DISTRICT OF COLUMBIA
PUBLIC SCHOOLS

Distance Learning Plan

Sixth Grade Math

Week 6

1200 First Street, NE | Washington, DC 20002 | T 202.442.5885 | F 202.442.5026 | www.dcps.dc.gov

Family Overview

Dear Students and Families,

Welcome to Week 6 of Distance Learning! We hope you are safe and healthy while you are out of school and learning from home.

Content Overview

This week you will continue with 3D geometry concepts such as surface area, and solving problems in real-world contexts. You will end the week with a knowledge check of your new learning this module.

We recommend that you spend 40 – 60 minutes per day working on these tasks, but you can decide how best to organize your work and spread it out across the week.

Week at a Glance

Day 1	Day 2	Day 3	Day 4
Learning Objective: By the end of today's learning, I will be able to find the surface area of rectangular prisms and cubes using the most efficient method.	**Learning Objective:** By the end of today's learning, I will be able to determine the surface area and volume of three-dimensional figures in real-world contexts.	**Learning Objective:** By the end of today's learning, I will solidify a strong understanding of this unit's geometry concepts.	**Learning Objective:** By the end of today's learning, I will demonstrate my understanding of this unit's geometry concepts through an assessment.
Agenda: 1. Opening 2. New Learning 3. Your Turn! 4. Exit Ticket	**Agenda:** 1. Opening 2. New Learning 3. Your Turn! 4. Exit Ticket	**Agenda:** 1. Opening 2. Review Activity	**Agenda:** 1. Opening 2. Your Turn! (Knowledge Check)

Digital Extended Learning Opportunities (Optional)

iReady- In addition to the math tasks and connections in the distance learning plan, you can also supplement your learning by continuing your lessons on i-Ready. You can access i-Ready through your Clever account (clever.com). All students will have access to i-Ready lessons even if you usually do not work on i-Ready lessons at school.

ALEKS (for students who have been using ALEKS this year only)- In addition to the math tasks and problems in the distance learning plan, you can also supplement your learning by continuing your lessons on ALEKS. You can access ALEKS through your Clever account (clever.com).

Look for this icon to see recommended Khan Academy videos and practice problems.

Adapted from Eureka Math Grade 6 Module 5 Lessons 17-18

Day One – Determining Surface Area of Three-Dimensional Figures Using Nets

Objective

By the end of today's learning, I will be able to find the surface area of rectangular prisms and cubes using the most efficient method.

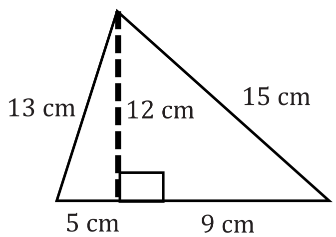
Opening

5 minutes

Directions:

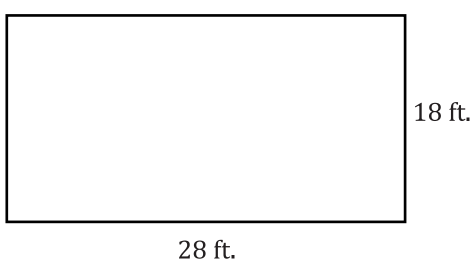
1. Write a numerical equation for the area of the figure below. Explain and identify different parts of the figure.

   a.



   b. How would you write an equation that shows the area of a triangle with base b and height h?

2. Write a numerical equation for the area of the figure below. Explain and identify different parts of the figure.



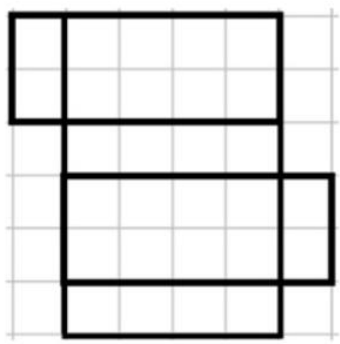
   a. How would you write an equation that shows the area of a rectangle with base b and height h?

New Learning

Today, we will continue to build our understanding of surface area. By the end of today, you will be able to use both nets and formulas to find surface area.

Example 1

Name the shape, and write an expression for surface area. Calculate the surface area of the figure. Assume each box on the grid paper represents a 1 ft. ×1 ft. square.



