Module 5 - Lesson 20:

Interpret volume as filling.

CCSS Standard – 5.MD.C.3 / 5.MD.C.3.a / 5.MD.C.3.b

FLUENCY (10-min) **Beep Counting by 4 Tenths by 8 Tenths**

Listen carefully as I count by 4 tenths or 8 tenths. I will replace one of the numbers with the word beep. Raise your hand when you know the beep number. Ready?

$0, 0.4, \_\_\_\_\_$ $2.0, \_\_\_\_\_, 2.8$ $2.0, 1.6, \_\_\_\_\_$

$4.0, \_\_\_\_\_, 3.2$ $0, 0.8, \_\_\_\_\_$ $4.0, \_\_\_\_\_, 5.6$

$4.0, 3.2, \_\_\_\_\_$ $8.0, \_\_\_\_\_, 6.4$

FLUENCY (10-min) **Match: Equivalent Expressions**

LEARN book pages 195 – 201.

Identify equivalent expressions and create equations to build fluency with adding and subtracting fractions with unlike units.

$\frac{1}{3}-\frac{1}{6}$	$\frac{2}{6}-\frac{1}{6}$	$\frac{3}{4}+\frac{1}{8}$	$\frac{6}{8}+\frac{1}{8}$	$\frac{1}{4}+\frac{6}{8}$
$\frac{2}{3}-\frac{1}{6}$	$\frac{4}{6}-\frac{1}{6}$	$\frac{1}{5}+\frac{1}{2}$	$\frac{2}{10}+\frac{5}{10}$	$\frac{4}{6}-\frac{1}{3}$
$\frac{2}{4}+\frac{1}{8}$	$\frac{4}{8}+\frac{1}{8}$	$\frac{2}{5}+\frac{1}{2}$	$\frac{4}{10}+\frac{5}{10}$	

TASK:

- Lay out all cards faceup.
- Match cards that show two equivalent expressions. (Note: two cards do not have matches).
- Lay each set of matched cards side by side. Form an equation by placing an equal sign between equal expressions.
- Continue until all but two cards are matched.

$\frac{1}{3}-\frac{1}{6}$ = $\frac{2}{6}-\frac{1}{6}$

$\frac{1}{6}$ $\frac{1}{6}$

$\frac{1}{5}+\frac{1}{2}$ = $\frac{2}{10}+\frac{5}{10}$

$\frac{7}{10}$ $\frac{7}{10}$

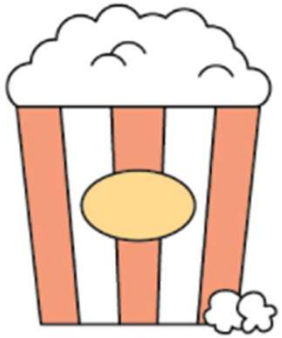
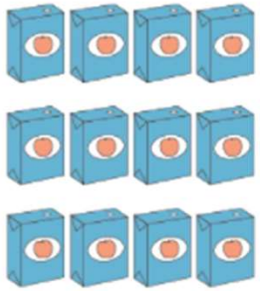
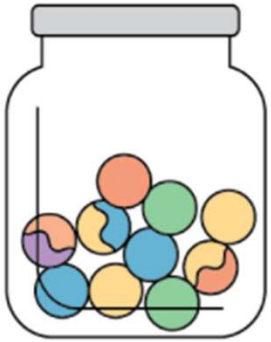
LAUNCH (10-min) **Compare Volume of Various Objects**

THINK-PAIR-SHARE:

Does every three-dimensional object, including liquid, have volume? How do you know?

Yes! All three-dimensional objects, including liquids, have volume because every three-dimensional object takes up space.

Which quantity has the greatest volume?

1 cubic foot of popcorn	1 cubic foot of juice boxes	1 cubic foot of marbles	1 cubic foot of water
			

THINK-PAIR-SHARE:

Which quantity has the greatest volume?

Cubic Foot?

How big is a cubic foot? Show me with your hands.

Packing a Box

What does it mean to pack a container in the shape of a solid?

What is the difference between packing a box with popcorn versus marbles?

Can juice boxes be packed in a cubic foot?

Today, we will learn the difference between packing and filling.

LEARN (30-min) **Pack Prisms and Cylinders**

Cubes in a Cylinder video

Determine why packing with cubes is not always useful for finding volume.

Part 1

What do you notice? Wonder?

