Name: _____ Due Date: _____

# In-Class Workbook

## Geometry – Unit 7: Workbook Part 2

***How do geometric models describe spatial relationships?***

***How does what we measure influence how we measure?***

| Standard | Description |
|---|---|
| 7.G.A.1 | Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. |
| 7.G.A.3 | Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. |
| 7.G.B.4 | Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. |
| 7.G.B.6 | Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. |

| Lesson | I can… |
|---|---|
| 7.8 | Find the area of unconventional shapes. |
| 7.9 | Find the surface area of composite figures. |
| 7.10 | Find the volume of three-dimensional shapes. |
| 7.11 | Find the volume and surface area of a composite figure. |
| 7.12 | Determine the two-dimensional shape that results from slicing a three-dimensional figure. |
| 7.13 | Problem-solve and critically analyze a solution to a problem using mathematical skills and thinking. |

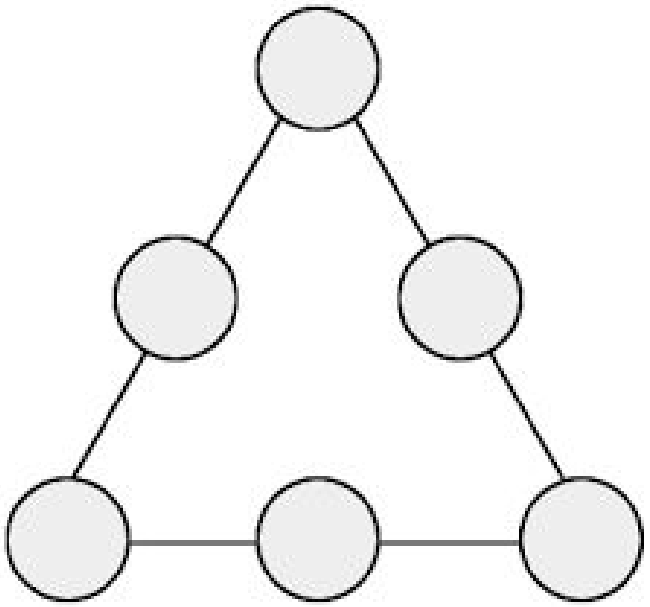
| Packet Completion Rubric | | | | |
|---|---|---|---|---|
| **4** | **3** | **2** | **1** | **0** |
| Workbook demonstrates significant effort. Student utilizes notes to help extend their thinking, writing questions, comments or reactions to the content. | Workbook demonstrates some effort. Student takes notes but could further understanding by questioning and interacting with the material. | Workbook shows little effort. Student takes notes sporadically, and could benefit from greater consistency with the material. | Workbook shows little to no effort. Student does not take notes and must demonstrate future interaction with the material to aid understanding. | Workbook is entirely incomplete or not turned in. |

Score: ___/4 Comments:

**Grading Breakdown: 3.5 - 4 = A 3 - 3.4 = B 2.5 - 2.9 = C 2 - 2.4 = D 0 - 1.9 = F**

**Use our class website too! www.7mathscience.weebly.com**

| **Geometry Objective: I can find the area of unconventional shapes.** | **Lesson 7.8** |
|---|---|

| | |
|---|---|
| **Lesson 7.8 Do Now** | The Magic Triangle<br>Arrange the numbers 1-6 in each of the following circles. You can only use each number once, and all sides of the triangle must add up to 9!<br>  |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.7<br>Do you have any homework questions? |
| **Check-In** | How are you?<br><br>What is the best part of your day? |

## Review of Finding the Area of a Composite Figure

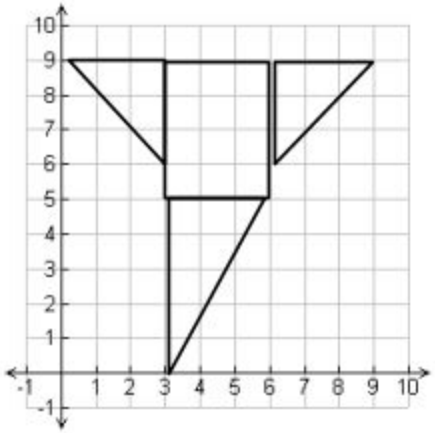
**A composite figure is made up of simple geometric shapes!**

Steps of finding the area:

1. Divide the figure it into simple, _____ geometric shapes.
2. Find the _____ of each simpler shape.
3. _____ the areas together to find the total area of the composite figure.

Tips and Tricks:

Find the area of composite figure below:

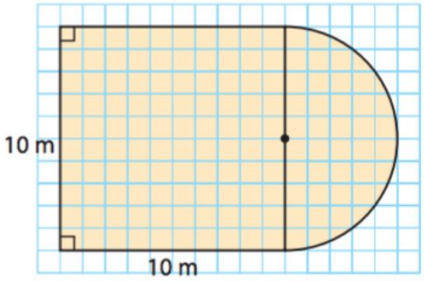


| Triangle #1 | Triangle #2 | Triangle #3 | Rectangle |
|---|---|---|---|
| | | | |

Final Answer: _____

Find the Area of Composite Figure Below

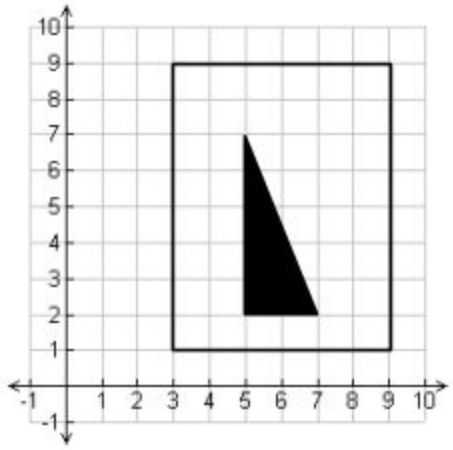
(The Figure below is composed of a _____ and a _____ Circle)




Work for:

Work for:

Find the Area of the **Unshaded Region** of the Composite Figure Below




**Complete Task Cards in Groups of 3.**

Group Member Name 1 _____ Favorite Shave Ice Flavor: _____

Group Member Name 2 _____ Favorite Shave Ice Flavor: _____

Group Member Name 3 _____ Favorite Shave Ice Flavor: _____

After completing the guided practice, please reflect on how well your group members worked together and collaborated. What worked well? Did everyone contribute effectively?

