Name _____ Class _____ Date _____

TEACH TO ONE MATH
a New Classrooms® solution

SMALL GROUP COLLABORATION (SGC)

INDEPENDENTLY, READ THIS PAGE WHILE YOU'RE WAITING FOR YOUR GROUP.

INTRODUCTION

SKILL 600

PRACTICE STANDARD: Make valid arguments and critique the reasoning of others

SKILL OVERVIEW

This skill is about finding the volume and surface area of prisms.

LEARNING GOAL

Your goal is to solve a real-world problem involving volume and surface area of cereal boxes.

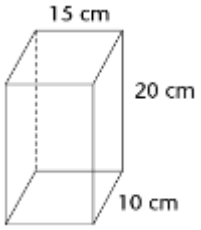
WHY IS THIS LEARNING GOAL IMPORTANT?

This learning goal is important because understanding geometry helps us better understand the world we live in.

MATERIALS: Pencil only

DO NOW: PRACTICE QUESTION

Determine the volume of this rectangular prism:



VOCAB

What mathematical vocabulary is important for this activity?

3-Dimensional
A figure with length, width, and height

Prism
A 3-D figure with two parallel, congruent bases that are polygons

Polygon
A closed two dimensional figure made of three or more line segments

☐ **QUICK CHECK: Is everyone ready to go? – turn the page and get started!**

Calculating Volume and Surface Area

INDEPENDENTLY, READ THE INFORMATION BELOW OR ONE PERSON CAN READ ALOUD.

INTRODUCTION

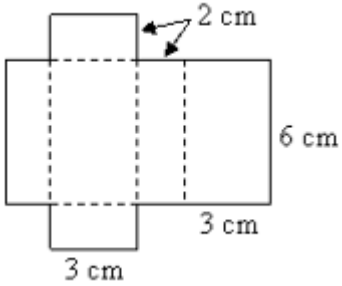


Figure 1

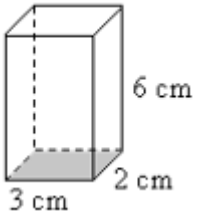


Figure 2

Figure 1 above is a **rectangular prism**, meaning that it is a 3-D figure with two congruent, parallel rectangles as bases. Figure 2 is **net**, and it is the "unfolded" version of the prism.

To find the **volume** of the prism, or how much space the prism takes up, multiply the area of the base times the height.

$$3cm \times 2cm = 6cm^2$$
$$6cm^2 \times 6cm = 36cm^3$$

To find the surface area, add up the individual areas of each of the faces. It is helpful to use the net to make sure you calculate the areas of all faces.

Bottom $3cm \times 2\ cm = 6cm^2$
Top $3cm \times 2\ cm = 6cm^2$

Front $3cm \times 6\ cm = 18cm^2$
Back $3cm \times 6\ cm = 18cm^2$

Left $2cm \times 6cm = 12cm^2$
Right $2cm \times 6cm = 12cm^2$

$$\text{Surface Area} = 6cm^2 + 6cm^2 + 18cm^2 + 18cm^2 + 12cm^2 + 12cm^2 = 72cm^2$$

WHOLE GROUP

TALK ABOUT IT: Why do you think the units for volume are in cm^3 and surface area are in cm^2?

<5 min

REMEMBER

To find the area of a rectangle, multiply LENGTH x WIDTH

VOCAB

Net
A deconstructed, or "unfolded," 3-D figure

Volume
The amount of space a 3-D object takes up; measured in cubic units

Surface Area
the sum of the areas of all of the faces of a 3-D figure

☐ **QUICK CHECK: I have read the information on this page with my group.**

Cereal Box Conundrum

INDEPENDENTLY, READ THE INFORMATION BELOW OR ONE PERSON CAN READ ALOUD.

CHALLENGE GOAL

GROUP CHALLENGE GOAL

A cereal company wants to decide if they should keep their current box or use a new style based on how much cardboard is needed for the box and how much cereal the box can hold.

Each group should:

1. Calculate the surface area and volume of the boxes
2. Come up with a 3rd alternative of your own design (be creative!)

Then, you will come back together to decide which box you think the cereal company should use.

IN YOUR OWN WORDS: What final decision will your group need to make at the end of this activity?

SMALL TEAM

SMALL TEAM BREAK-OUT: Break into two **smaller thinking teams** to complete this activity. The whole group will reconvene for page six.

Who will be in your **small team** for the work on pages four and five?
Write their names below.

<5 min

QUICK CHECK ☐

I understand what I need to do for the challenge!

REMEMBER

For the work on pages 4 & 5, you'll be in small teams.

VOCAB

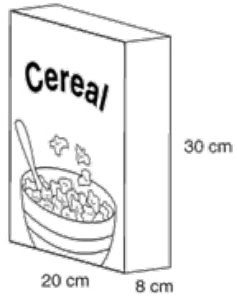
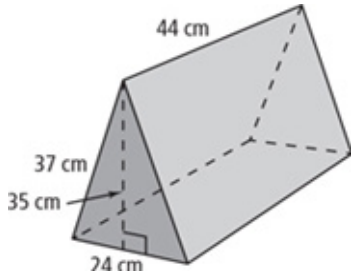
Reconvene
get together again

☐ **QUICK CHECK: We've divided up into small thinking teams.**

Cereal Box Conundrum

SOLVE THIS PART WITH YOUR SMALL TEAM OR INDEPENDENTLY.