What is the volume of the prism? *20 cubes*

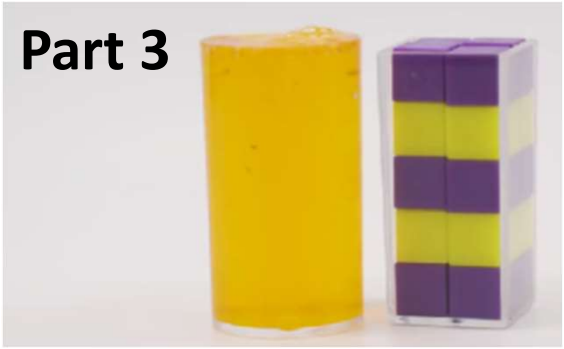
What is the volume of the cylinder? *????*

Part 2

What do you notice? Wonder?

Do you think the rice takes up ALL the space in the cylinder? Why?

Part 3



What do you notice? Wonder?

Why does water fill the cylinder when the cubes and rice do not?

There is no empty space in the cylinder when it is filled with water. Water fills all the space in the cylinder, but we still do not know the volume of cylinder. We need to know how much water was poured into the cylinder.

LEARN (30-min) **From Packing to Filling**

We are trying to find the volume of something that <u>can't</u> be PACKED with centimeter cubes.

When we packed a right rectangular prism with cubes, there were no gaps or overlaps. The cubes filled ALL the space inside the prism. Not all containers can be packed with cubes to find their volumes.

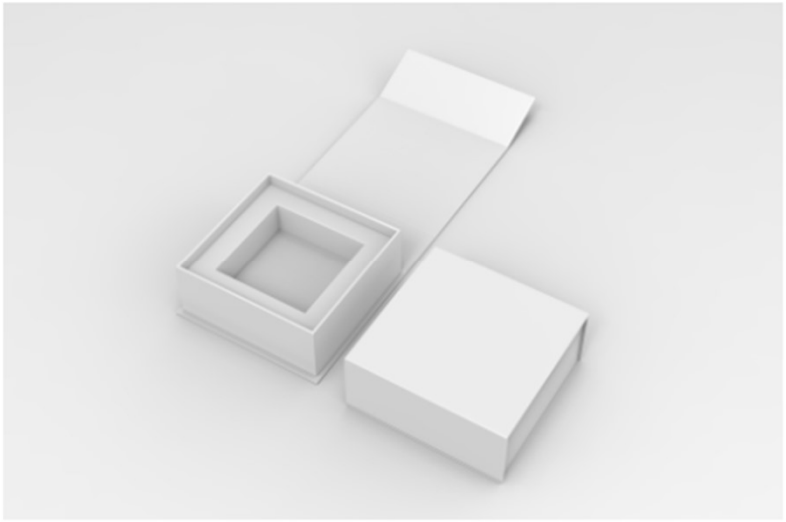
Containers come in all shapes and sizes, not just prisms and cylinders!

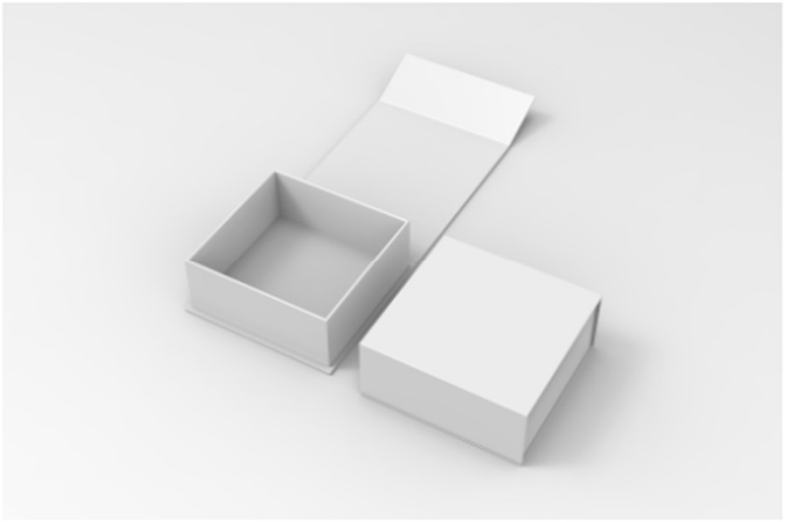
We know that we can fill a container with water to find the volume of the container. What we do not know yet is how the volume of the water in the container relates to the volume of the centimeter cubes.

You learned previously that <u>CAPACITY</u> is the maximum amount that a container can hold, and that liquid volume is the amount of space a liquid takes up.

