



Holyoke Public Schools

Grade 7

Filling and Wrapping

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CURRICULUM MAPS OUTLINE

Map Goals:

1. To ensure that students are exposed to a rigorous curriculum in every school and every grade.
2. To have consistent instruction and assessment district wide.
3. To prepare students for the MCAS test.
4. To explain what is expected to be covered in each CMP or Investigations Unit.

Expectations:

The district's expectation is for students to successfully meet the Massachusetts Mathematics Standards. In order to help facilitate this, teachers are required to follow the curriculum maps. The successful implementation of these maps requires teachers to thoroughly read each lesson in the TE and work through the project and problems in the map and the text prior to planning their lessons. Work should be kept in the binder with the curriculum map. Working through the math is an essential part of lesson planning, as it helps the teacher to better understand the concept being taught and the students' possible misunderstandings.

Feedback To Students:

Feedback needs to happen daily in the classroom. There are many ways to give feedback. Conferencing, observations, questions asked during your opening, work time and closing are all forms of feedback.

Map Components:

1. GENERAL PROBING QUESTIONS
2. UNIT SPECIFIC PROBING QUESTIONS
3. GOALS OF UNIT, CONTENT STANDARDS, & PERFORMANCE STANDARDS
4. PROJECT- to be done at end of unit and kept in the portfolio.
5. STUDENT MASTER – for project
6. INVESTIGATIONS
7. NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
8. ACCOUNTABLE TALK – using probing questions
9. ON DEMAND ASSESSMENTS - to be done during teaching of unit.
10. STUDENT MASTERS- for on-demand assessments.

Mathematics Evidence of Learning Artifacts

Artifact	K - 1	2 – 5	6 - 8
3 Ring Binder (3R)*	<ul style="list-style-type: none"> ○ Student Work¹ 	<ul style="list-style-type: none"> ○ Vocabulary ○ Student sheets¹ <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>	<ul style="list-style-type: none"> ○ Math books ○ Vocabulary ○ Core Problems¹ ○ Lab sheets <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>
Marble Notebook (MNB)	<ul style="list-style-type: none"> ○ Journal entries² 	<ul style="list-style-type: none"> ○ Table of Contents ○ Problem of the day ○ Journal entries ○ Class work <p style="text-align: center;"><u>All work should be dated and listed by investigation in the Table of Contents</u></p>	<ul style="list-style-type: none"> ○ Table of Contents ○ Work time ○ Journal entries <p style="text-align: center;"><u>All work should be dated and listed by investigation in the Table of Contents</u></p>
Portfolio³ (P)	<ul style="list-style-type: none"> ○ On-demand tasks ○ Projects ○ Teacher anecdotal notes 	<ul style="list-style-type: none"> ○ On-demand tasks ○ Reflections ○ Projects <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>	<ul style="list-style-type: none"> ○ On-demand tasks ○ Reflections ○ Projects <p style="text-align: center;"><u>All work should be dated and listed by investigation</u></p>

* Folders may be used in place of binders for these grade levels

¹ Send home at the end of each unit

² Use grade level math journals

³ All documents should be kept for the entire year

Accountable Talk

Probing Assessment Questions

As students progress through this unit, they should be asked the following questions to assess their specific knowledge of the unit.

What quantities are involved in the problem?

Which measures of an object are involved – volume or surface area?

Is an exact answer required?

What are the appropriate units to use in multi-dimensional measurement?

What strategies or formulas might help?

What method should be used to determine these measures?

Probing Questions – Teacher’s Role

The teacher’s role in probing for understanding is to ask questions that will:

- *Clarify student understanding*
- *Get at the objective of the lesson*
- *Go deeper into the mathematics*
- *Uncover misconceptions and misunderstandings*
- *Compare and contrast*

Probing Questions – Student’s Role

The students’ role is to be an active participant by:

- *Explaining their strategies*
- *Asking clarifying questions to teacher and other students*
- *Being active listeners*
- *Using the language of mathematics*

Probing Questions - Suggestions

When probing for understanding the teacher and students can use one or more of these suggested questions:

Why are you using $< >$?

What are the ways you could $< >$?

What else do you know?

How do you know that?

Can you show that?

What convention did you use here?

What can you do if you do not know?

What standard does this work apply to?

Is this always true?