Group Member 1:

Group Member 2:

Group Member 3:

# Get Rid of Empty Cardboard Boxes and Declutter After Christmas With the Give Back Box and Amazon

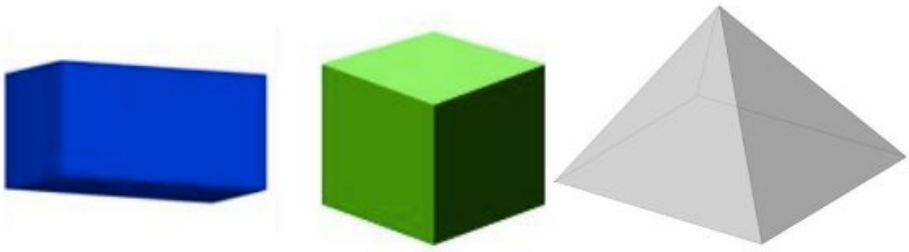
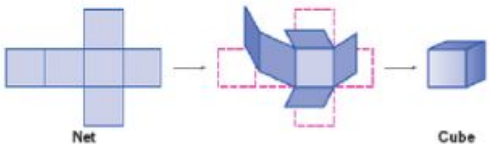
It's a new year which means a plethora of things. Whether you've made a resolution to do good, clear out clutter, or recycle…there's a program that Amazon has partnered with that can help. Amazon has partnered with the Give Back Box and it's very simple. You just take your old amazon box or any box for that matter, fill it up with clothes or household items you would donate, go online to givebackbox.com, print a free shipping label and then send the box on it's way.

Not only are you recycling the box and getting it out of your house, you're also making room for all the things Santa brought you this year.

Now there are a few rules if you decide to use the Give Back Box, don't pack any liquids, fragile or volatile items. If you do have more than one box to fill, you will need to print out multiple shipping labels. The Give Back Box was started back in 2012 and the boxes are routed to participating charities.

## How can this model of reusing and repurposing boxes help reduce waste?

| Geometry Objective: I can find the surface area of composite figures. | Lesson 7.9 |
|---|---|

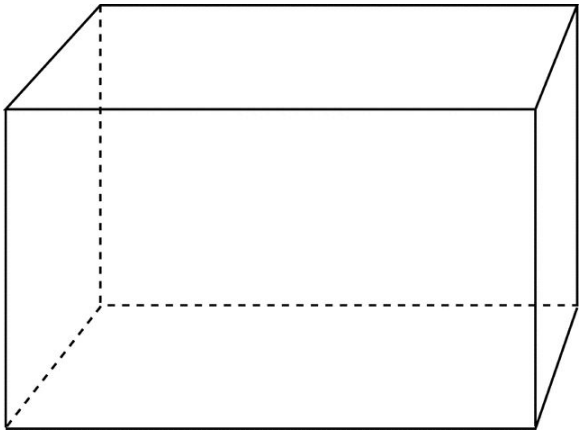
| | |
|---|---|
| **Lesson 7.9 Do Now** | **Describe each of the shapes below.**<br><br>**What 2d figures compose each of the 3d shapes?**<br><br>  <br><br>Where have you seen these figures in real life?<br><br>Examine this figure:<br><br>  |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.8!<br>Do you have any homework questions? |
| **Check-In** | How are you doing?<br><br>On a scale of 1-4, how do you feel about geometry so far? |

# Edges, Faces & Vertices

Edges: _____

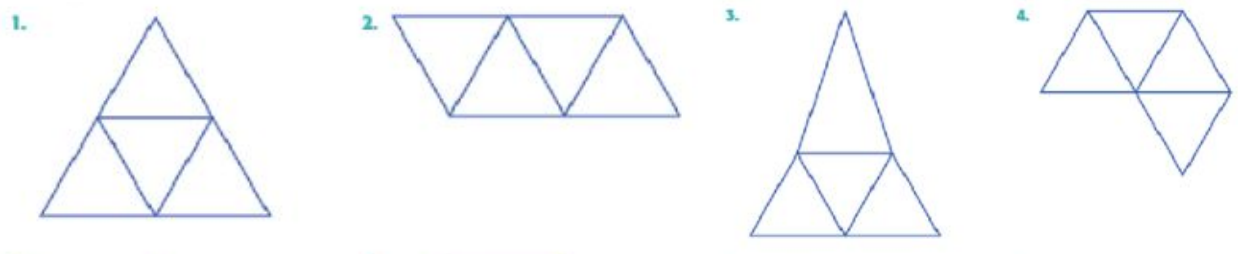
Faces: _____

Vertices: _____



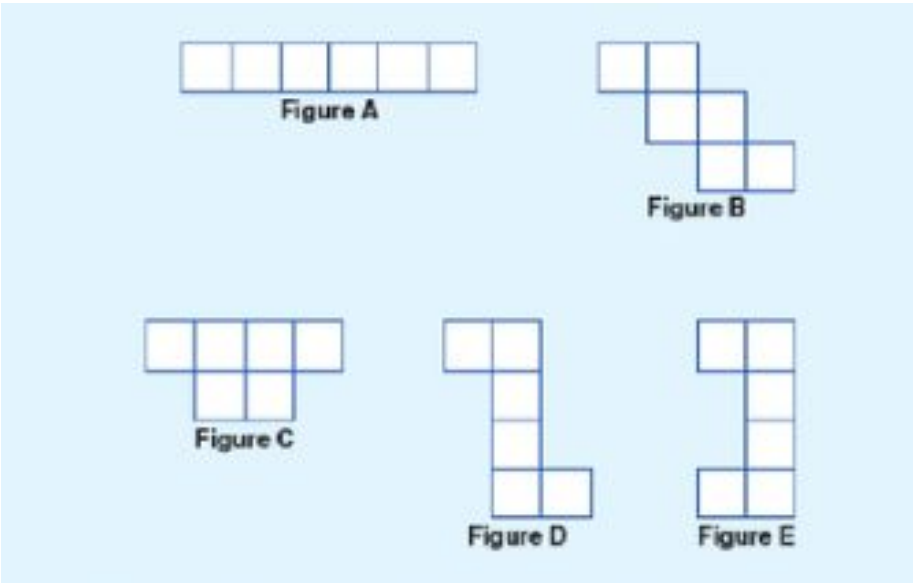
# Thinking in 3D: Mental Math

Decide whether each figure is a net, that is, whether it will fold into a solid, 3D shape. One way to decide is to cut out a copy of the figure and try to fold it. The challenge though here, is to visual how this net will fold together in your mind. If the figure is a net, describe the shape it creates. If it is not a net, explain why not.




| | |
|---|---|
| #1 | #2 |
| #3 | #4 |

Which of these figures are also nets for a cube? That is, which will fold into a cube? Picture it in your mind!

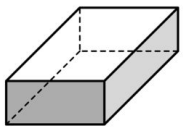
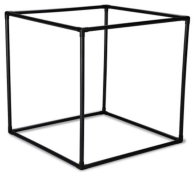
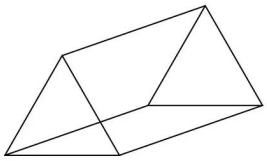
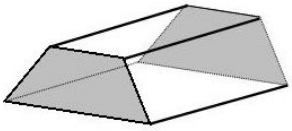
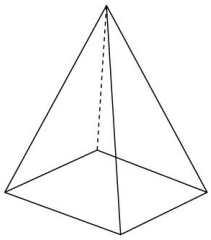
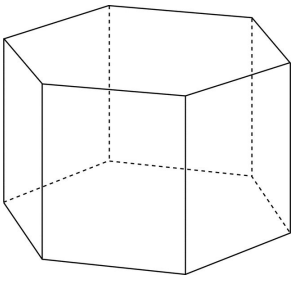


## Nets of 3-Dimensional Figures

A _____ is model that describes how 2-dimensional shapes make up a 3-dimensional shape.