Name of Shape: Rectangular Prism

I know this is a rectangular prism because there are six rectangular faces.

To find the surface area, I can find the area of each face and then find the sum of the areas of all six faces.

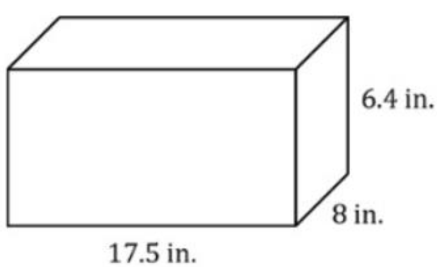
Surface Area:

$$(2\text{ ft.}\times 1\text{ ft.})+(2\text{ ft.}\times 1\text{ ft.})+(4\text{ ft.}\times 2\text{ ft.})+(4\text{ ft.}\times 2\text{ ft})+(4\text{ ft.}\times 1\text{ ft.})+(4\text{ ft.}\times 1\text{ ft.})$$
$$=2(2\text{ ft.}\times 1\text{ ft.})+2(4\text{ ft.}\times 2\text{ ft.})+2(4\text{ ft.}\times 1\text{ ft.})$$
$$=4\text{ ft}^2+16\text{ ft}^2+8\text{ ft}^2$$
$$=28\text{ ft}^2$$

I notice there are three groups of faces that have identical areas, so I can rewrite the expression to reflect this idea.

Example 2

Calculate the surface area of the figures below. These figures are not drawn to scale.



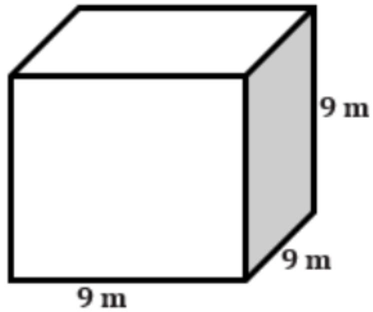
The formula $SA=2(l\times w)+2(l\times h)+2(w\times h)$ can be used to determine the surface area of this figure.

$$SA=2(17.5\text{ in.})(8\text{ in.})+2(17.5\text{ in.})(6.4\text{ in.})+2(8\text{ in.})(6.4\text{ in.})$$
$$SA=280\text{ in}^2+224\text{ in}^2+102.4\text{ in}^2$$
$$SA=606.4\text{ in}^2$$

The surface area of the figure is 606.4 in^2.

Example 3:

. Examine the figure below.



a. What is the most specific name of the three-dimensional shape?

Cube

b. Write two different expressions for the surface area.

$(9\text{ m} \times 9\text{ m}) + (9\text{ m} \times 9\text{ m}) + (9\text{ m} \times 9\text{ m}) + (9\text{ m} \times 9\text{ m}) + (9\text{ m} \times 9\text{ m}) + (9\text{ m} \times 9\text{ m})$

$6(9\text{ m})^2$

I know that a cube is a unique rectangular prism because it has 6 identical faces. I can use the formula for surface area of a rectangular prism or the formula $SA = 6s^2$, which is more efficient for a cube.

c. Explain how these two expressions are equivalent.

The two expressions are equivalent because the first expression shows the sum of the areas of each face. The second expression is a more compact expression because each face has the same area and there are 6 groups of 9 m^2.

Lesson Summary

Surface Area Formula for a Rectangular Prism: $SA = 2lw + 2lh + 2wh$

Surface Area Formula for a Cube: $SA = 6s^2$

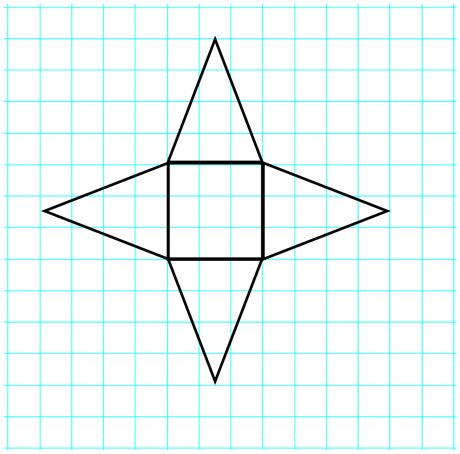
Your Turn!