How does this connect to other mathematics we have learned?

What is the same and what are the differences between $< >$?

Can you back that up?

Where is the math in your sketch?

What does the answer mean?

Does the answer make sense?

Could you have used another operation to solve this task?

Can you give examples?

Can you say it another way?

What's the math?

Tell me about the task in your own words?

What are you trying to find?

How did you make your estimate?

Will your answer be an over-estimate or an under-estimate? Why?

I noticed that you used $<....>$ to help you understand the task. Can you show us what you did and tell us how it helped you?

Where do you see $< >$ in your $<model, diagram, number line, chart, etc.>$?

How can we see $< >$ in your $<model, diagram, number line, chart, etc.>$?

You have used a representation that is different from others that I've seen. Can you show us your <model, diagram, number line, chart, etc.>, and tell us how it helped you?

How did you decide to solve the task? Why did you choose that method?

Did you try any method that didn't work?

Tell us what you tried.

Why didn't it work?

Would it ever work?

Goals, Content Standards, & Performance Standards

Unit Goals:

Understand volume as a measure of filling an object and surface area as a measure of wrapping an object

Design and use nets to visualize and calculate surface areas of prisms and cylinders

Explore patterns among the volumes of cylinders, cones, and spheres

Develop strategies for finding the volumes of square pyramids, prisms, cylinders, cones, and spheres directly and by comparison with known volumes

Understand that three-dimensional figures may have the same volume but quite different surface areas

Understand how changes in one or more dimensions of a rectangular prism or cylinder affect the prism's volume and surface area

Extend students' understanding of similarity and scale factors to three-dimensional figures

Use surface area and volume to solve a variety of real-world problems

Math Content Standards:

(7G7) Identify three-dimensional figures (e.g., prisms, pyramids) by their physical appearance, distinguishing attributes, and spatial relationships such as parallel faces.

(7M2) Given formulas, convert from one system of measure to another. Use technology as appropriate.

(7M3) Demonstrate an understanding of the concepts and apply formulas and procedures for determining measures, including those of area and perimeter/circumference of parallelograms, trapezoids, and circles. Given the formulas, determine the surface area and volume of rectangular prisms, and cylinders, and spheres. Use technology as appropriate.

Performance Standards:

(M2a) Is familiar with assorted two- and three-dimensional objects, including squares, triangles, other polygons, circles, cubes, rectangular prisms, pyramids, spheres, and cylinders.

(M2c) Identifies three dimensional shapes from two dimensional perspectives; draws two dimensional sketches of three dimensional objects that preserve significant features.

(M2d) Determines and understands length, area, and volume (as well as the differences among these measurements), including perimeter and surface area; uses units, square units, and cubic units of measure correctly; computes areas of rectangles, triangles, and circles; computes volumes of prisms

Investigation 1: Building Boxes

<p><u>Objectives</u> Investigations 1.1 – 1.4</p>	<p><u>Pacing:</u> 3 days</p>
<p style="text-align: center;"><i>Evidence of Learning Artifacts</i></p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment</p>	<p><u>Vocabulary</u>²: Appendix 2, Investigation 1</p>
	<p><u>Core Problems</u>²: Filling and Wrapping, Investigation 1 ACE Problems: #1-3, 5-13, 16 p. 10 – 13</p>
	<p><u>Work Time</u>¹: Filling and Wrapping, Problems. 1.1-1.4</p>
	<p><u>Journal Entries</u>¹: Appendix 3, Inv #1.1, 1.2, 1.3, 1.4</p>
	<p><u>On Demand Tasks</u>³: Appendix 5, Investigation 1</p>
<p><u>Mathematical Reflection</u>³ Appendix 4, MMR1:</p>	
<p style="text-align: center;"><i>Accountable Talk</i></p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</p> <ul style="list-style-type: none"> ○ How did you know that? ○ How can you use ...? ○ Can you show another way? ○ What convention did you use? <p>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</p>