**We Can Use Nets to Turn 3-Dimensional Surface Area Problems into Composite Figure**

**Fill In Blanks in Table**

| Shape | Description | Shape | Net |
|---|---|---|---|
| Rectangular Prism | A solid (3-dimensional) object which has six faces that are rectangles (2 rectangular **bases** with 4 rectangular **sides**). |  | |
| Cube | A symmetrical three-dimensional shape, either solid or hollow, contained by six equal squares (2 square **bases** with 4 square **sides**). |  | |
| Triangular Prism | A prism composed of two triangular **bases** and three rectangular **sides**. |  | |
| Trapezoidal Prism | A prism composed of two trapezoidal **bases** and four rectangular **sides**. |  | |
| Square Pyramid | A square pyramid is a pyramid with a **square** base and four triangular **sides**. |  | |
| Hexagonal Prism | A prism composed of two hexagonal **bases** and six rectangular **sides**. |  | |

# Surface Area of a Composite Figure

## What is a composite figure?

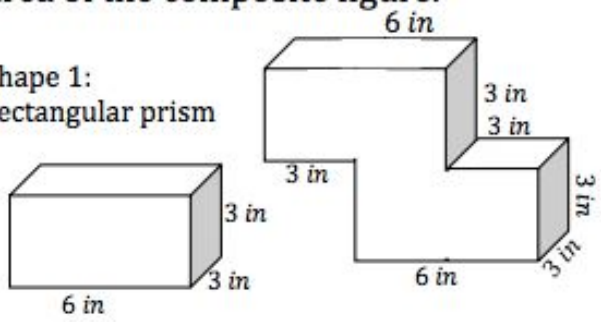
A composite figure is an irregular shape made up of regular shapes.

## Steps:

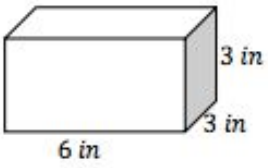
1. Identify each of the regular shapes that make up the composite figure.
2. Identify the dimensions of each regular shape.
3. Determine the surface area of each regular figure and subtract the area where the figures overlap.
4. Add the surface areas together.

**Example 1:** Determine the surface area of the composite figure.

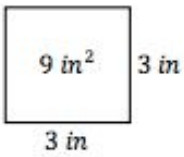
shape 1: rectangular prism




shape 2: rectangular prism




overlap area




shape 1: $SA = 2 \cdot 6 \cdot 3 + 2 \cdot 6 \cdot 3 + 2 \cdot 3 \cdot 3 = 90\ in^2$

$90\ in^2 - 9\ in^2 = 81\ in^2$

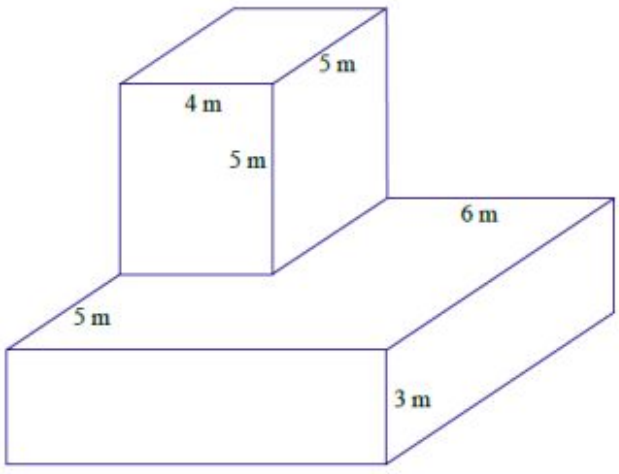
shape 2: $SA = 2 \cdot 6 \cdot 3 + 2 \cdot 6 \cdot 3 + 2 \cdot 3 \cdot 3 = 90\ in^2$

$90\ in^2 - 9\ in^2 = 81\ in^2$

Total surface area = $162\ in^2$

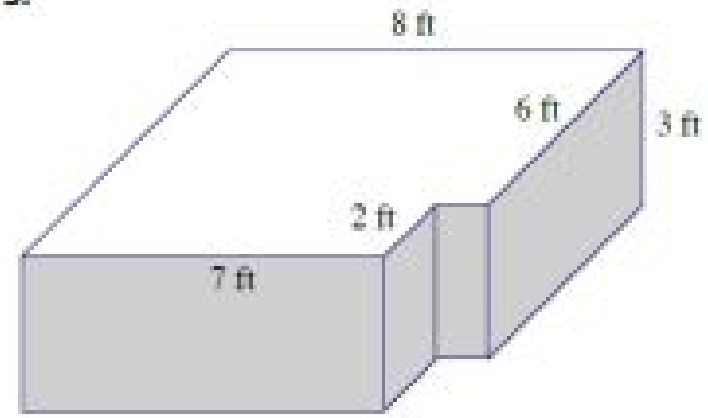


**Find the surface area of the composite figure below.**



**What is different about this composite figure? How can we solve for the surface area?**

3.



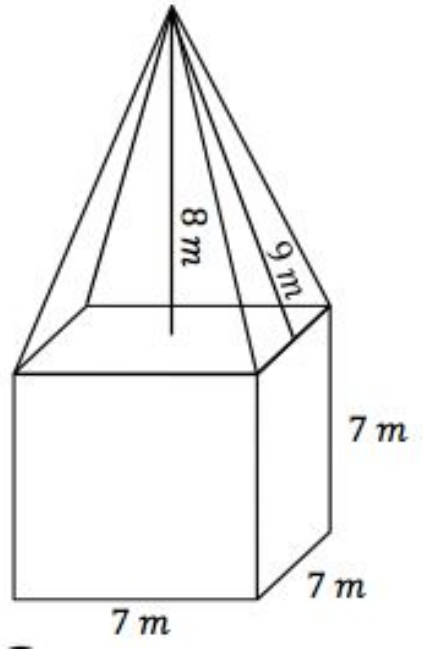

# Practice: Solve to find the surface area of each of the following composite figures.

## Organize your work and circle your final answer!

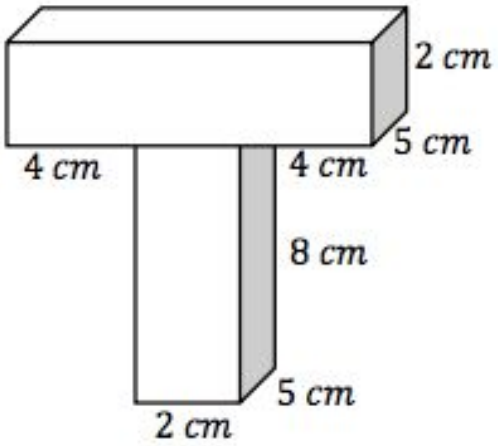
Solve the following problems with your partner. Make sure that you consider the question:

- Where is the overlap?