Visit bit.ly/khangeo1 for extra help!

Directions: Solve each question in the space provided. Refer back to the examples in this lesson if you get stuck.

Explain the error in each problem below. Assume each box on the grid paper represents a $1\text{ m} \times 1\text{ m}$ square.

1.



Name of Shape: Rectangular Pyramid, but more specifically a Square Pyramid

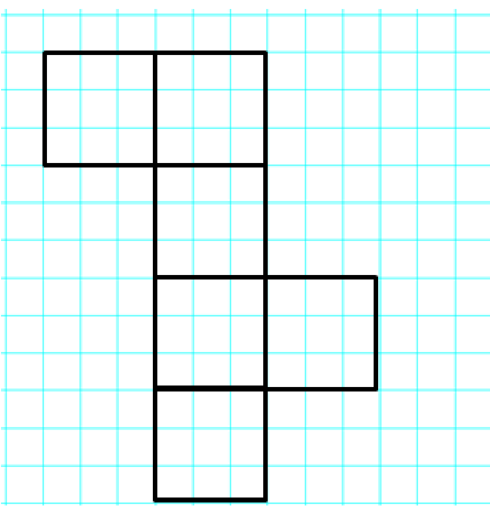
Area of Base: $3\text{ m} \times 3\text{ m} = 9\text{ m}^2$

Area of Triangles: $3\text{ m} \times 4\text{ m} = 12\text{ m}^2$

Hint: Look here!

Surface Area: $9\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 + 12\text{ m}^2 = 57\text{ m}^2$

2.



Name of Shape: Rectangular Prism or, more specifically, a Cube

Area of Faces: $3\text{ m} \times 3\text{ m} = 9\text{ m}^2$

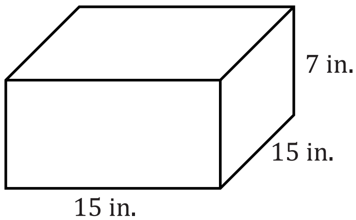
This looks right!

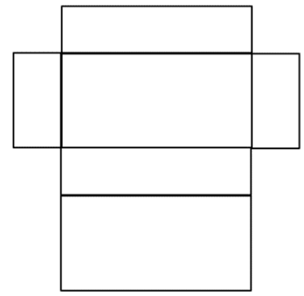
Surface Area: $9\text{ m}^2 + 9\text{ m}^2 + 9\text{ m}^2 + 9\text{ m}^2 + 9\text{ m}^2 = 45\text{ m}^2$

Hmm…

Calculate the surface area of each figure below. Figures are not drawn to scale. Use the net if needed.

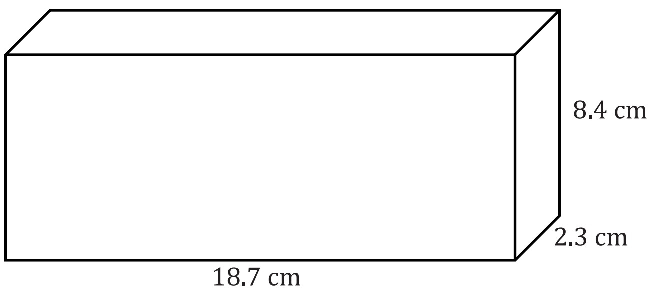
3.

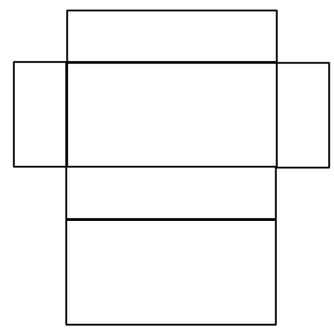




Surface area = _______________ square in.

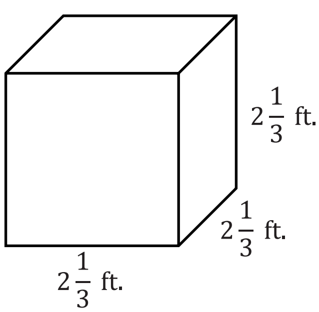
4.