1. Marble Note Book
2.3 Ring Binder
3. Portfolio

Investigation 2: Designing Rectangular Boxes

<p><u>Objectives</u> Investigations 2.1 – 2.3</p>	<p><u>Pacing:</u> 2 days</p>
<p style="text-align: center;"><i>Evidence of Learning Artifacts</i></p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment</p>	<p><u>Vocabulary</u>²: Appendix 2, Investigation 2</p> <p><u>Core Problems</u>²: Filling and Wrapping , Investigation 2 ACE Problems: #1-6, 8-15, 20 pp. 24 – 28</p> <p><u>Work Time</u>¹: Filling and Wrapping, Problems 2.1 – 2.3</p> <p><u>Journal Entries</u>¹: Appendix 3, Inv #2.1 – 2.3</p> <p><u>On Demand Tasks</u>³: Appendix 5, Investigation 2</p> <p><u>Mathematical Reflection</u>³ Appendix 4, MMR2:</p>
<p style="text-align: center;"><i>Accountable Talk</i></p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</p> <ul style="list-style-type: none"> ○ How did you know that? ○ How can you use ...? ○ Can you show another way? ○ What convention did you use? <p>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</p>

1. *Marble Note Book*

2.3 *Ring Binder*

3. *Portfolio*

Investigation 3: Prisms and Cylinders

<p><u>Objectives</u> Investigations 3.1 – 3.4</p>	<p><u>Pacing:</u> 4 days</p>
<p style="text-align: center;"><i>Evidence of Learning Artifacts</i></p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment</p>	<p><u>Vocabulary</u>²: Appendix 2, Investigation 3</p> <p><u>Core Problems</u>²: Filling and Wrapping, Investigation 3 ACE Problems: #1-2, 8-12, 15-18, 20-22, 26 pp38 - 43</p> <p><u>Work Time</u>¹: Filling and Wrapping, Problems 3.1 – 3.4</p> <p><u>Journal Entries</u>¹: Appendix 3, Inv #3.1 – 3.4</p> <p><u>On Demand Tasks</u>³: Appendix 5, Investigation 3</p> <p><u>Mathematical Reflection</u>³ Appendix 4, MMR3:</p>
<p style="text-align: center;"><i>Accountable Talk</i></p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</p> <ul style="list-style-type: none"> ○ How did you know that? ○ How can you use ...? ○ Can you show another way? ○ What convention did you use? <p>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</p>

1. Marble Note Book
2.3 Ring Binder
3. Portfolio

Investigation 4: Cones, Spheres, and Pyramids

<p><u>Objectives</u> Investigation 4.1 – 4.3</p>	<p><u>Pacing:</u> 3 day</p>
<p style="text-align: center;"><i>Evidence of Learning Artifacts</i></p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment</p>	<p><u>Vocabulary</u>²: Appendix 2, Investigation 4</p> <hr/> <p><u>Core Problems</u>²: Filling and Wrapping, Investigation 4 ACE Problems: #1, 3-14, 17-22, 25 pp54 - 57</p> <hr/> <p><u>Work Time</u>¹: Filling and Wrapping, Problem 4.1 – 4.3</p> <hr/> <p><u>Journal Entries</u>¹: Appendix 3, Inv #4.1 – 4.3</p> <hr/> <p><u>On Demand Tasks</u>³: Appendix 5, Investigation 4</p> <hr/> <p><u>Mathematical Reflection</u>³ Appendix 4, MMR4:</p>
<p style="text-align: center;"><i>Accountable Talk</i></p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</p> <ul style="list-style-type: none"> ○ How did you know that? ○ How can you use ...? ○ Can you show another way? ○ What convention did you use? <p>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</p>

1. Marble Note Book
2.3 Ring Binder
3. Portfolio

Investigation 5: Scaling Boxes

<p><u>Objectives</u> Investigations 5.1 – 5.2</p>	<p><u>Pacing:</u> 3 days</p>
<p style="text-align: center;"><i>Evidence of Learning Artifacts</i></p> <p>Journal and Reflection questions should be posted and referred to at the beginning of the appropriate <i>Investigation</i>.</p> <p>Journal and Reflection entries need to be done in class as part of the closure and assessment</p>	<p><u>Vocabulary</u>²: Appendix 2, Investigation 5</p> <p><u>Core Problems</u>²: Filling and Wrapping, Investigation 5 ACE Problems: # 2-4, 8, 10-14, 18-19, 24, 26 pp.67 - 70</p> <p><u>Work Time</u>¹: Filling and Wrapping, Problem 5.1 – 5.2</p> <p><u>Journal Entries</u>¹: Appendix 3, Inv #5.2 – 5.2</p> <p><u>On Demand Tasks</u>³: Appendix 5, Investigation 5</p> <p><u>Mathematical Reflection</u>³ Appendix 4, MMR5:</p>
<p style="text-align: center;"><i>Accountable Talk</i></p> <p>To promote learning, explore solutions, and justify reasoning, conversations between students and students or students and teacher must be accountable – accountable to the learning community, to the mathematics discipline, and to rigorous thinking.</p>	<p>As a result of this Investigation, students should be able to talk and manipulate the vocabulary of the Investigation in response to this type of question:</p> <ul style="list-style-type: none"> ○ How did you know that? ○ How can you use ...? ○ Can you show another way? ○ What convention did you use? <p>These are some recommended questions that you might use. Others can be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</p>

