



Holyoke Public Schools

Grade 8

The Shapes of Algebra

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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   |
|--|--|---|---|
| <b>3 Ring Binder</b><br><br><b>(3R)*</b>       | <ul style="list-style-type: none"> <li>○ Student Work<sup>1</sup></li> </ul>   | <ul style="list-style-type: none"> <li>○ Vocabulary</li> <li>○ Student sheets<sup>1</sup></li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation</u></b></p>  | <ul style="list-style-type: none"> <li>○ Math books</li> <li>○ Vocabulary</li> <li>○ Core Problems<sup>1</sup></li> <li>○ Lab sheets</li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation</u></b></p> |
| <b>Marble Notebook</b><br><br><b>(MNB)</b>     | <ul style="list-style-type: none"> <li>○ Journal entries<sup>2</sup></li> </ul>  | <ul style="list-style-type: none"> <li>○ Table of Contents</li> <li>○ Problem of the day</li> <li>○ Journal entries</li> <li>○ Class work</li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation in the Table of Contents</u></b></p> | <ul style="list-style-type: none"> <li>○ Table of Contents</li> <li>○ Work time</li> <li>○ Journal entries</li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation in the Table of Contents</u></b></p>  |
| <b>Portfolio<sup>3</sup></b><br><br><b>(P)</b> | <ul style="list-style-type: none"> <li>○ On-demand tasks</li> <li>○ Projects</li> <li>○ Teacher anecdotal notes</li> </ul> | <ul style="list-style-type: none"> <li>○ On-demand tasks</li> <li>○ Reflections</li> <li>○ Projects</li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation</u></b></p>  | <ul style="list-style-type: none"> <li>○ On-demand tasks</li> <li>○ Reflections</li> <li>○ Projects</li> </ul> <p style="text-align: center;"><b><u>All work should be dated and listed by investigation</u></b></p>                                  |

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

<sup>1</sup> Send home at the end of each unit

<sup>2</sup> Use grade level math journals

<sup>3</sup> 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 patterns relate the coordinates of points on lines and curves?*
- *Does the problem involve an equation or an inequality?*
- *Does the problem call for writing and/or solving linear equations?*
- *What patterns relate the points whose coordinates satisfy linear equations?*

## 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:

- *Write and use equations of circles*
- *Determine if lines are parallel or perpendicular by looking at patterns in their graphs, coordinates, and equations*
- *Find solutions to inequalities represented by graphs or equations*
- *Write inequalities that fit given solutions*
- *Graph linear inequalities and systems of inequalities*
- *Describe the points that lie in regions determined by linear inequalities and systems of inequalities*

## Math Content Standards:

- *8N8 Demonstrate an understanding of the properties of arithmetic operations on rational numbers. Use the associative, commutative, and distributive properties; properties of the identity and inverse elements (e.g.,  $-7 + 7 = 0$ ;  $3/4 \times 4/3 = 1$ ); and the notion of closure of a subset of the rational numbers under an operation (e.g., the set of odd integers is closed under multiplication but not under addition).*
- *8N9 Use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and solve problems, e.g. multiplying by  $1/2$  or  $0.5$  is the same as dividing by  $2$ .*
- *8P3 Demonstrate an understanding of the identity  $(-x)(-y) = xy$ . Use this identity to simplify algebraic expressions, e.g.,  $(-2)(-x+2) = 2x - 4$ .*
- *8P4 Create and use symbolic expressions and relate them to verbal, tabular, and graphical representations.*
- *8P5 Identify the slope of a line as a measure of its steepness and as a constant rate of change from its table of values, equation, or graph. Apply the concept of slope to the solution of problems.*
- *8P6 Identify the roles of variables within an equation, e.g.,  $y = mx + b$ , expressing  $y$  as a function of  $x$  with parameters  $m$  and  $b$ .*
- *8P7 Set up and solve linear equations and inequalities with one or two variables, using algebraic methods, models, and/or graphs.*
- *8P10 Use tables and graphs to represent and compare linear growth patterns. In particular, compare rates of change and  $x$ - and  $y$ -intercepts of different linear patterns.*