Surface area = _______________ square cm.

5.



Surface area = _______________ square ft.

DISTRICT OF COLUMBIA
PUBLIC SCHOOLS

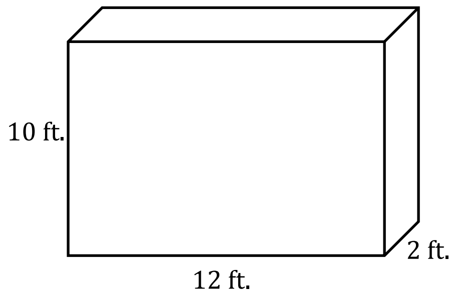
Exit Ticket

≤ 10 minutes

Directions: Answer each question in the space provided. Be sure to show all work!

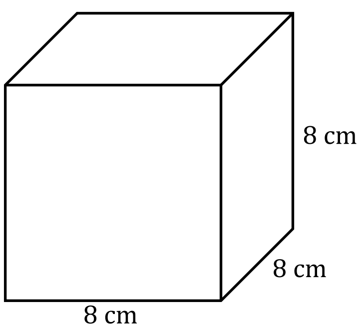
Calculate the surface area of each figure below. Figures are not drawn to scale.

1.



Surface Area = _______________square feet.

2.



Surface Area = _______________square cm.

Day Two – Surface Area and Volume in the Real World

Objective

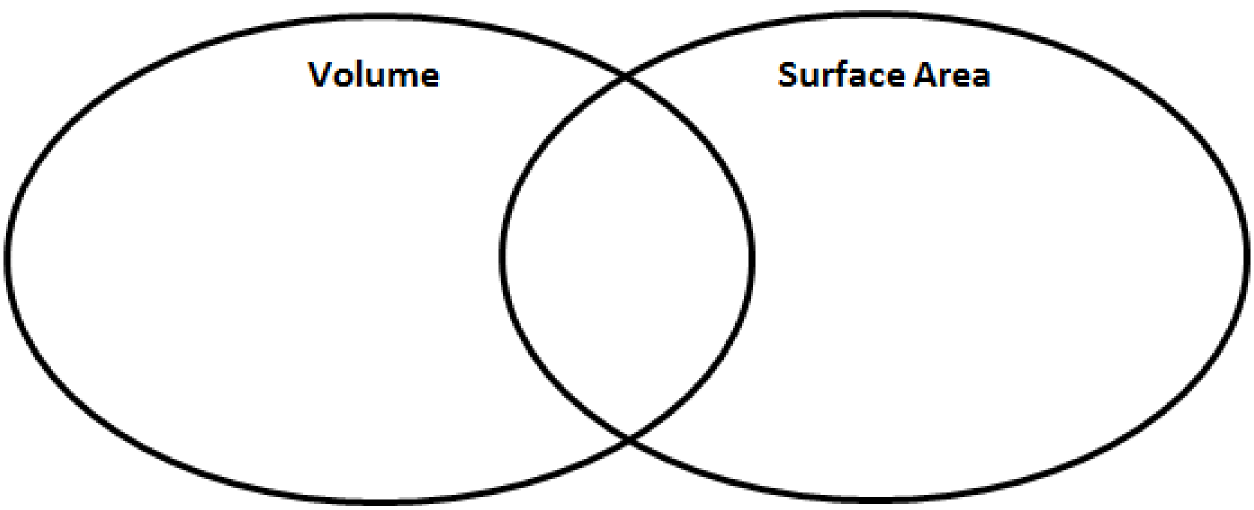
By the end of today's learning, I will be able to determine the surface area and volume of three-dimensional figures in real-world contexts.