1. Marble Note Book
2.3 Ring Binder
3. Portfolio

Appendix 1 Unit Project

<p>Project¹</p> <p>student work should be placed in portfolio</p>	<p>The project is the culminating assessment, which will allow students to apply what they learned about the use of three-dimensional measurement. It is written in MCAS form to give students the experience of answering an open-response question.</p> <p>The unit project is called “The Aquarium” and the student handout for the project can be found in Appendix 1</p>
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1. portfolio

Unit Project Scoring Guide

Score	Description
<u>4</u>	The student response demonstrates an exemplary understanding of the Measurement concepts involved in determining the volume of a rectangular prism, given the formula.
<u>3</u>	The student response demonstrates a good understanding of the Measurement concepts involved in determining the volume of a rectangular prism, given the formula. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result the response merits 3 points.
<u>2</u>	The student response demonstrates a fair understanding of the Measurement concepts involved in determining the volume of a rectangular prism, given the formula. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
<u>1</u>	The student response demonstrates a minimal understanding of the Measurement concepts involved in determining the volume of a rectangular prism, given the formula.
<u>0</u>	The student response contains insufficient evidence of an understanding of the Measurement concepts involved in determining the volume of a rectangular prism, given the formula to merit any points.

NAME: _____

DATE: _____

The Aquarium

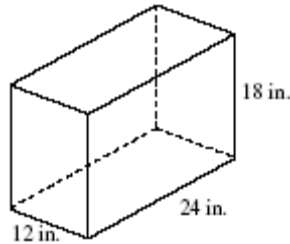
- *BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.*
- *Show all work (diagrams, tables, and computations) on your answer sheet.*
- *If you do the work in your head, explain in writing how you did the work.*

2004, Mathematics - Grade 8
Question 39: Open-Response
Reporting Category: Measurement

Standard(s): 8.M.3



The figure below shows an aquarium that is shaped like a rectangular prism.



- a. What is the volume, in cubic inches, of the aquarium?
- b. One gallon is equal to 231 cubic inches. How many gallons of water will the aquarium hold?
- c. If 10 gallons of water were poured into the empty aquarium, what would be the depth, in inches, of the water? Show your work or explain how you got your answer.

2004 MCAS Grade 8 Mathematics

Student Work: Question #39 - Score Point 4

a. The volume of the aquarium is $5,184 \text{ in}^3$.

To figure this out, I used the formula

base \times width \times height = volume (or $bwh = V$).

So $12 \text{ in} \times 24 \times 18 \text{ in} =$ my answer: $5,184 \text{ in}^3$.

b. The aquarium would hold about 22.4 gallons of water. To come

to this conclusion I divided

the volume by 231 (the number of cubic inches in one gallon).

c. Here is my work:

① First off, 10 gallons = $10 \times 231 = 2,310 \text{ in}^3$

② Since the height is undetermined,

to figure it out you need to divide

the $2,310 \text{ in}^3$ by the width and the base (12 in and 24 in).

This would be around 8 inches. Thus the height would be 8 inches.

③ Another way of looking at this is $12 \text{ in} \times 24 \text{ in} \times h$ (the undetermined depth) = $2,310 \text{ in}^3$. And one can just figure it out fairly simply from there.

