Holyoke Public Schools

Mathematics Curriculum Map

Grade 4

Moving Between Solids and Silhouettes

Table of Content

Curriculum Maps

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.
    - STUDENT MASTER – for project
5. INVESTIGATIONS:
    - NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
    - ACCOUNTABLE TALK – using probing questions

5. ON-DEMAND ASSESSMENTS - to be done during teaching of unit.
    - STUDENT MASTERS- for on-demand assessments.

Mathematics
Evidence of Learning Artifacts

Artifact	K - 1	2 - 5	6 - 8
3 Ring Binder (3R)*	o Student Work[1]	o Vocabulary o Student sheets[1] ***All work should be dated and listed by investigation***	o Math books o Vocabulary o Core Problems[1] o Lab sheets ***All work should be dated and listed by investigation***
Marble Notebook (MNB)	o Journal entries[2]	o Table of Contents o Problem of the day o Journal entries o Class work ***All work should be dated and listed by investigation in the Table of Contents***	o Table of Contents o Work time o Journal entries ***All work should be dated and listed by investigation in the Table of Contents***
Portfolio[3] ***(P)***	o On-demand tasks o Projects o Teacher anecdotal notes	o On-demand tasks o Reflections o Projects ***All work should be dated and listed by investigation***	o On-demand tasks o Reflections o Projects ***All work should be dated and listed by investigation***

[*] *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*

Moving Between Solids and Silhouettes
Probing Questions for Accountable Talk

As students progress through this unit, they should be asked the following questions to assess their knowledge about 3-Dimensional Geometry and Measurement.

- How can you determine a solid's silhouette?
- How can you determine a solid from its silhouette?
- What are some attributes we can use to describe geometric solids?
- How are geometric solids and silhouettes different?
- What strategies can we use to find volume? Do these strategies always work?
- Is there a way that we can use to find volume for any box?
- What strategies can you use to construct cube buildings?
- How can visualizing all aspects of a building help to create its silhouettes?
- How can you construct boxes using different information such as layers or patterns?
- How are predictions useful in determining volume?

Ten Minute Math

Ten Minute Math: Session 1.1 Practicing Place Value
Session 1.4 Quick Images

Ten Minute Math activities offer practice and review of key concepts at each grade level. After their initial introduction, these short activities, designed to take no longer than 10 minutes, support and balance the in-depth work of each curriculum unit.

Implementing Investigations in Grade 4: Please review pages 24, 28 -32, for 2 Ten Minute Math activities in this unit.

Additional Probing Questions for Accountable Talk

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

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

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:

- Identify 2-dimensional silhouettes of 3-dimensional solids
- Draw 2-dimensional representations showing different perspectives of a 3-dimensional object.
- Find the volume of cube buildings and rectangular prisms.

Math Content Standards:

(4.G.1) Compare and analyze attributes and other features of two- and three-dimensional geometric shapes
(4.G.2) Describe, model, draw, compare, and classify two- and three- dimensional shapes
(4.G.7) Describe and apply techniques such as reflections, rotations, and translations for determining if two shapes are congruent

Performance Standards:

(M2b) Visualizes and represents two dimensional views of simple rectangular three dimension shapes
(M2d) Uses many type of figures and identifies the figures by their properties

UNIT: Moving Between Solids and Silhouettes

End-of-Unit Project

GRADE: 4

End-of-Unit Project (P) Student work should be placed in **portfolio (P)**. The project is the culminating assessment which will allow students to apply what they learned in the unit. It is written in MCAS form to give students the experience of answering an open-response question.	Unit 7 End of Unit Assessment Resource Binder: M23-25*

UNIT: MOVING BETWEEN SOLIDS AND SILHOUETTES
Investigation 1 (1.1 – 1.4) DAYS: 5

GRADE: 4

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio** ***Vocabulary*** – prism, cylinder, solid, vertex, edge, face, silhouette (3R) ***Work Time –*** Student Activity Book pgs. 1 – 15 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 1.1** What properties can you use to describe geometric solids? **Inv. 1.2** What is the difference between solids and silhouettes? **Inv. 1.3** If you are looking at a triangle as a silhouette, what solids could be making that silhouette? How do you know? **Inv. 1.4** None, due to assessment ***Reflection*** – What is a silhouette? How are silhouettes and solids related? What strategies can you use to determine a solid's silhouette? What strategies can you use to determine a solid from a silhouette?(P)
Accountable Talk 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.	*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:* How did you know that? How can you use …? Can you show another way? What convention did you use? *These are some recommended questions that you might use. Others can be found be found at the beginning of the map and on the probing question sheet in the district mathematics guide.*