Opening

5 minutes

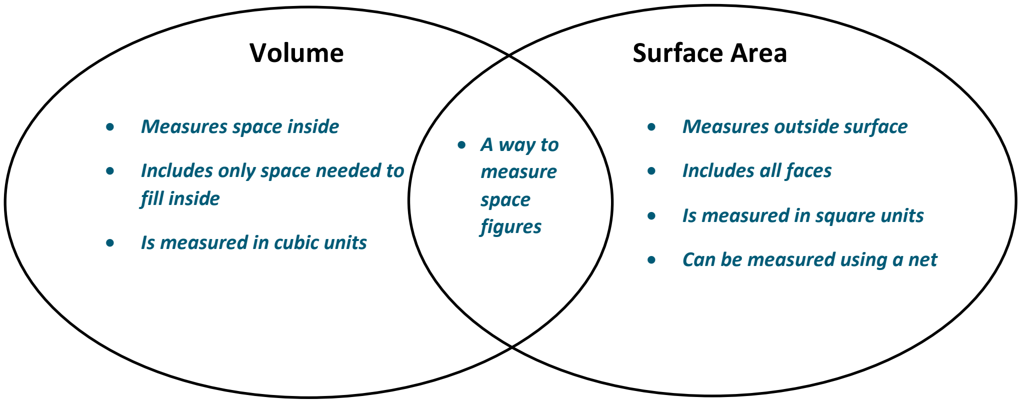
Directions: Do your best to complete the Venn Diagram below comparing volume and surface area. The intersecting area in the middle is what is common for both volume and surface area. The space to the left is only true for Volume and the space to the right is only true for Surface Area.

Some ideas to consider



New Learning

In the opening, you considered what was similar and different about surface area and volume. Below is a completed Venn Diagram for your reference:



The key difference between the two is that volume measures what is ________ a 3D figure,

and surface area measures the space on the _______ of a 3D figure.

For some of today's problems, you will have to determine whether to find surface area or volume depending on the context of the question.

Example

1. Samuel built a small wooden box to hold nails. Each side of the box measures 7 inches.

   a. How many square inches of wood did he use to build the box?

   Surface Area of the Box: $SA = 6(7 \text{ in.})^2 = 6(49 \text{ in}^2) = 294 \text{ in}^2$

   Samuel used 294 square inches of wood to build the box.

   I need to determine the surface area because it measures the total area of the surface of a figure.

   b. How many cubic inches of nails does the box hold?

   Volume of the Box: $V = 7 \text{ in.} \times 7 \text{ in.} \times 7 \text{ in.} = 343 \text{ in}^3$

   The box holds 343 cubic inches of nails.

   The volume of a cube measures the space inside a three dimensional figure. To calculate the volume of a cube, I multiply the length, width, and height, or $V = s^3$ since the dimensions are the same.

Sometimes, you will see problems that ask you to not just find surface area or volume, but involve multiple steps.

Example:

Auntie Math, Co. has two different boxes for Auntie Math Cereal. The large box is 7.5 inches wide, 8 inches high, and 3 inches deep. The small box is 4 inches wide, 11 inches high, and 1.5 inches deep.

a. How much more cardboard is needed to make the large box than the small box?

Surface Area of the Large Box:

$$2(7.5\text{ in.})(8\text{ in.}) + 2(7.5\text{ in.})(3\text{ in.}) + 2(8\text{ in.})(3\text{ in.})$$

$$120\text{ in}^2 + 45\text{ in}^2 + 48\text{ in}^2$$

$$213\text{ in}^2$$

Before I can answer the question, I need to calculate the surface area for each box.

Surface Area of the Small Box:

$$2(4\text{ in.})(11\text{ in.}) + 2(4\text{ in.})(1.5\text{ in.}) + 2(11\text{ in.})(1.5\text{ in.})$$

$$88\text{ in}^2 + 12\text{ in}^2 + 33\text{ in}^2$$

$$133\text{ in}^2$$

Difference:

$$213\text{ in}^2 - 133\text{ in}^2$$

$$80\text{ in}^2$$

The large box requires 80 square inches more material than the small box.

Your Turn!

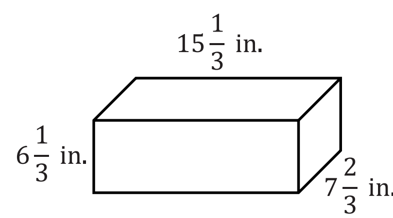
Visit bit.ly/khangeo2 for extra help!

Directions: Solve each question in the space provided. Refer back to the examples in this lesson if you get stuck.

1. Dante built a wooden, cubic toy box for his son. Each side of the box measures 2 feet.
   a. How many square feet of wood did he use to build the box?

   b. How many cubic feet of toys will the box hold?