LEARN (30-min) **From Packing to Filling**

These two boxes are identical except one box has extra padding to protect what goes inside it.





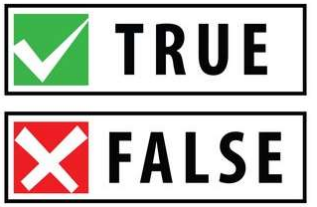
These two boxes have the same dimensions when closed. Do they have the same volume when closed?

Yes! If the boxes are the same size, they take up the same amount of space and therefore have the same volume.

Do the boxes have the same capacity?

No. The boxes do not have the same capacity. The one on the left has more padding so it cannot hold as much. The one of the right can hold more.

LEARN (30-min) **True or False?**



For each question, let's respectfully debate whether it is true or false.

Liquids and solids have volume. TRUE *Every substance and every three-dimensional object have volume.*

Solids take up more space than liquids. FALSE *Solids and liquids can take up the same amount of space.*

When we measure a liquid's volume, we are measuring how much space the liquid takes up. TRUE *That is the definition of volume.*

When we measure a solid's volume, we are measuring how much space the solid takes up. TRUE *That is the definition of volume.*

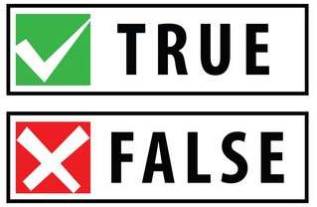
Liquids, such as water, can change shape but solids, such as cubes and rice, cannot change shape. TRUE *Liquids **FILL** a container. Solids **PACK** a container.*

A ruler does not have volume because it is not packed or filled with anything. FALSE *A ruler has volume because it takes up space.*

The volume of a three-dimensional figure is the same whether the figure is a solid or not. TRUE *The figure takes up the same amount of space whether it is solid or not.*

LEARN (30-min)

True or False?



For each question, let's respectfully debate whether it is true or false.

The volume of a prism is the same regardless of whether we think of it being packed with cubes or filled with water.

TRUE

The amount of space taken up is the same whether the space is packed or filled.

A prism with a capacity of 20 cubic centimeters holds the same amount of water as a cylinder with a capacity of 20 cubic centimeters.

TRUE

The prism and the cylinder hold the same amount of water.

Every three-dimensional object has volume, even Earth!

TRUE

Every three-dimensional object takes up space.

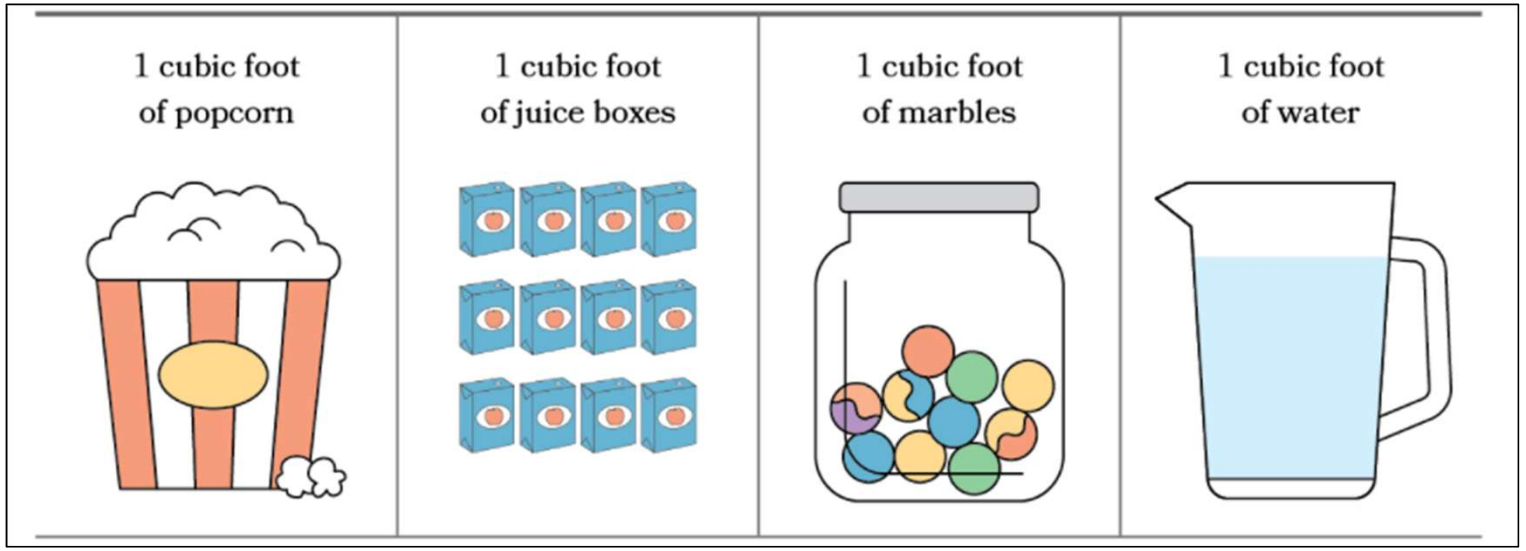
LEARN (30-min)

Which quantity has the greatest volume?