UNIT: MOVING BETWEEN SOLIDS AND SILHOUETTES
Investigation 2 (2.1 – 2.5) DAYS: 8

GRADE: 4

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio** ***Vocabulary*** – volume, recessed, oriented(3R) ***Work Time –*** Student Activity Book pgs. 17-34 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 2.1** What strategies can you use to determine the volume of a cube building? **Inv. 2.2** What was difficult about drawing the three different views of the building? **Inv. 2.3** Was it easier to make silhouettes with or without the cube building? Why? **Inv. 2.4** What strategies did you use to construct the building from the three silhouettes? **Inv. 2.5** None, due to assessment ***Reflection*** – What is volume? How is volume measured? What units are used to denote volume? How do you find volume of the cube buildings? . (P)
Accountable Talk 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.	*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:* How did you know…? Can you solve the problem in a different way? Does your answer make sense? What was your strategy? *These are some recommended questions that you might use. Others can be found be found at the beginning of the map and on the probing question sheet in the district mathematics guide.*

UNIT: MOVING BETWEEN SOLIDS AND SILHOUETTES
Investigation 3 (3.1 – 3.5) DAYS: 8

GRADE: 4

Evidence of Learning Artifacts Journal and Reflection questions should be posted and referred to at the beginning of the appropriate *Investigation*. Journal and Reflection entries need to be done in class as part of the closure and assessment.	**(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio** ***Vocabulary*** – rectangular prism (3R) ***Work Time –*** Student Activity Book pgs. 35 - 52 (3R) ***Journal Entries*** – (MNB) *Maximum 5 minutes **Inv. 3.1** How did your prediction of how many cubes change after you put the cubes in the box? **Inv. 3.2** How did you figure out how many layers the box needed? **Inv. 3.3** What strategies can you use for finding the volume of a box without building the box? **Inv. 3.4** Continue journal from 3.3 **Inv. 3.5** None, due to assessment ***Reflection*** – If you have a box that is 3 x 4 x 3 cubes, what is the volume of the box? How many layers are in the box? Explain how you know. (P)
Accountable Talk 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.	*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:* How did you know…? Can you solve the problem in a different way? Does your answer make sense? What was your strategy? *These are some recommended questions that you might use. Others can be found be found at the beginning of the map and on the probing question sheet in the district mathematics guide.*

End-of-Unit Project

Student work should be placed in **portfolio (P)**.

The project is the culminating assessment which will allow students to apply what they learned about two and three dimensional shapes and measurement. It is written in MCAS form to give students the experience of answering an open-response question.

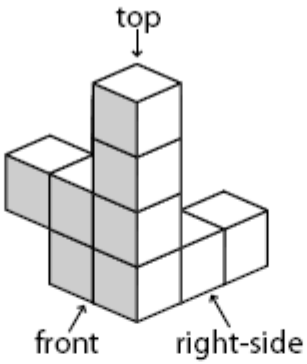
NAME: _____ **DATE:** _____

End-of-Unit Project

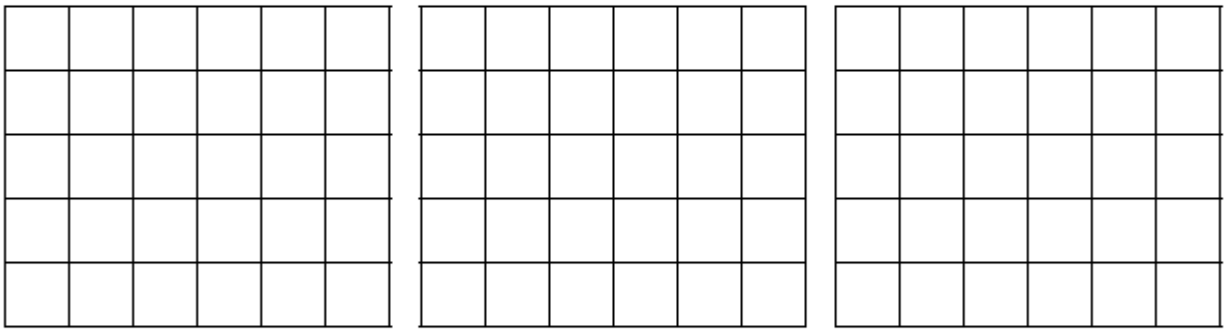
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all work (diagrams, tables, and computations) on your answer sheet.**
- **If you do the work in your head, explain in writing how you did the work.**