2. A rectangular box of rice is shown below. What is the greatest amount of rice, in cubic inches, that the box can hold?



3. The Mars Cereal Company has two different cereal boxes for Mars Cereal. The large box is 8 inches wide, 11 inches high, and 3 inches deep. The small box is 6 inches wide, 10 inches high, and 2.5 inches deep.

   a. How much more cardboard is needed to make the large box than the small box?

   b. How much more cereal does the large box hold than the small box?

DISTRICT OF COLUMBIA
PUBLIC SCHOOLS

Exit Ticket

≤ **10 minutes**

Directions: Answer each question in the space provided. Be sure to show all work!

Solve the word problem below.

1. Kelly has a rectangular fish aquarium that measures 18 inches long, 8 inches wide, and 12 inches tall.

   a. What is the maximum amount of water the aquarium can hold?

   b. If Kelly wanted to put a protective covering on the four glass walls of the aquarium, how big does the cover have to be?

Day Three – Geometry Review

Objective

By the end of today's learning, I will solidify a strong understanding of this unit's geometry concepts.

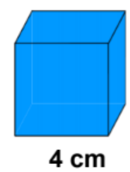
Opening

5 minutes

Directions: Answer each question in the space provided.

How many cubic inches of water can the fish tank below hold?

What is the surface area a cube with a side length of 4 cm?



Review Scavenger Hunt

Visit bit.ly/khangeo3 to take a sample test and identify areas you may need to review more!

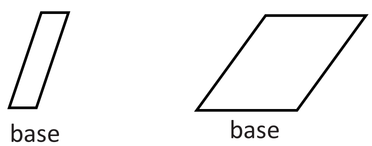
Directions: Today, you will be making a review sheet covering all the topics you have learned in this module. For each topic, you will need to recall or refer back to previous new learning sections to find definitions, formulas, and example problems with solutions. ***You will be able to use this sheet on tomorrow's knowledge check!***

Parallelograms

Definition: A parallelogram is a ____________________ that has two sets of ____________ lines

$Area_{Parallelogram} =$

Draw and label the height of each parallelogram:



Find at least 2 problems where you need to calculate the area of a parallelogram, draw them here, and solve them. Refer to Week 5 Lesson 1 to find them.

1)

2)

Triangles

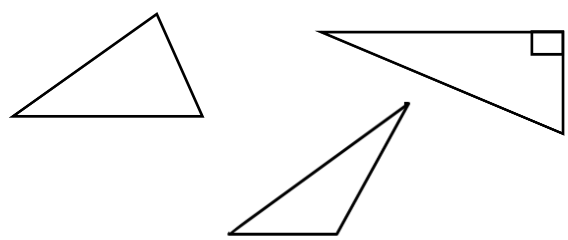
$Area_{Triangle} =$

OR

$Area_{Triangle} =$

Definition: The *altitude* of a triangle is a line segment from a __________ of the triangle and ___________________ to the opposite side. Altitude is another way of referring to the _________ of the triangle.

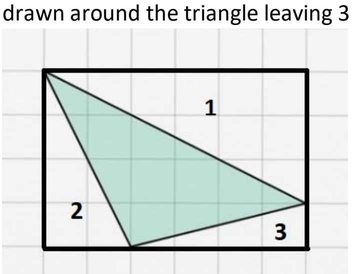
Draw and label the altitude of each triangle below.



Draw your own triangle, label each dimension, and find the area. You may need to refer to Week 5 Lesson 2 for examples.

Polygons on the Coordinate Plane Part 1

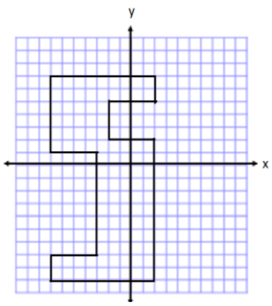
Find the area of the shaded triangle below. Because we were unable to determine the base and height by counting, a rectangle has been drawn around the triangle leaving 3 right triangles whose dimensions can be easily counted. Refer to Week 5 Lesson 3 for examples.