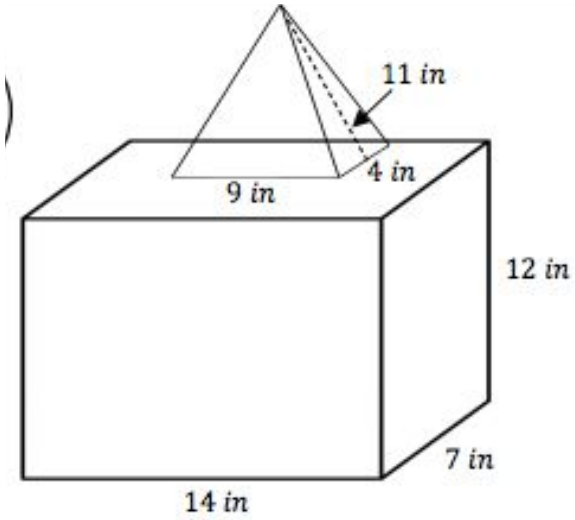
Feel free to draw pictures, label and color your sides, and organize your work!



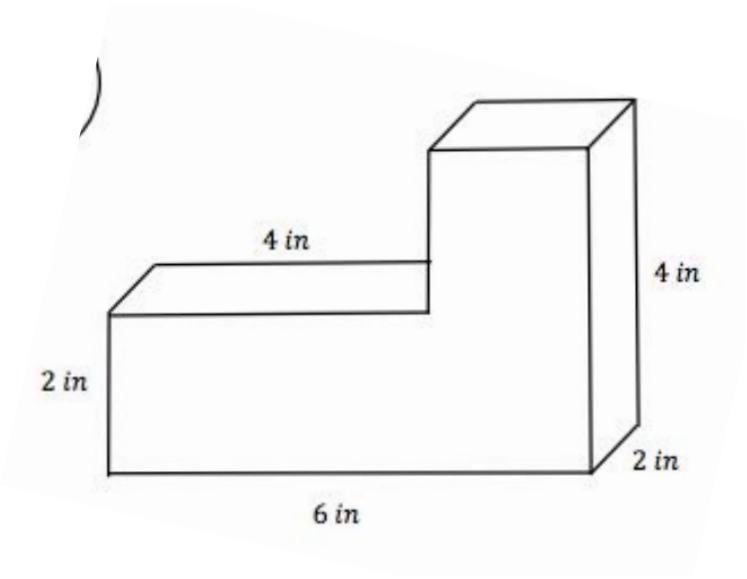

**Total Surface Area = _____**



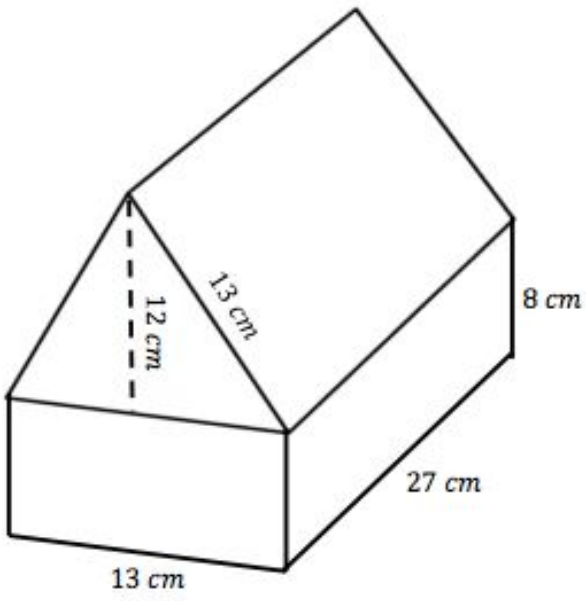

**Total Surface Area = _____**



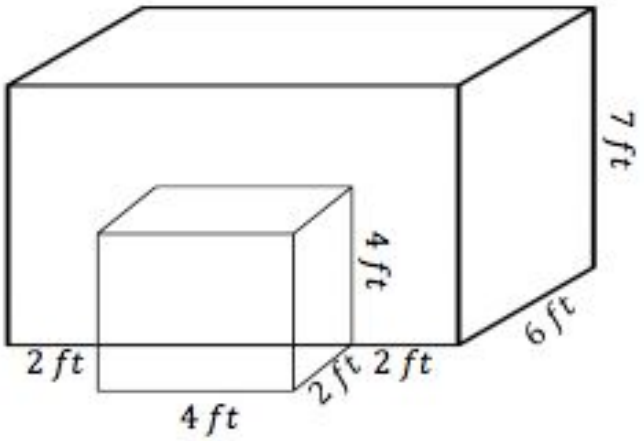

**Total Surface Area = _____**




**Total Surface Area = _____**




**Total Surface Area = _____**



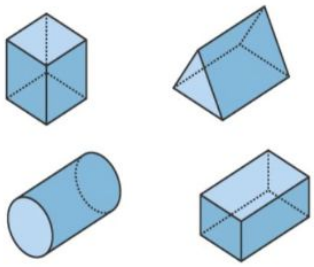
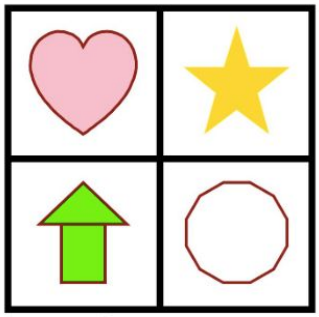

**Total Surface Area = _____**

Household Item: Tomorrow, you will need to bring a 3-dimensional household item into class. Consider the different objects you could bring. Make a list of potential choices below. At home tonight, choose one and bring it in. Your parent must sign off below to give permission!

Parent Signature: Date:

Hello parent or guardian! Feel free to also look through this packet. Everything up to this page should be done by now!

| Geometry Objective: I can find the volume of three-dimensional shapes. | Lesson 7.10 |
|---|---|

| | |
|---|---|
| **Lesson 7.10 Do Now** | Which one doesn't belong? Why?<br>  <br>Which one doesn't belong? Why?<br>  |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.9!<br>Do you have any homework questions? |
| **Check-In** | How are you doing? |

**Taking Volume to the Movies!**

***How can we maximize the amount of popcorn we can take into the movies?***

**Making a Prediction:** *Which container do you believe will hold the greatest amount of popcorn? Why?*

_____

_____

_____

**Testing our Hypothesis:** *In the space below, quickly sketch the two containers, noting their differences.*

| | |
|---|---|
| | |

**Drawing a Conclusion:** *Based on what you see, was your hypothesis correct? How do you know?*

_____

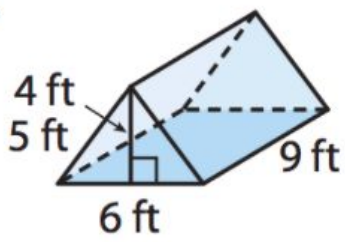
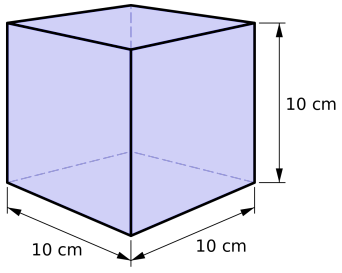
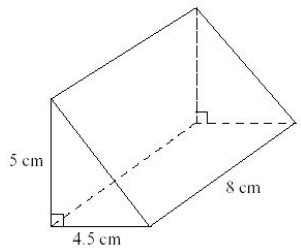
_____

_____

_____

| **What is Volume?** | |
|---|---|
| Volume is…. | To calculate volume: |
| Find the volume of each popcorn container to <u>prove</u> your answer to this question is correct. | |
| Formula for Volume: | |

**Identifying the Base**

| | | |
|---|---|---|
| **1.**   |   |   |

What is the shape of the **base**?

| 1. | 2. | 3. |
|---|---|---|

What is the **height**?