## **Performance Standards:**

- *(M3a) Discovers, describes and generalizes patterns, including linear, exponential, and simple quadratic relationships, i.e., those of the form  $f(n) = n^2$  or  $f(n) = cn^2$ , for the constant  $c$ , including  $A = \pi r^2$ , and represents them with variables and expressions*
- *(M3b) Represents relationships with tables, graphs in the coordinate plane, and verbal or symbolic rules.*
- *(M3c) Analyzes tables, graphs, and rules to determine functional relationships.*
- *(M3d) Finds solutions for unknown quantities in linear equations and in simple equations and inequalities.*

# Investigation 1 Equations for Circles and Polygons

|   |  |
|---|--|
| <p><b><u>Objectives</u></b><br/>Investigations 1.1 – 1.2</p>  | <p><b><u>Pacing:</u></b><br/>3 days</p>  |
| <p style="text-align: center;"><b><i>Evidence of Learning Artifacts</i></b></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><b><u>Vocabulary</u><sup>2:</sup></b><br/><a href="#">Appendix 2</a>, Investigation 1</p>   |
|   | <p><b><u>Core Problems</u><sup>2:</sup></b><br/>The Shapes of Algebra, Investigation 1 ACE Problems: 2, 4, 6, 8, 9, 12, 14, 15, 25, 32, 38, 42, 45, 49 (3R)</p>  |
|   | <p><b><u>Work Time</u><sup>1:</sup></b><br/>The Shapes of Algebra, Problems 1.1-1.2</p>  |
|   | <p><b><u>Journal Entries</u><sup>1:</sup></b><br/><a href="#">Appendix 3</a>, Inv 1.1,1.2,</p>   |
|   | <p><b><u>On Demand Tasks</u><sup>3:</sup></b><br/><a href="#">Appendix 5</a>, Investigation 1</p>  |
|   | <p><b><u>Mathematical Reflection</u><sup>3</sup></b><br/><a href="#">Appendix 4</a>, MMR1:</p>   |
| <p style="text-align: center;"><b><i>Accountable Talk</i></b></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"> <li>○ What patterns did you notice with the equations, slopes, inequalities?</li> <li>○ Can you show another way to find the slope?</li> <li>○ How do you know what values to start with when finding the midpoints?</li> </ul> <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> |

<sup>1</sup> .Marble Note Book  
<sup>2,3</sup> Ring Binder  
<sup>3</sup> .Portfolio

## Investigation 2 Linear Equations and Inequalities

|   |   |
|---|---|
| <p><b><u>Objectives</u></b><br/>Investigations: 2.1-2.3</p>   | <p><b><u>Pacing:</u></b><br/>5 days</p>   |
| <p style="text-align: center;"><b><i>Evidence of Learning Artifacts</i></b></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><b><u>Vocabulary</u><sup>2</sup>:</b><br/><a href="#">Appendix 2</a>, Investigation 2</p>  |
|   | <p><b><u>Core Problems</u><sup>2</sup>:</b><br/>The Shapes of Algebra , Investigation 2 ACE Problems: #s 2, 6-11 12, 16, 19, 21, 23, 30, 33, 42 (3R)</p>  |
|   | <p><b><u>Work Time</u><sup>1</sup>:</b><br/>The Shapes of Algebra, Problems 2.1 -2.3</p>  |
|   | <p><b><u>Journal Entries</u><sup>1</sup>:</b><br/><a href="#">Appendix 3</a>, Inv 2.1 – 2.3</p>   |
|   | <p><b><u>On Demand Tasks</u><sup>3</sup>:</b><br/><a href="#">Appendix 5</a>, Investigation 2</p>   |
| <p><b><u>Mathematical Reflection</u><sup>3</sup></b><br/><a href="#">Appendix 4</a>, MMR2:</p>  |   |
| <p style="text-align: center;"><b><i>Accountable Talk</i></b></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"> <li>○ How did you know...?</li> <li>○ How can you justify...?</li> <li>○ Does your answer make sense?</li> <li>○ Can you draw a diagram?</li> </ul> <p>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.</p> |