Problem 1

A. Make this building and show it to your teacher.



B. Using the same building, draw it from 3 different views.



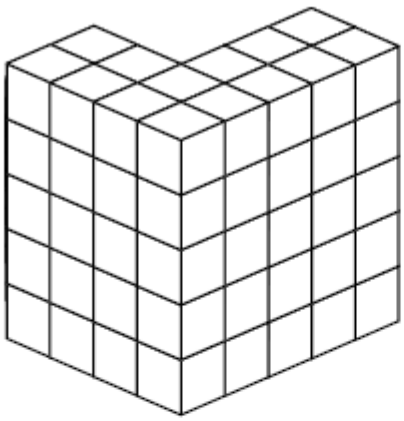
Front view

Top as seen from front

Right-side view

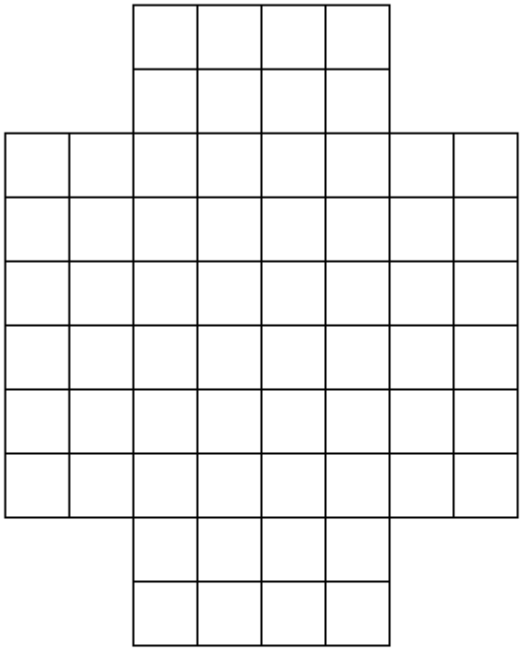
Problem 2

What is the volume of this cube building?



Problem 3

A. Examine the pattern below. If this box were put together, how many cubes would fit?



B. Explain how you found your answer.

On-Demand Assessments

(To be filed in portfolio)

Moving Between Solids and Silhouettes
Investigations

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.

UNIT: MOVING BETWEEN SOLIDS AND SILHOUETTES

On-Demand Assessments

GRADE: 4
NOTES

On-Demand Assessments (P) <u>Moving Between Solids and Silhouettes</u> Investigations 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.	***<u>Inv. 1:</u>*** Resource Binder: Session 1.4, M14* ***<u>Inv. 2</u>:*** Resource Binder: Session 2.5, M16-18** *Assessment Checklists should be kept with tracking sheets ***Please refer to the section in the Teacher's Unit Guide entitled, "Professional Development" for examples of student work for each assessment.**

Holyoke Public Schools
2007 - 2008
Mathematics
Scoring Rubric

Score point 4:
The response shows a ***comprehensive*** understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has ***completed the task(s) correctly***, using mathematically sound procedures. It contains ***clear, complete explanations*** and/or ***adequate work required***.

Score point 3:
The response shows a ***general*** understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It indicates that the student has ***completed the task(s)***, using mathematically sound procedures. It contains ***complete explanations*** and/or ***adequate work required***.

Score point 2:
The response shows a ***basic*** understanding of the mathematical concept(s) and/or procedures embodied in the task(s). It addresses ***most aspects of the task(s)***, using mathematically sound procedures. It may contain a correct solution but provides ***incomplete procedures, reasoning and/or explanations***. It may reflect ***some misunderstandings*** of the underlying mathematical concepts and/or procedures.

Score point 1:
The response shows a ***minimal*** understanding of the mathematical concepts and/or procedures embodied in the task(s). It addresses ***some elements of the task(s) correctly*** but reaches an ***inadequate solution and/or provides reasoning that is faulty or incomplete***. It exhibits ***multiple flaws related to a misunderstanding of important aspects*** of the task(s), ***misuse*** of mathematical procedures, or faulty mathematical reasoning. It reflects a ***lack of essential understanding*** of the underlying mathematical concepts. It may contain a correct numerical answer but the ***required work is not provided***.

Score point 0:
The response is ***completely incorrect, irrelevant, or incoherent***, or contains a correct response arrived at using an ***obviously incorrect procedure***.

NOTES