Polygons on the Coordinate Plane Part 2- Irregular Shapes

Definition: Irregular shapes are _____ dimensional shapes whose sides and interior angles are ________ all the same.

Determine the area of the polygon:



Surface Area

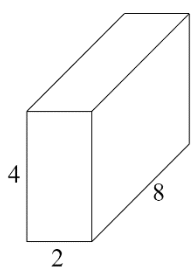
Definition: Surface area is the _________ area of each _____________ of a prism.

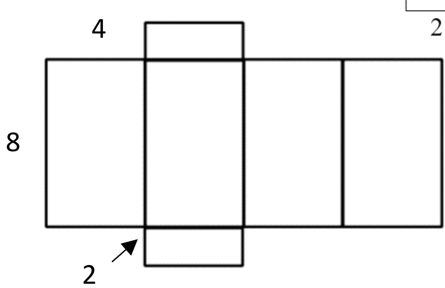
Formula for SA of a rectangular prism:

Formula for SA of a cube:

1) Label **all parts** of the net

2) Find the surface area of the prism





Area and Perimeter Problems

Find 2 word problems from Week 5 Day 4. One word problem where you need to find the area and one word problem where you need to find the perimeter. Copy them here and solve them.

1) Area

2) Perimeter

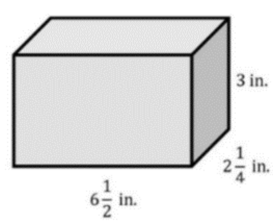
Volume

Definition: Volume is the amount of space that a _______ dimensional object occupies.

$$Volume = Bh$$

__________________ __________

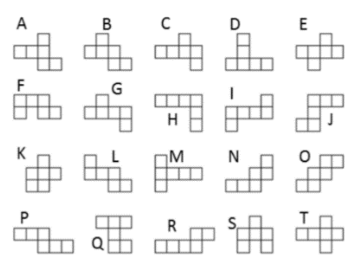
Find the volume of the rectangular prism below:



How many $\frac{1}{4}in$ cubes can fit inside the prism above?

Nets of a Cube

Shade in the nets that form a cube:



Day Four – Geometry Knowledge Check

Objective

By the end of today's learning, I will demonstrate my understanding of this unit's geometry concepts through a task.

Opening **5 minutes**

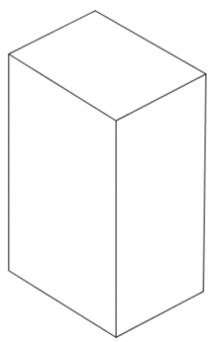
Directions: Use these 5 minutes to review your notes from yesterday's activity to prepare for the Knowledge Check.

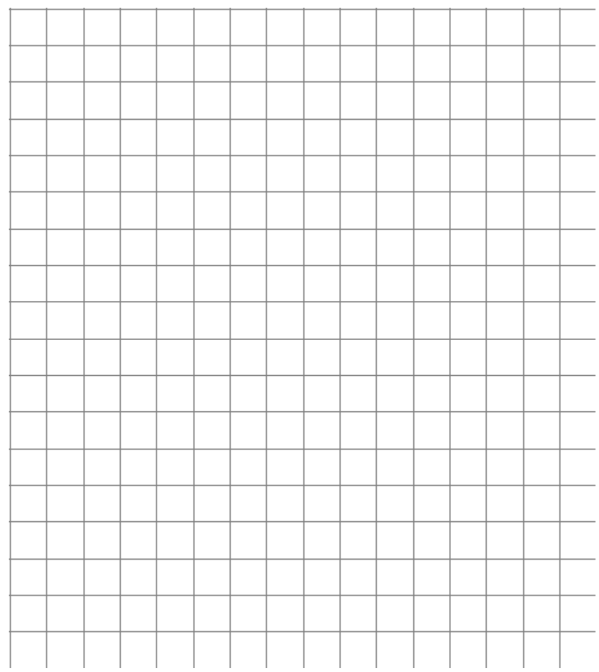
Your Turn!

Knowledge Check

Directions: Solve each question in the space provided. Feel free to use any materials from this module as you complete the task.

