume of water, in cubic centimeters, that the aquarium can hold?

$$V = L \times W \times H$$

$$V = 20 \times 25 \times 30$$

$$V = 500 \times 30$$

$$V = 15,000 \text{ cubic cm}$$

   b. How many liters of water can the aquarium hold?

Remember!
1 cubic centimeter = 1 milliliter
15,000 cubic cm = 15,000 mL

15,000 milliliters = _____ liters
*Milliliters are smaller than liters, they are 1/1000 of a liter. **We need to divide**.*
15,000 x 1 mL
*15,000 x **0.001 liter***
15 liters

Fill an Aquarium

LEARN book page 251.

2. Kelly fills the aquarium with water to a height of 25 centimeters, as shown. How many more milliliters of water does Kelly need to pour into the aquarium to fill it to the top?

25 cm

25 cm

20 cm
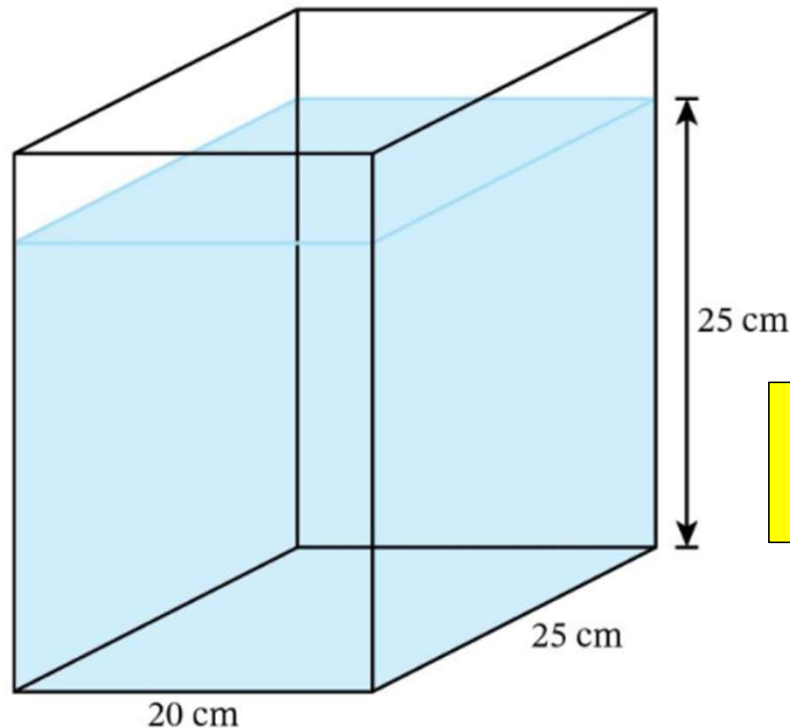
THE WHOLE AQUARIUM

$V = 20 \times 25 \times 30$
$V = 500 \times 30$
$V = 15,000$ cubic cm

THE EMPTY SECTION

$V = 20 \times 25 \times 5$
$V = 500 \times 5$
$V = 2,500$ cubic cm

Remember!
1 cubic centimeter = 1 milliliter
2,500 cubic cm = 2,500 mL

Kelly needs to pour
2,500 milliliters of water
into the aquarium.

When Kelly's aquarium is full, the volume is **15,000** cubic centimeters or **15,000** milliliters.

30 cm

25 cm

20 cm
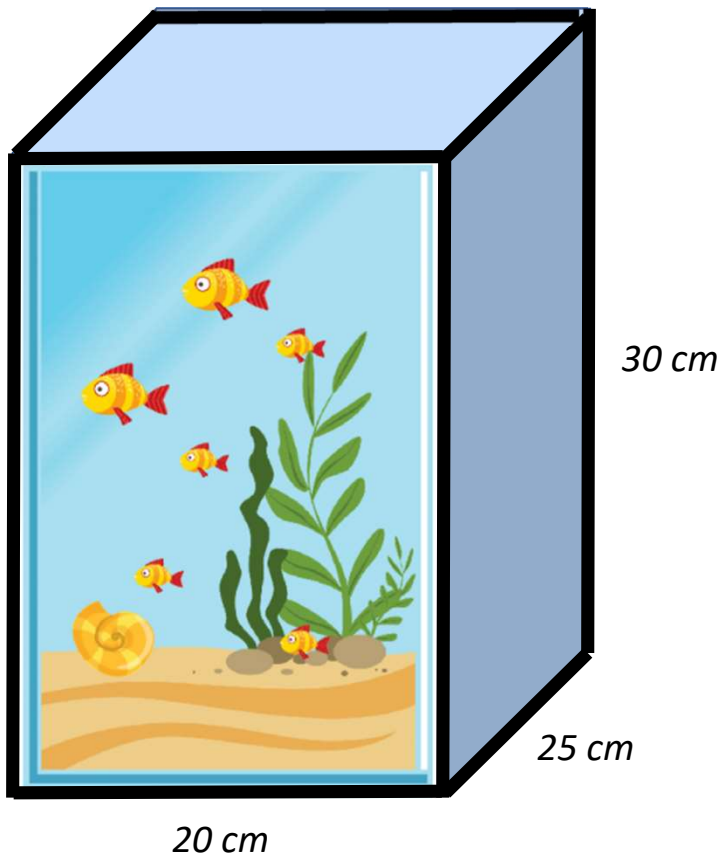
Let's say Kelly drains the aquarium **halfway.**
What would the volume be in cubic centimeters?