Let's revisit this question from the beginning of the lesson…

Suppose we have a container with a capacity of 1 cubic foot. Could we fill it exactly 1 cubic foot of **water**?

Yes. There would be no gaps in the water.



Now, let's focus if the juice boxes. Could we pack the 1 cubic foot container exactly with juice boxes?

Maybe. If the juice boxes take up all the space in the container perfectly, we could pack it with juice boxes.

Now let's focus on the marbles. Could be pack the 1 cubic foot container exactly with marbles?

No, there will always be empty spaces around the marbles.

Now let's focus on the popcorn. Could be pack the 1 cubic foot container exactly with popcorn?

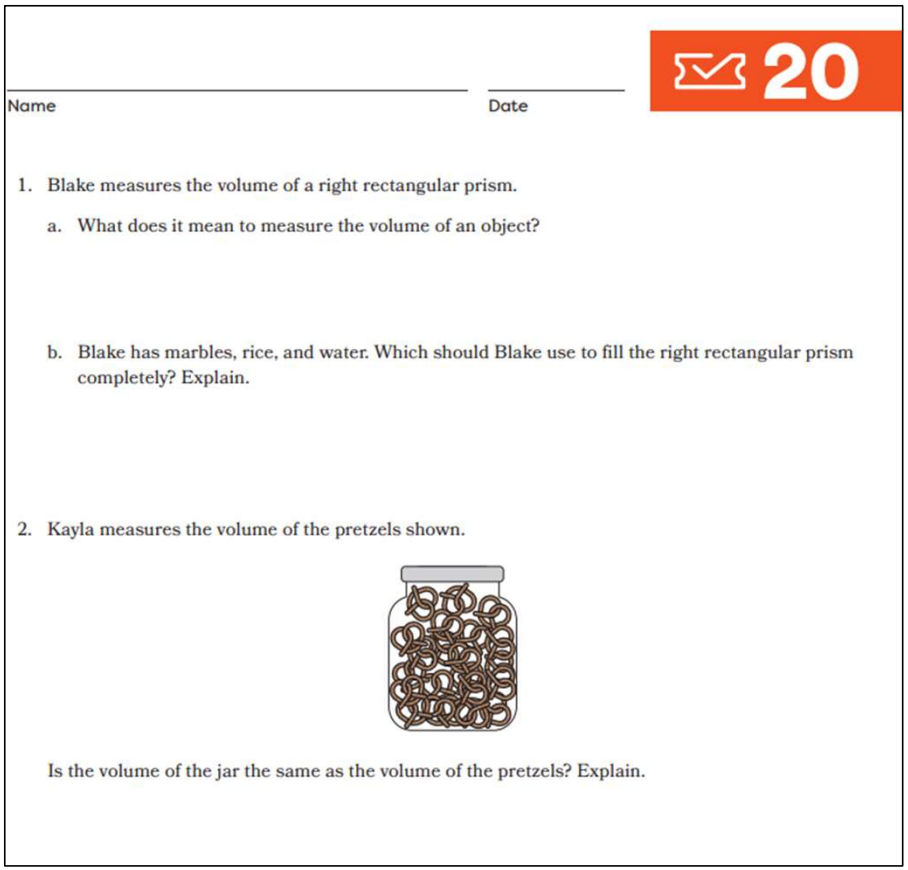
No, there will always be empty spaces around the popcorn.

LAND (10-min) **Exit Ticket**

Exit Ticket – PAGE 203

Small Group Time:
Problem Set Pages - None

Homework:
Page 127 APPLY BOOK



Name _____ Date _____

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1. Blake measures the volume of a right rectangular prism.
   a. What does it mean to measure the volume of an object?

   b. Blake has marbles, rice, and water. Which should Blake use to fill the right rectangular prism completely? Explain.

2. Kayla measures the volume of the pretzels shown.

Is the volume of the jar the same as the volume of the pretzels? Explain.