1. The juice box pictured below is 4 inches high, 3 inches long, and 2 inches wide.





   a. In the grid above, the distance between grid lines represents one inch. Use the grid paper to sketch the net of the juice box.

   b. Find the surface area of the juice box. Show your work.

   c. Find the volume of the juice box. Show your work.

2. The Cubic Crystal Company has a new Crystal Cube they want to sell. The packaging manager insists that the cubes be arranged to form a rectangular prism and that the package be designed to hold the Crystal Cubes exactly, with no leftover packaging. Each Crystal Cube measures $1 \text{ in.} \times 1 \text{ in.} \times 1 \text{ in.}$ There are 24 Crystal Cubes to be sold in a box.

   a. What are the dimensions of the possible box designs in inches? The first one has been done for you.

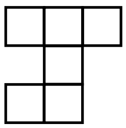
Height	**Width**	**Length**
1 in	1 in	24 in

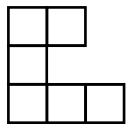
   b. Which Crystal Cube box design will use the least amount of cardboard for packaging? Justify your answer as completely as you can.

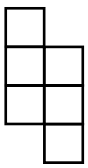
Height	**Width**	**Length**	**Surface Area**

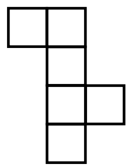
   c. Another type of cube is the Mini Crystal Cube, which has an edge length of $\frac{3}{4}$ inch. What is the volume in cubic inches of one Mini Crystal Cube? Show your work.

3. Which of these nets can be folded to form a cube? Circle your choice(s).

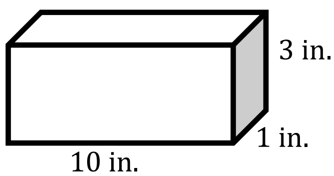
A


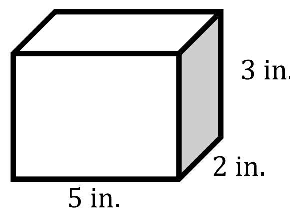
B


C


D


4. Which box below has the larger surface area?

Box A


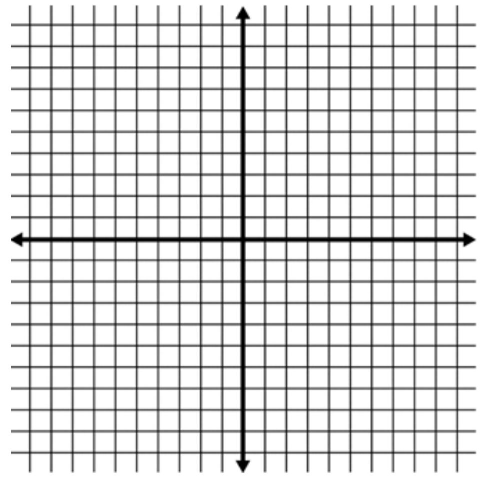
Box B


Answer: Box ______ has a larger surface area.

DISTRICT OF COLUMBIA
PUBLIC SCHOOLS

5. a. Draw a polygon in the coordinate plane using the given coordinates.

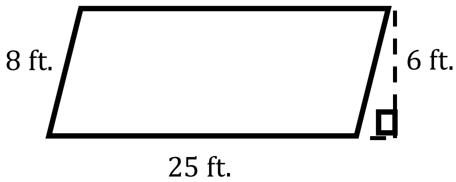
$(4, -4)$
$(6, -2)$
$(8, -6)$



b. Calculate the area of the polygon.

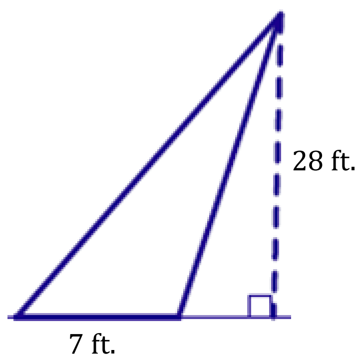
Answer: ______________________ square units

6. Eaglecrest Middle School is creating a vegetable garden at the school.



a. What is the area of the garden?

b. After more discussion, Eaglecrest decided to change the location of the garden so that the vegetables can get more sunlight. Below is the new garden.



In which garden can Eaglecrest students plant more vegetables? Explain your reasoning.