1. Marble Note Book  
2.3 Ring Binder  
3. Portfolio

## Investigation 3 Equations With Two or More Variables

|   |  |
|---|--|
| <p><b><u>Objectives</u></b><br/>Investigations: 3.1 – 3.2</p>   | <p><b><u>Pacing:</u></b><br/>3 days</p>  |
| <p style="text-align: center;"><b><i>Evidence of Learning Artifacts</i></b></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><b><u>Vocabulary</u><sup>2</sup>:</b><br/><a href="#">Appendix 2</a>, Investigation 3</p> <hr/> <p><b><u>Core Problems</u><sup>2</sup>:</b><br/>The Shapes of Algebra, Investigation 3 ACE Problems: #s # 1, 4, 5, 17, 20, 22, 26, 32, 34, 37, 40, 43, 47, 48(3R)</p> <hr/> <p><b><u>Work Time</u><sup>1</sup>:</b><br/>The Shapes of Algebra, Problems: 3.1- 3.2</p> <hr/> <p><b><u>Journal Entries</u><sup>1</sup>:</b><br/><a href="#">Appendix 3</a>, Inv. 3.1 – 3.2</p> <hr/> <p><b><u>On Demand Tasks</u><sup>3</sup>:</b><br/><a href="#">Appendix 5</a>, Investigation 3</p> <hr/> <p><b><u>Mathematical Reflection</u><sup>3</sup></b><br/><a href="#">Appendix 4</a>, MMR3:</p> |
| <p style="text-align: center;"><b><i>Accountable Talk</i></b></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"> <li>○ What is your strategy?</li> <li>○ How could you check that ... is correct?</li> <li>○ Could you begin with a different step?</li> <li>○ Does .... make sense given the information in the problem?</li> </ul> <p>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.</p>  |

1. Marble Note Book  
2.3 Ring Binder  
3. Portfolio

## Investigation 5 Linear Inequalities

|   |   |
|---|---|
| <b>Objectives</b><br>Investigations : 5.1 – 5.3   | <b>Pacing:</b><br>4 days  |
| <p style="text-align: center;"><b><i>Evidence of Learning Artifacts</i></b></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><b><u>Vocabulary</u><sup>2</sup>:</b><br/>Appendix 2, Investigation 5</p>  |
|   | <p><b><u>Core Problems</u><sup>2</sup>:</b><br/>The Shapes of Algebra, Investigation 5 ACE Problems: pg. 78 #s 1- 8, 13, 14</p>   |
|   | <p><b><u>Work Time</u><sup>1</sup>:</b><br/>The Shapes of Algebra, Problem: 5.1 – 5.3</p>   |
|   | <p><b><u>Journal Entries</u><sup>1</sup>:</b><br/>Appendix 3, Inv. 5.1 – 5.3</p>  |
|   | <p><b><u>On Demand Tasks</u><sup>3</sup>:</b><br/><a href="#">Appendix 5</a>, Investigation 5</p>   |
|   | <p><b><u>Mathematical Reflection</u><sup>3</sup></b><br/><a href="#">Appendix 4</a>, MMR5:</p>  |
| <p style="text-align: center;"><b><i>Accountable Talk</i></b></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"> <li>○ How did you decide to ....?</li> <li>○ How does this connect to other math we have learned?</li> </ul> <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><b><i>Project</i><sup>1</sup></b></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 algebraic notation and reasoning. 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 Shapes of Algebra End- of- Unit Project’ and the student handout for the project can be found in <a href="#">Appendix 1</a></p> |
|--|---|