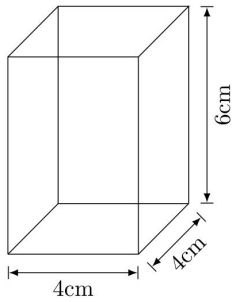
| 1. | 2. | 3. |
|---|---|---|

**Practice**

Use the dimensions you found above to calculate the **volume** of Figures 1, 2, and 3

| 1. | 2. | 3. |
|---|---|---|
| | | |

Calculate the Volume of rectangular prism




# Redesigning Household Products

Using the item that you brought to school from home, your task is to investigate the volume and surface area using a familiar container. You might choose a rectangular prism or other object that is used to hold cereal, tea, etc. You must design an efficient container for the product, using the steps outlined below:

## Part 1: Measure the Dimensions of the Container in Centimeters

## Part 2: What does the net for this look like? Draw what it looks like below.

Part 3: What is the volume of your container?

Part 4: What is the surface area?

Part 5 Challenge: Design three other containers, using different types of 3-dimensional solids, to hold the **same** amount of product as your original container. The challenge is to design containers that hold the same volume BUT have less surface area than your original container.

Part 6: Which solid maximizes volume while minimizing surface area? Why?

_____

_____

_____

_____

_____

_____

| Geometry Objective: I can find the volume and surface area of a composite figure. | Lesson 7.11 |
|---|---|

| | |
|---|---|
| **Lesson 7.11 Do Now** | amazon SHIPPING PROBLEM<br>You work in the Amazon Warehouse. What are some of the problems and challenges that you need to consider when choosing a box in which to ship items? Consider all that we have learned in geometry thus far. |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.10!<br>Do you have any homework questions? |
| **Check-In** | How are you doing?<br>How often do you order things online? |

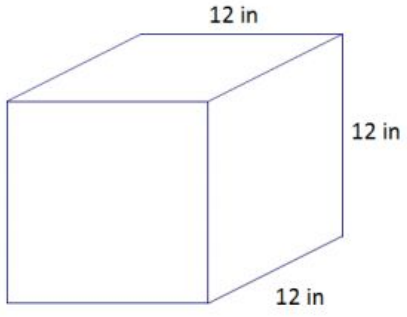
**Simple 3-Dimensional Figure**

Solve for The following Three Dimensions of the Shape Below

Area of Base = _____

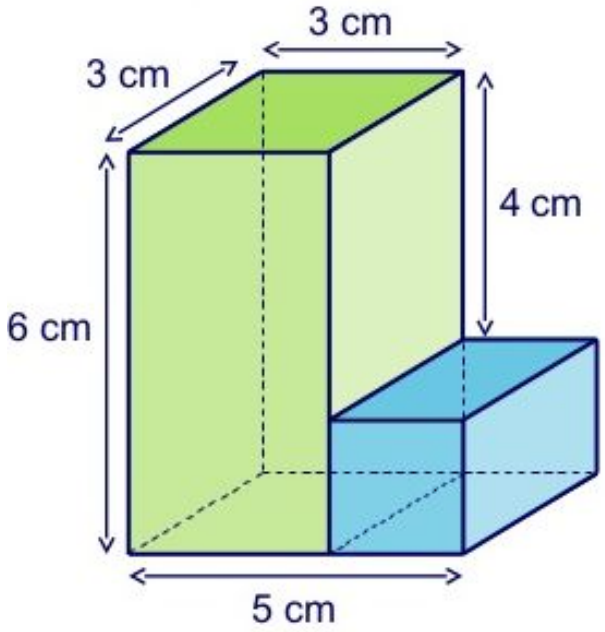
Surface Area = _____

Volume = _____



**Complex 3-Dimensional Figure**

# Solve for the following dimensions of the shape to the right:




**Surface Area of the Composite Prism:**

**Volume of the Composite Prism:**

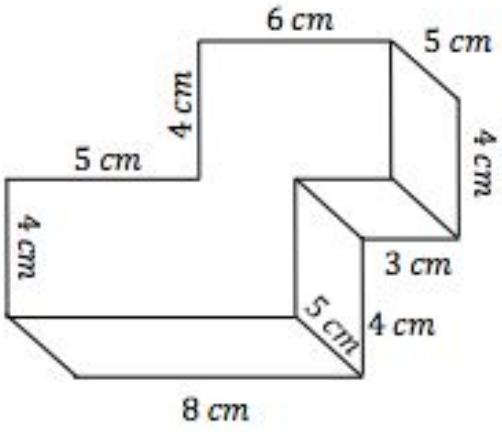
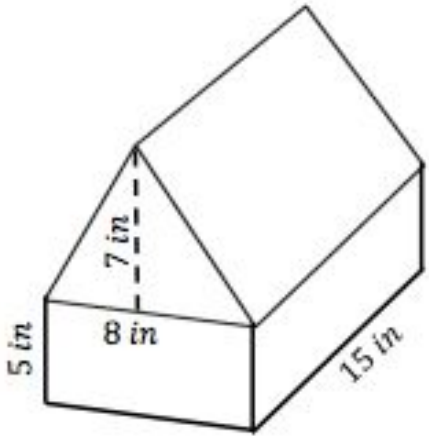
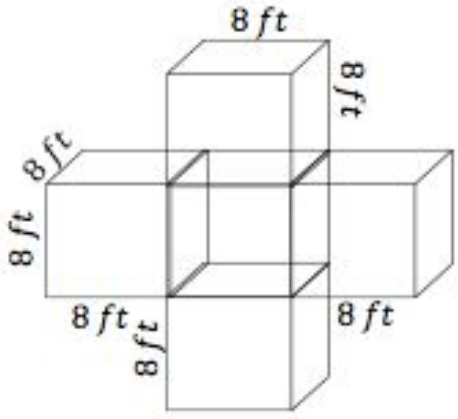
# Volume & Surface Area of a Composite Figure