PART A: SMALL TEAM

BOX 1 (OLD)	BOX 1 (NEW)	BOX 1 (YOUR DESIGN)
		
VOLUME	VOLUME	VOLUME
SURFACE AREA	SURFACE AREA	SURFACE AREA

10 min

REMEMBER

the formula for the area of a triangle is ½ (base x height)

Draw and label a net to help you find the surface area.

HINT

Draw and label a net to help you find the surface area.

☐ **QUICK CHECK: Double check that your units are correct**

Cereal Box Conundrum

SMALL TEAM

SOLVE THIS PART WITH YOUR SMALL TEAM OR INDEPENDENTLY.

PART B: SMALL TEAM

Do you think the cereal company should keep the old box, use the new one or choose one of your designs? Why? Write your answer in complete sentences and use evidence from the problem above.

SMALL TEAM

TALK ABOUT IT: Each person should be prepared to share something with the whole group.

One thing I plan to say is _____

One question I might want to ask another team about their work is:

10 min

HINT

Keep two things in mind while making your decision: How much cereal can fit in the box, and how much cardboard it will take to make the box.

☐ **QUICK CHECK: Our small team is ready to share with the whole group.**

☐ **Other teams are ready to reconvene**

Discuss and Decide

AS A WHOLE GROUP, DISCUSS AND ANSWER THE CHALLENGE GOAL QUESTION.

PART C: WHOLE GROUP

SHARE-OUT PROCEDURE

10 min

- **30 seconds:** One person talks – everyone else respectfully listens.
  Does anyone have questions about what they just heard?
  30 more seconds to answer questions if needed.
- **Repeat** until everyone has shared.
- **5 minutes:** Anyone can ask questions or speak about the topic.
  Discuss & answer the Group Challenge question below.

CHALLENGE GOAL: Final Decision

Based on your group's learning and discussion, what did your group decide the cereal company should do and why?

My idea (from the last page)	The group's final decision

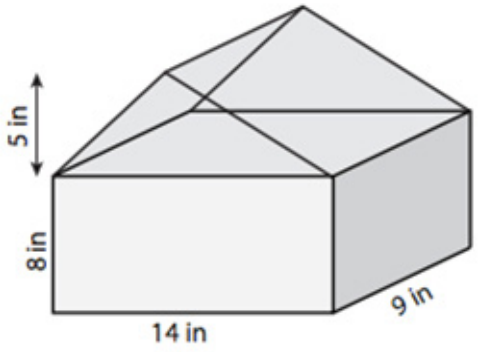
☐ **QUICK CHECK: *Everyone* in the group had a chance to speak.**
☐ ***Everyone* in the group helped complete the Group Challenge.**

Reflection

INDEPENDENTLY, COMPLETE THE REFLECTION

REFLECTION

Look at the compound figure below. Make a plan for how you think you could find the volume of it.



MY PLAN

Find the volume of the figure

MATH PRACTICE STANDARD: MAKE VALID ARGUMENTS AND CRITIQUE THE REASONING OF OTHERS

Describe another way you could have found the volume of the figure above?

5 min

SKILL CHECK ☐

One a scale of 1-5, how well do you understand finding volume and surface area of prisms?

1 = low
5 = high

☐ **QUICK CHECK: I've answered these questions thoughtfully.**

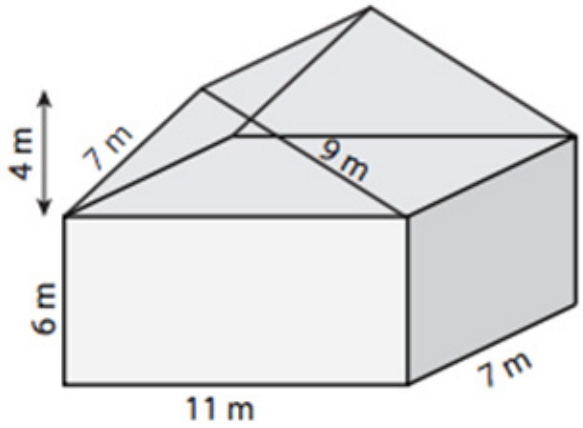
Ending Problem

INDEPENDENTLY, SOLVE THE PROBLEM

Find the surface area of the figure:

a) 416 m^2
b) 493 m^2
c) 570 m^2
d) 623 m^2

Show all your work below:



REFERENCES:
http://www.onlinemathlearning.com/geometry-nets.html
http://www.to2s.com/tests/math5mt/
http://assets.pearsonschool.com/file-vault/flipbooks/texasreview/mathematics/digits/TX_Digits_HomeworkHelper_HTML_Files/Grade%208/Volume%201/page_161.html
http://www.mathworksheets4kids.com/volume/compound-shapes-easy1.pdf
http://www.mathworksheets4kids.com/surface-area/compound-shapes2.pdf

<5 min

HINT

This question is similar to the types of questions you'll see on your skill assessment.

☐ **QUICK CHECK: I've cleaned up my working space and put all materials away.**