*1. portfolio*

## Unit Project Scoring Guide

| Score    | Description   |
|----------|---|
| <u>4</u> | The student response demonstrates an exemplary understanding of the Patterns, Relations, and Algebra concepts involved in the use of tables to represent linear growth patterns. Given a verbal description, the student completes a table of values, analyzes the sequential pattern in order to create an equation, and then uses the equation to predict a real-world outcome. |
| <u>3</u> | The student response demonstrates a good understanding of the Patterns, Relations, and Algebra concepts involved in the use of tables to represent linear growth patterns. Although there is significant evidence that the student recognizes and applies 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 Patterns, Relations, and Algebra concepts involved in the use of tables to represent linear growth patterns. 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 Patterns, Relations, and Algebra concepts involved in the use of tables to represent linear growth patterns.   |
| <u>0</u> | The student response contains insufficient evidence of an understanding of the Patterns, Relations, and Algebra concepts involved in the use of tables to represent linear growth patterns to merit any points.   |

**NAME:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

### **The Shapes of Algebra 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.*

#### **Assessment Resource pg. 123, #5-8**

Jose is batboy for the Lansing Lugnuts baseball team during the summer vacation. His pay includes two season tickets worth a total of \$80 and he also gets paid \$5 per hour of practice or game time that he works. Charlie works at the concession stand for most Lugnuts games, earning \$6 per hour plus a \$50 bonus if he works at least 20 games.

1. Write an equation showing how Jose's summer pay depends on the number of hours he works.
  
2. Write and solve an inequality that answers the question, "For how many hours of work will Jose's total summer pay be less than \$260?"
  
3. Suppose that Charlie plans to work at least 20 games. Write an equation showing how his total summer earnings are related to the number of hours he works.
  
4. Write and solve an inequality to find the number of hours worked for which Charlie will earn more in total summer pay than Jose.

## Appendix 2 Vocabulary

### **Investigation 1:**

- *interior, radius, inequality, perpendicular lines, parallelogram, midpoint, vertex, vertices, boundary*  
*interior, radius, inequality, perpendicular lines, parallelogram, midpoint, vertex, vertices, boundary*  
(Review words: scale factor, similarity(3R))

### **Investigation 2:**

- *systems of linear equations, linear inequality, inequalities, symbolic reasoning(3R)*

### **Investigation 3:**

- *linear equation in standard form, slope-intercept form, linear system(3R)*

### **Investigation 5:**

- *strict inequalities, inclusive inequalities, at least, no more than, systems of linear inequalities (3R)*
- *\*What vocabulary help clue our students into knowing they are dealing with an inequality? For example, at least, no more than... Discuss with students and pull clues from the story problems they create with their journal entry in 5.1*

## Appendix 3 Journal Entries

### Investigation 1:

#### *Investigation 1.1:*

What happens to the sides of the right triangles as  $(x, y)$  travels around the circle?

#### *Investigation 1.2:*

Inv. 1.2 What patterns show up in equations for pairs of parallel lines and pairs of perpendicular lines?

### Investigation 2:

#### *Investigation 2.1*

Describe the elements of a system of linear equations. Use pictures, numbers and/or words?

#### *Investigation 2.2*

Describe the elements of a linear inequality. Use pictures, numbers and/or words?

#### *Investigation 2.3*

In solving linear inequalities, what are the advantages and disadvantages to using symbolic reasoning and graphing?

### Investigation 3

#### *Investigation 3.1*

What can you say about the likely graph shape for solutions to any equation that looks like  $ax + by = c$

#### *Investigation 3.2*

Describe the similarities and differences between the standard form and slope-intercept form.

## **Investigation 5**

### ***Investigation 5.1***

Create a story problem situation that would require a linear inequality with 2 variables.\*

### ***Investigation 5.2***

Why does the graphic solution of a linear inequality involve shading?

### ***Investigation 5.3***

What is the difference between a strict and inclusive inequality. How does that affect the graphic solution?