2004 MCAS Grade 8 Mathematics

Student Work: Question #39# - Score Point 3

a. $V = Bh$
 $V = (12)(24)(18)$
 $V = 5,184 \text{ in}^3$

The volume of the aquarium is 5,184 cubic inches.

b. This aquarium can hold about 22 gallons of water.

$$\begin{array}{r} 231 \\ \times 22 \\ \hline 462 \\ 462\text{-} \\ \hline 5082 \end{array}$$

$$\begin{array}{r} 5184 \\ -5082 \\ \hline 0102 \end{array} \quad \begin{array}{l} \text{not enough} \\ \text{for another} \\ \text{gallon} \end{array}$$

c. If 10 gallons of water were poured into the empty aquarium 2,310 cubic inches would be covered ($231 \times 10 = 2310$). The aquarium would be filled about half-way up ($5184 \div 2310 = 2.24$), about 9 inches or so.

Student Work: Question #39 - Score Point 2

The volume of the tank
is 5184 cubic inches.

The tank will hold
22 gallons. 7 in.

2004 MCAS Grade 8 Mathematics

Student Work: Question #39 - Score Point 1

a) $V = Bh$
 $= 216 \text{ in} \times 18 \text{ in}$

$$\begin{array}{r} 216 \\ \times 18 \\ \hline 1728 \\ 2160 \\ \hline \end{array}$$

$V = 3,888 \text{ in} = 3,888 \text{ in}$

$$\begin{array}{r} B = 18 \\ \times 12 \\ \hline 36 \\ + 180 \\ \hline 216 \end{array}$$

$$\begin{array}{r} 1944 \text{ in}^2 \\ 2 \overline{) 3888} \\ \underline{-2} \\ 18 \end{array}$$

b) The aquarium will hold 8 gallons of water.

$$\begin{array}{r} 8 \\ 231 \overline{) 1848} \\ \underline{-1848} \\ 96 \end{array}$$

c)

Appendix 2 Vocabulary

Investigation 1:

- *unit cube, net, edge, face, dimensions, rectangular prism, base, two-dimensional, flat pattern, cubic, rectangular box, hexomino*

Investigation 2:

- *volume, surface area, square units*

Investigation 3:

- *cylinder, prism, triangular prism, square prism, pentagonal prism, hexagonal prism, congruent*

Investigation 4:

- *cone, pyramid, sphere, triangular pyramid, square pyramid, pentagonal pyramid, cylindrical, conical, spherical*

Investigation 5:

- *reinforce previous vocabulary, scaling, doubling, tripling, quadrupling*

Appendix 3 Journal Entries

Investigation 1:

Investigation 1.1:

What is the total area needed to cover a unit cube?

Investigation 1.2:

What patterns did you notice between the dimensions, faces, vertices, and/or edges of a unit cube and that of a rectangular box?

Investigation 1.3:

Explain how to find the total area of all the faces of a rectangular box?

Investigation 1.4:

Explain how to find the number of identical cubes it will take to fill a rectangular box?

Investigation 2:

Investigation 2.1

For a given number of cubes, what arrangement will give a rectangular prism with the least surface area? What arrangement will give a rectangular prism with the greatest surface area? Use specific examples to illustrate your ideas.

Investigation 2.2

Describe how you can find the surface area of a rectangular prism? Give a rule for finding the surface area.

Investigation 2.3

Describe how you can find the volume of any prism? Give a rule for finding the volume.

Investigation 3

Investigation 3.1

Describe how you can find the volume of any prism? Give a rule for finding the volume.

Investigation 3.2

Describe how you can find the volume of a cylinder using its dimensions. Write a rule that represents your strategy.

Investigation 3.3

Describe how you can find the surface area of a cylinder using its dimensions. Write a rule that represents your strategy.

Investigation 3.4

Describe the similarities and differences in the methods for finding the volume of a cylinder, a rectangular prism, and a non-rectangular prism.

Investigation 4

Investigation 4.1

If a cylinder and a sphere have the same radius and height, describe the relationship between their volumes. Use examples and sketches to illustrate your answer.

Investigation 4.2

If a square pyramid and a rectangular prism have the same base and height, how do their volumes compare? Use examples and sketches to illustrate your answer.

Investigation 4.3

If you know the radius and height of a cone, how can you find the volume?

Investigation 5

Investigation 5.1

Suppose you wanted to build a rectangular box with eight times the volume of a given rectangular box. How can you determine the possible dimensions for the new box? Are the two boxes similar? Explain.