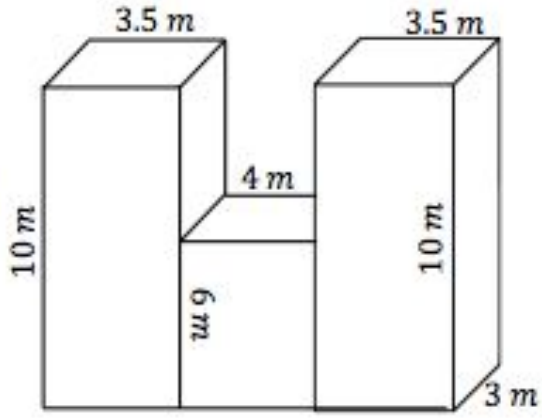
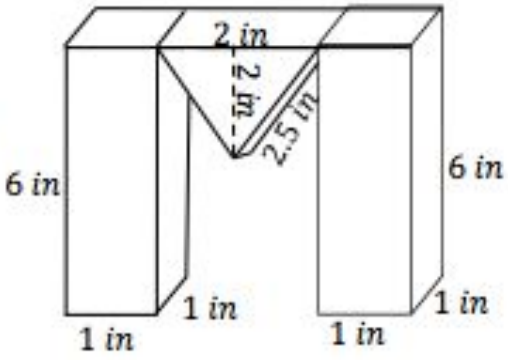
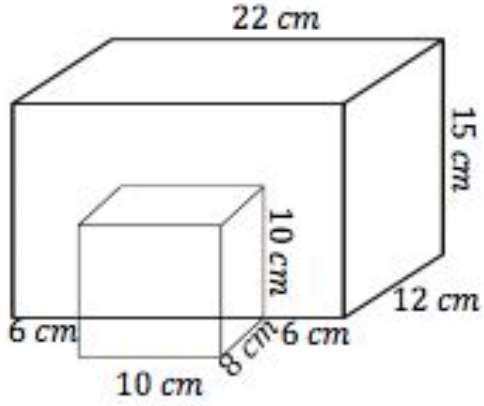
Directions: Complete the anchor chart graphic organizer by filling in each blank with definitions, steps, and your own examples.

| **Definitions** | **List the formulas to determine the volume of a rectangular prism and a pyramid:** |
| --- | --- |
| *What is a composite figure? Draw one example.* | |
| **Create an example & solve.** | **List the formulas to determine the surface area of a rectangular prism:** |

# Volume & Surface Area of a Composite Figure

Directions: Determine the volume or surface area of each composite figure. Find the problem number on the mistory lib page and use the word assigned to the solution to fill into the blank.

| | | | |
|---|---|---|---|
| 1.   | $SA = 332\ cm^2$: second | $SA = 280\ cm^2$: fifth | $SA = 302\ cm^2$: first |
| 2.   | $V = 1{,}020\ in^3$: second | $V = 1{,}440\ in^3$: third | $V = 600\ in^3$: first |
| 3.   | $SA =$ $2{,}560\ ft^2$: used | $SA =$ $1{,}408\ ft^2$: retired | $SA =$ $1{,}920\ ft^2$: observed |

| | | | | |
|---|---|---|---|---|
| 4.   | $V = 282\ m^3$: Vice President | $V = 315\ m^3$: President | $V = 177\ m^3$: Treasurer |
| 5.   | $SA = 60\ in^2$: Baseball | $SA = 63\ in^2$: Freedom | $SA = 82\ in^2$: Sports |
| 6.   | $V = 4{,}040\ cm^3$: Bronze | $V = 5{,}280\ cm^3$: Silver | $V = 4{,}760\ cm^3$: Gold |

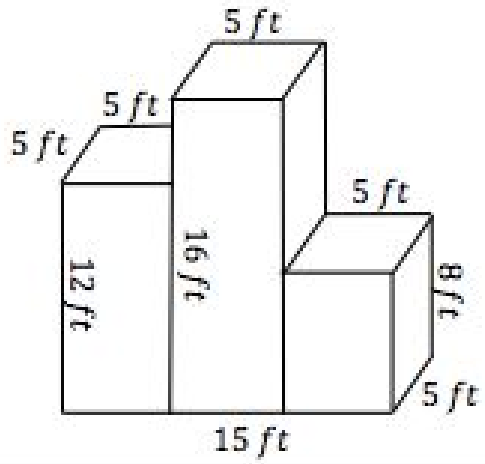
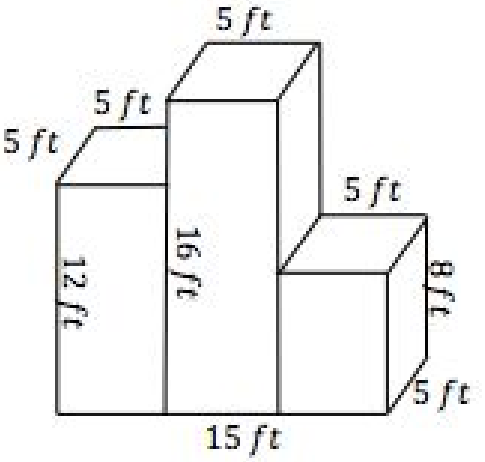
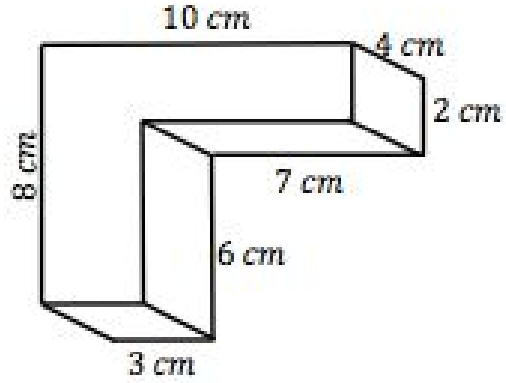
# Volume and Surface Area of a Composite Figure

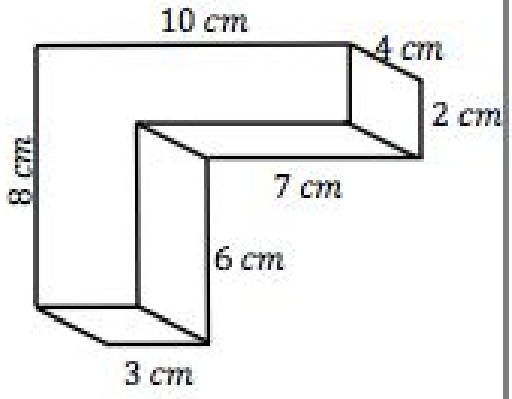
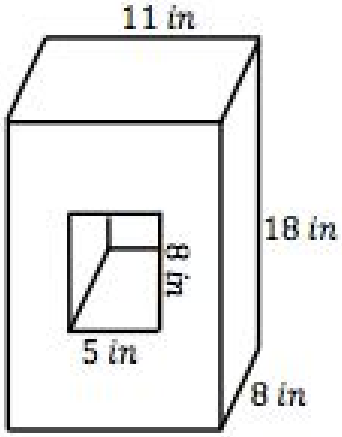
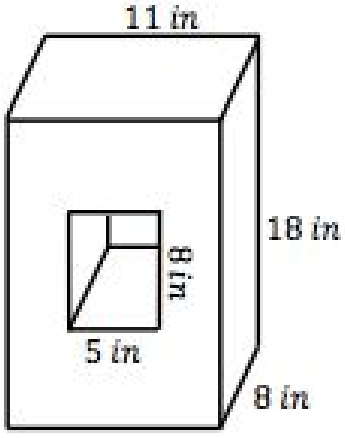
Directions: Copy the words assigned to each answer from the previous pages.