## Appendix 4 Reflections

### MMR1

What types of equations or inequalities describe points  $(x, y)$  that lie:

- on a circle of radius  $r$  centered at the origin
- in the interior of a circle radius  $r$  centered at the origin (P)

### MMR2

Describe the similarities and differences between linear equations and linear inequalities? (P)

### MMR3

What pattern will result from plotting all points  $(x, y)$  that satisfy an equation in the form  $ax + by = c$  (P)

### MMR5

Suppose you are given one linear inequality. How can you use a graph to find solutions to the inequality? (P)

# Appendix 5 On-Demand Tasks

## CMP2: The Shapes of Algebra

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| <p><b><i>On-Demand Tasks</i></b></p> <p><b><u><i>Additional Practice &amp; Skills Workbook</i></u></b></p> <p><b><u><i>Assessment Resources</i></u></b></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><br/>Assessment Resources: pg.114 “Check Up”, #1</p> <p><u><i>After Inv. 2</i></u><br/>Additional Practice and Skills Workbook pg 148 #1,2,5,6 and pg 149 #15</p> <p><u><i>After Inv. 3</i></u><br/>ACE question #2 p42</p> <p><u><i>After Inv. 5</i></u><br/>Additional Practice and Skills Workbook Pg 168 #2<br/>Assessment Resources: pg 122 #1-4</p> |
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## HPS Mathematics Scoring Rubric

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



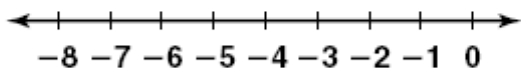
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### Investigation 2

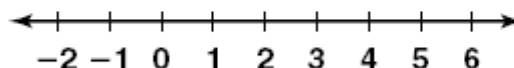
- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION.**
- **Show all work (diagrams, tables, and computations) on your answer sheet.**
- **If you do the work in your head, explain in writing how you did the work.**

**Solve each inequality. Graph the solutions on the number line.**

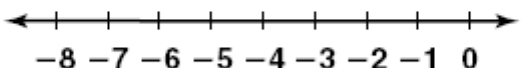
1.  $m + 6 > 2$



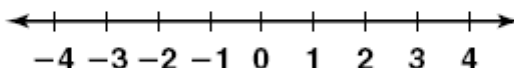
2.  $q + 4 \leq 9$



5.  $-5m < 20$



6.  $\frac{j}{6} \leq 0$



**Write and solve an inequality to answer each question.**

15. A drama club's production of "Oklahoma!" is going to cost \$1,250 to produce. How many tickets will they need to sell for \$8 each in order to make a profit of at least \$830?

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### 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.**

2. Neema saves her quarters and dimes. She plans to exchange the coins for paper money when the total value equals \$10.
- a. How many coins does she need to make \$10 if all the coins are quarters? If all the coins are dimes?
  - b. What equation relates the number of quarters  $x$  and dimes  $y$  to the goal of \$10?
  - c. Use the answers from part (a) to help you draw a graph showing all solutions to the equation.
  - d. Use the graph to find five combinations of dimes and quarters that will allow Neema to reach her goal.



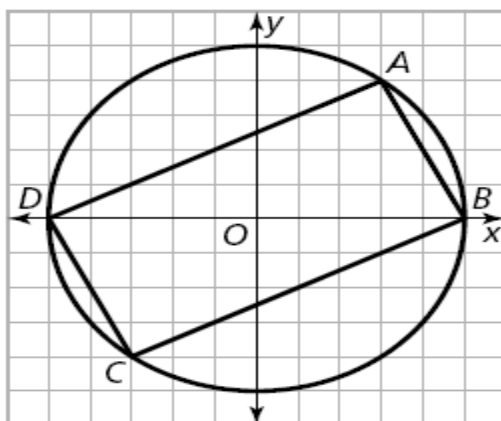
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**Additional Practice**

**BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH QUESTION. Show all work (diagrams, tables, and computations) on your answer sheet.**

**This diagram shows a quadrilateral with vertices on a circle of radius 5 and center  $(0, 0)$  on a coordinate grid.**



1. Write an equation satisfied by  $(x, y)$  coordinates of points on the circle.
2. Is side  $AD$  parallel to side  $BC$ ? Explain how you know.
3. Is side  $AB$  perpendicular to  $CB$ ? Explain how you know.
4. Write an equation for a line that is parallel to side  $AD$  and passes through the point  $(0, 1)$ .

# NOTES