Investigation 5.2

Suppose you wanted to build a rectangular box with an eighth of the volume of a given rectangular box. How can you determine the possible dimensions for the new box? Are the two boxes similar? Explain.

Appendix 4 Reflections

MMR1

Suppose several different nets are made for a given box. What do all of the nets have in common? What might be different?

MMR2

Describe what you now understand about length, area, and volume; include several similarities and differences among these measurements, as well as any specific examples with the appropriate units used and any new vocabulary?

MMR3

Describe the similarities and differences in the methods for finding the surface area of a cylinder, a rectangular prism, and a non-rectangular prism.

MMR4

How are pyramids and cones alike and different? How are prisms and cylinders alike and different?

MMR5

Describe how the volume and surface area of a rectangular prism change as each of its dimensions is doubled, tripled, quadrupled, and so on? Can you write a rule that represents this pattern?

Appendix 5 On Demand Tasks

CMP2: Filling and Wrapping

<p><i>On-Demand Tasks</i></p> <p><u><i>Additional Practice & Skills Workbook</i></u></p> <p><u><i>Assessment Resources</i></u></p> <p>In class individualized On-Demand tasks assess knowledge of mathematical facts, operations, concepts, and skills, and their efficient application to problem solving. The results of these different forms of assessment provide rich profiles of students' achievements in mathematics and serve as the basis for identifying curricula and instructional approaches to best develop their talents.</p>	<p><u><i>After Inv. 1</i></u> Additional Practice and Skills Workbook Pg 115 #2 a-c</p> <p><u><i>After Inv. 2</i></u> Additional Practice and Skills Workbook Pg 118 #2 a-d</p> <p><u><i>After Inv. 3</i></u> Additional Practice and Skills Workbook Pg 127 #8</p> <p><u><i>After Inv. 4</i></u> Additional Practice and Skills Workbook Pg 133 #4 a-d</p> <p><u><i>After Inv. 5</i></u> Additional Practice and Skills Workbook Pg 138 #8 a-c</p>
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HPS Mathematics Scoring Rubric

Score	Description
<u>4</u>	The response shows a <u>comprehensive</u> understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has <u>completed the task(s)</u> correctly, using mathematically sound procedures. It contains <u>clear, complete explanations</u> and/or <u>adequate work required</u> .
<u>3</u>	The response shows a <u>general</u> understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has <u>completed the task(s)</u> , using mathematically sound procedures. It contains <u>complete explanations</u> and/or <u>adequate work required</u> .
<u>2</u>	Response shows a <u>basic</u> understanding of the mathematical concept(s) and/or procedures in the task(s). It addresses <u>most aspects of the task(s)</u> , using mathematically sound procedures. It may contain a correct solution but provides <u>incomplete procedures, reasoning explanations</u> . It may reflect <u>some misunderstandings</u> of the underlying mathematical concepts and/or procedures.
<u>1</u>	The response shows a <u>minimal</u> understanding of the mathematical concepts and/or procedures embodied in the task(s). It addresses <u>some elements of the task(s)</u> correctly but reaches an <u>inadequate solution and/or provides reasoning that is faulty or incomplete</u> . It exhibits <u>multiple flaws related to a misunderstanding of important aspects</u> of the task(s), misuse of mathematical procedures, or faulty mathematical reasoning. It reflects a <u>lack of essential understanding</u> of the underlying mathematical concepts. It may contain a correct numerical answer but <u>the required work is not provided</u> .
<u>0</u>	The response is <u>completely incorrect, irrelevant, or incoherent</u> , or contains a correct response arrived at using an <u>obviously incorrect procedure</u> .

NAME: _____

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Investigation 1

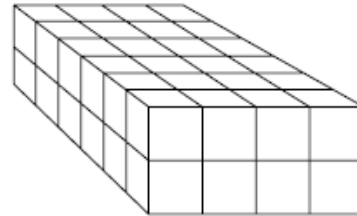
- *BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.*
 - *Show all work (diagrams, tables, and computations) on your answer sheet.*
 - *If you do the work in your head, explain in writing how you did the work.*
-
- a. Gina has a sheet of cardboard that measures 9 feet by 6 feet. She uses scissors and tape to make the entire sheet of cardboard into a closed box that is a perfect cube. What is the surface area of the box?
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- b. What is the length of each edge of the box? Explain your reasoning.
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- c. How many unit cubes would it take to fill the box?