Jackie Robinson , born in 1919, was the _____ (1)
African American to play in Major League Baseball. He was a _____ (2) baseman and played for the Brooklyn Dodgers. In 1997, his jersey number 42 was universally _____ (3) by Major League Baseball. Jackie Robinson was crucial to the Civil Rights Movement and outside of baseball was the first African American _____ (4) of a major American corporation. For all his achievement, he was awarded the Presidential Medal of _____ (5) and the Congressional _____ (6) Medal.

# Volume & Surface Area of a Composite Figure

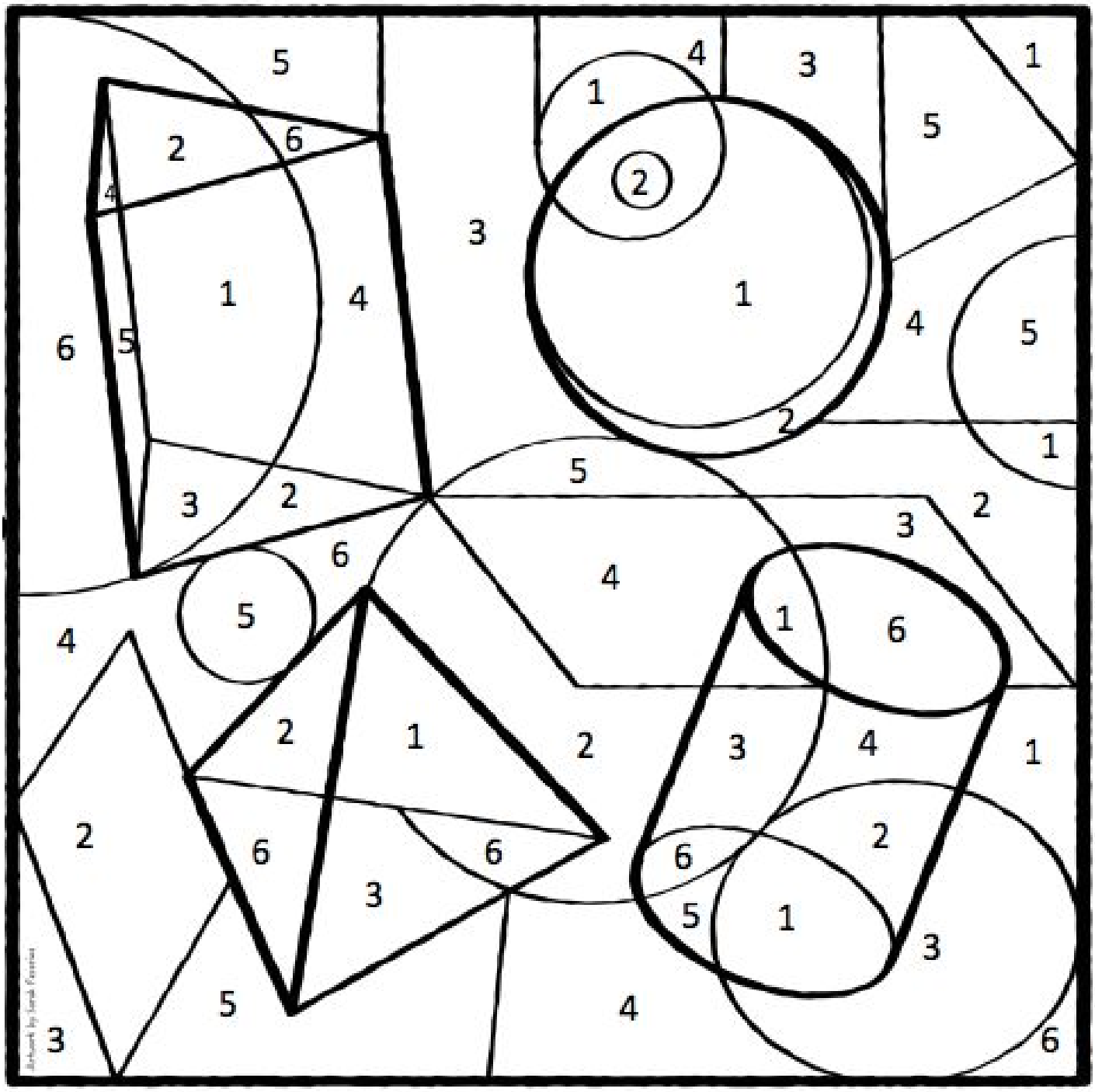
Directions: Determine the volume or surface area of each composite figure. Find the problem number on the coloring page and use the color assigned to the solution to fill shade in the enclosed region.

| | | | | |
|---|---|---|---|---|
| 1. |  | $V = 960\ ft^3$: orange | $V = 900\ ft^3$: green | $V = 375\ ft^3$: yellow |
| 2. |  | $SA = 670\ ft^2$: blue | $SA = 870\ ft^2$: green | $SA = 600\ ft^2$: purple |
| 3. |  | $V = 146\ cm^3$: red | $V = 128\ cm^3$: yellow | $V = 152\ cm^3$: orange |

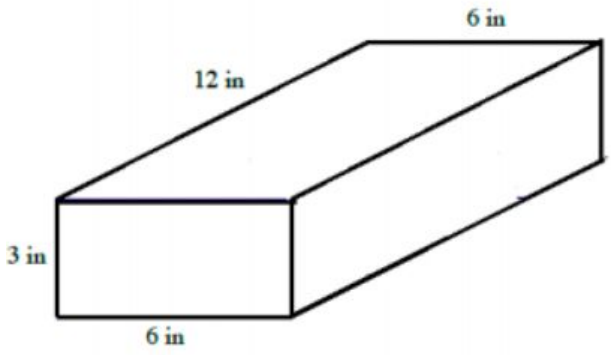
| | | | | |
|---|---|---|---|---|
| 4. |  | $SA = 340\ cm^2$: orange | $SA = 244\ cm^2$: purple | $SA = 220\ cm^2$: yellow |
| 5. |  | $SA = 988\ in^2$: purple | $SA = 780\ in^2$: red | $SA = 1{,}100\ in^2$: blue |
| 6. |  | $V = 1{,}584\ in^3$: green | $V = 1{,}264\ in^3$: red | $V = 1{,}544\ in^3$: yellow |

# Volume & Surface Area of a Pyramid

Directions: Color the coloring page based off of your answers from the previous pages.