½ of 15,000
½ x 15,000
15,000/2
7,500 cubic cm

Let's say Kelly drains the aquarium to **1/3.**
What would the volume be in cubic centimeters?

1/3 of 15,000
1/3 x 15,000
15,000/3
5,000 cubic cm

Find Dimensions of an Aquarium

Fish are different sizes. Some require less space in an aquarium, and others require more space.

For the type of fish Kelly wants, he needs an aquarium with a volume of **30,000 milliliters** (or **30,000 cubic centimeters**).

Knowing that the aquarium will be a right rectangular prism, **what are the possible length, width, and height dimensions?**

We can find factors of 30,000 and decompose those factors into the three dimensions.

LEARN book page 252.

3. Find the length, width, and height of at least two different right rectangular prisms that each have a volume of 30,000 cubic centimeters.

$V = L \times W \times H$ $30{,}000 = 100 \times 300$ $30{,}000 = 20 \times 5 \times 50 \times 6$ $30{,}000 = 20 \times 50 \times 30$ $V = 20 \times 50 \times 30$	$V = L \times W \times H$ $30{,}000 = 200 \times 150$ $30{,}000 = 40 \times 5 \times 50 \times 3$ $30{,}000 = 40 \times 50 \times 15$ $V = 40 \times 50 \times 15$
$V = L \times W \times H$ $30{,}000 = 400 \times 75$ $30{,}000 = 80 \times 5 \times 15 \times 5$ $30{,}000 = 80 \times 15 \times 25$ $V = 80 \times 15 \times 25$	$V = L \times W \times H$ $30{,}000 = 250 \times 120$ $30{,}000 = 25 \times 10 \times 30 \times 4$ $30{,}000 = 25 \times 30 \times 40$ $V = 25 \times 30 \times 40$

LEARN book page 253.

4. To have enough space for his fish, Blake needs an aquarium that takes up at least 1,000 square centimeters of space. He buys an aquarium that is shaped like a right rectangular prism and is 40 centimeters long, 30 centimeters wide, and 25 centimeters tall.

a. Does the aquarium take up at least 1,000 square centimeters of space? Show how you know.

$V = L \times W \times H$

$V = 40 \times 30 \times 25$

$V = 1,200 \times 25$

$V = 30,000$

1,200 represents the BASE, the amount of space the aquarium takes up on the shelf. Regardless of its height, the question is asking how much space it takes up. 1,200 cubic centimeter of space.

b. Blake pours 24 liters of water into the aquarium. How many milliliters of water does he pour into the aquarium?

1 L = 1,000 milliliters

24 x 1,000 milliliters
24,000 milliliters

Use Volume to Solve Problems

LEARN book page 253.

c. What is the height of the water in centimeters?

$V = L \times W \times H$

$V = 40 \times 30 \times 25$

$V = 1{,}200 \times 25$

$V = \mathbf{30{,}000}$

> The entire aquarium (when full) holds 30,000 milliliters (or 30,000 cubic centimeters) of water.
>
> In part B, Blake poured **24,000 milliliters** into the aquarium. The question is asking the height of the water now.

$V = L \times W \times H$

$\mathbf{24{,}000} = 40 \times 30 \times \mathbf{H}$

$\mathbf{24{,}000} = 1{,}200 \times \mathbf{H}$

$24{,}000 \,/\, 1{,}200 = H$

$20 \text{ cm} = H$

> We know the volume is 24,000 mL in the tank.
> The BASE cannot change. It remains 40 by 30, or 1,200 cubic cm.
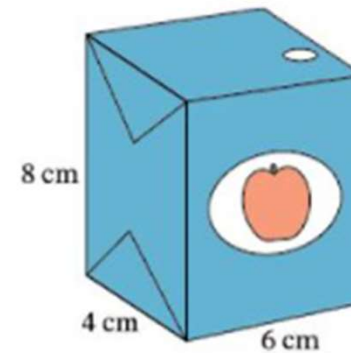> The formula requires us to calculate for the height.
> We need to divide the volume by the base to determine the height.

Problem Set

1. The juice box shown is in the shape of a right rectangular prism. Match each situation to the expression that represents it.

8 cm

4 cm

6 cm

The only dimension that changes is the height. The base of the juice box carton does not change, only the height of the juice as it is consumed. Volume of the box is different than volume of the juice in the box.

Please Notice This

Situation	Expression
The total volume of juice the juice box can hold	$6 \times 4 \times 4$
The volume of juice the juice box holds when it is $\frac{1}{2}$ full	$6 \times 4 \times 2$
The volume of juice the juice box holds when it is $\frac{1}{4}$ full	$6 \times 4 \times 8$

Exit Ticket – PAGE 259

Small Group Time:
Problem Set Pages 255 - 258

Homework:
Page 153   APPLY BOOK

✉ **24**

Name _____   Date _____

1. A right rectangular prism has a volume of 450 cubic centimeters. What is one possible length, width, and height for the prism?

2. The inside of a fish tank that is shaped like a right rectangular prism is 20 centimeters long, 20 centimeters wide, and 25 centimeters tall.

   a. What is the volume of the inside of the tank in cubic centimeters?

   b. How many liters of water does the tank hold?