NAME: _____ **DATE:** _____

Investigation 2

- *BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.*
- *Show all work (diagrams, tables, and computations) on your answer sheet.*
- *If you do the work in your head, explain in writing how you did the work.*

a. The rectangular prism at the right is made from centimeter cubes.
What are the dimensions of the prism?



- b. What is the surface area of the prism?
- c. What is the volume of the prism? That is, how many cubes are in the prism?
- d. Give the dimensions of a different rectangular prism that can be made from the same number of cubes. What is the surface area of the prism?

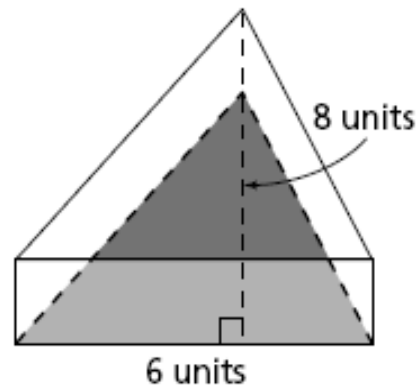
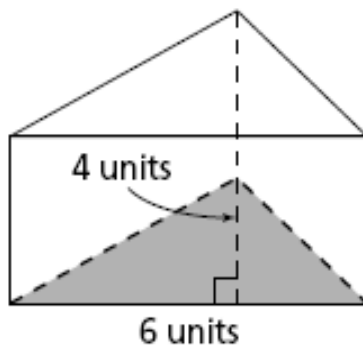
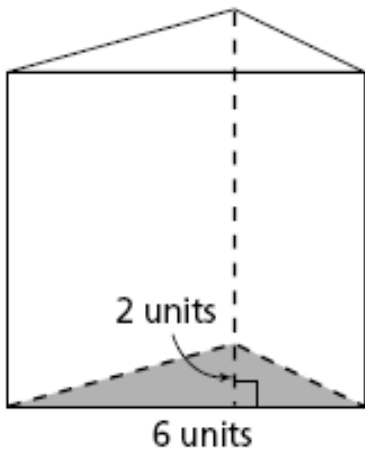
NAME: _____

DATE: _____

Investigation 3

- BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.
- Show all work (diagrams, tables, and computations) on your answer sheet.
- If you do the work in your head, explain in writing how you did the work.

8. Below are three triangular prisms (not drawn to scale). The height of the first prism is 8 units, and the volumes of all three prisms are the same. What are the heights of the other two prisms?

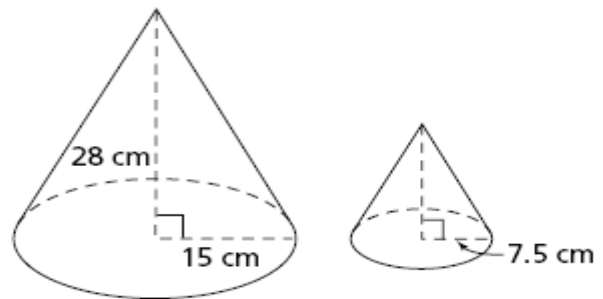


NAME: _____ DATE: _____

Investigation 4

- BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.
- Show all work (diagrams, tables, and computations) on your answer sheet.
- If you do the work in your head, explain in writing how you did the work.

a. Assuming the two cones at the right are similar, what is the height of the smaller cone?



b. What is the volume of the larger cone?

c. What is the volume of the smaller cone?

d. Angie is using the smaller cone to scoop popcorn into the larger cone. How many scoops from the smaller cone will it take to fill the larger cone?

NAME: _____

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Investigation 5

- *BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.*
- *Show all work (diagrams, tables, and computations) on your answer sheet.*
- *If you do the work in your head, explain in writing how you did the work.*

a. Complete the table below for each rectangular box.

Closed Box	Surface Area	Volume
A: 1-2-3 box		
B: 2-4-6 box		
C: 3-6-9 box		
D: 4-8-12 box		

b. Use your table from part (a) to complete the table below.

Boxes to Compare	Ratio of Dimensions	Ratio of Surface Areas	Ratio of Volumes
B and A			
C and A			
D and A			
D and B			
C and B			
D and C			

c. What patterns do you see in the ratios?

NOTES