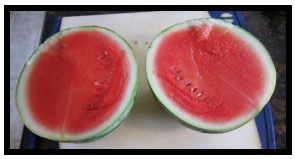
| **Geometry Objective: I can determine the 2-dimensional shape that results from slicing a 3-dimensional figure.** | **Lesson 7.12** |
|---|---|

| | |
|---|---|
| **Lesson 7.12 Do Now** | Find the volume and surface area of the rectangular prism.<br>  <br> |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.11!<br>Do you have any homework questions? |
| **Check-In** | How are you doing?<br><br>What questions are you wondering about geometry? |

**Instruction & Notes**

**A _____ is a surface or shape that is or would be exposed by making a straight cut through a three dimensional figure.**

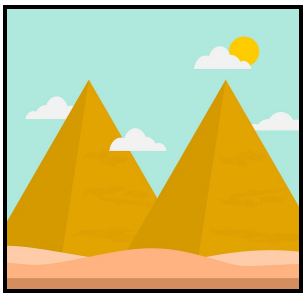
**Example:**

| | | |
|---|---|---|
|  | What type of 3D shape is this?<br>_____<br><br>What 2D shape will be the cross section?<br>_____ | _____<br>  |

What are some examples of cross sections you have seen in real-world contexts?

# Let's Predict!

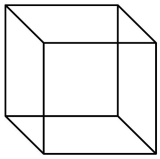
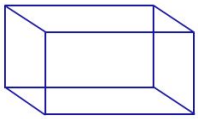
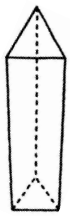
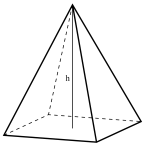
- What type of **2D** shapes would be revealed from a ***horizontal***, ***vertical*** and ***diagonal*** *cut*?
- Would all the shapes revealed be the same? _____

| | | | |
|---|---|---|---|
|  |  |  |  |
| **Triangular Prism**<br><u>2D cross sections:</u><br>Parallel to base?<br>_____<br>Perpendicular to base?<br>_____<br>Diagonal?<br>_____ | **Cube**<br><u>2D cross sections:</u><br>Parallel to base?<br>_____<br>Perpendicular to base?<br>_____<br>Diagonal?<br>_____ | **Rectangular Prism**<br><u>2D cross sections:</u><br>Parallel to base?<br>_____<br>Perpendicular to base?<br>_____<br>Diagonal?<br>_____ | **Square Pyramid**<br><u>2D cross sections:</u><br>Parallel to base?<br>_____<br>Perpendicular to base?<br>_____<br>Diagonal?<br>_____ |

**Check Your Prediction**

Directions: Use the clay and foam pieces to explore cross sections.

- Create 3D shapes out of clay, then CAREFULLY cut the shape each direction separately to determine the 2D cross section. Draw what you see!

| Shape | 3-D Visual | Cross Section Parallel to Base | Cross Section Perpendicular to Base | Diagonal Cross Section |
|---|---|---|---|---|
| Cube |  | | | |
| Rectangular Prism |  | | | |
| Triangular Prism |  | | | |
| Square Pyramid |  | | | |

**Let's Reflect!**

What do you notice? _____

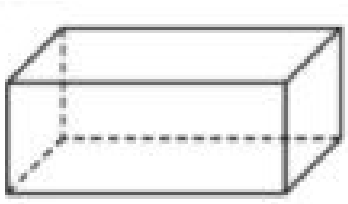
Do you see any trends in our cross sections? _____

**The Cross Section Parallel to Base would also be the shape of the base!**

# Cross Sections and 3D Figures Task Cards

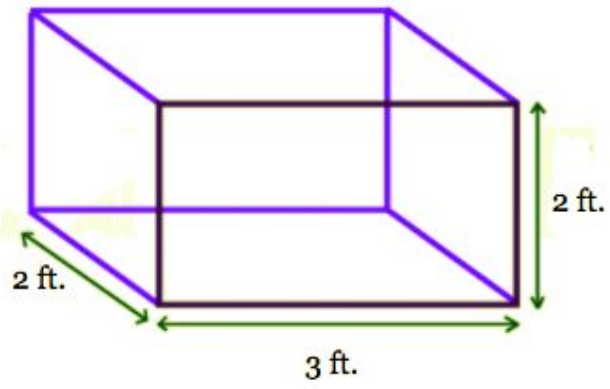
| | | | |
|---|---|---|---|
| 1. | 2. | 3. | 4. |
| 5. | 6. | 7. | 8. |
| 9. | 10. | 11. | 12. |
| 13. | 14. | 15. | 16. |
| 17. | 18. | 19. | 20. |
| 21. | 22. | 23. | 24. |

| **Geometry Objective: I can problem solve and critically analyze a solution to a problem using mathematical skills and thinking.** | **Lesson 7.13** |
|---|---|

| | |
|---|---|
| **Lesson 7.13 Do Now** | Draw the 2-dimensional shape that would result from making each of the following cross-sections to the rectangular prism below!<br>  <br>**Horizontal Cross Section** \| **Vertical Cross Section** \| **Diagonal Cross Section** |
| **Homework Reminder** | Shade this box in if you turned in your homework! You should turn in Practice 7.12!<br>Do you have any homework questions? |
| **Check-In** | How are you doing?<br><br>What are your strengths in geometry? What are your weaknesses? |

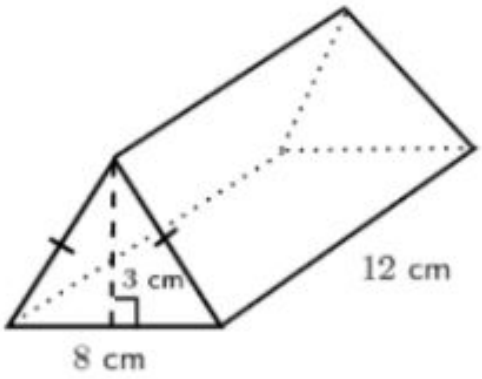
## Practice Makes Perfect!

Solve for the following measurements:




Solve for the following measurements:

*FYI: The sides of the triangle are 5 cm.*



| | |
|---|---|
| Area of Base = _____ | Area of Base = _____ |
| Surface Area = _____ | Surface Area = _____ |
| Volume = _____ | Volume = _____ |

| | |
|---|---|
| 1. Challenge or Problem<br><br>***Write down and summarize the issue that is a challenge.*** | |
| 2. Proposed Solution<br><br>***Come up with an unconventional way to address the challenge.*** | |
| 3. Why the Solution Will Fail<br><br>***Review the proposed solution and come up with a reason why it will fail.***<br><br>***This is your chance to be a critic!*** | |
| 4. Final Concept<br><br>***Review the critique. Then, come up with an idea that solves the issue raised.*** | |

# Final Concept

# Workbook Reflection

Answer the question as completely as possible, using evidence from what we have learned this unit. Justify your response with examples and evidence from throughout the packet.

How do geometric models describe spatial relationships? How does what we measure influence how we measure?

## How can geometry be used to help us solve the waste and packaging problem?

**Choose one of the following concepts and describe it. Include visuals to support your answer.**

- *Finding the surface area*
- *Finding the volume*
- *Finding the cross section of a 3d figure*

**What lesson most challenged your thinking?**

**Flip through your packet, and look to see if you shaded the box every day for turning in your homework. How many days did you shade it in?**

| Lesson 8 | Lesson 9 | Lesson 10 | Lesson 11 | Lesson 12 | Lesson 13 |
|---|---|---|---|---|---|

**If you didn't finish it each night, consider why:**