



Holyoke Public Schools  
Mathematics Curriculum Map  
Grade 3

**EQUAL GROUPS**

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## 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.
  - o STUDENT MASTER – for project
5. INVESTIGATIONS:
  - o NOTEBOOK - includes: 3 Ring Binder, Bound Notebook, Portfolio
  - o ACCOUNTABLE TALK – using probing questions
5. ON-DEMAND ASSESSMENTS - to be done during teaching of unit.
  - o STUDENT MASTERS- for on-demand assessments.

# Mathematics

## Evidence of Learning Artifacts

<b>Artifact</b>	<b>K - 1</b>	<b>2 - 5</b>	<b>6 - 8</b>
<b><i>3 Ring Binder (3R)*</i></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><i>Marble Notebook (MNB)</i></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><i>Portfolio<sup>3</sup> (P)</i></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

## EQUAL GROUPS

### Probing Questions for Accountable Talk

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

- *How did you demonstrate the concept of equal groups?*
- *If we continue counting around the class, what would the ending number be?*
- *What patterns did you notice when skip counting by 2's, 5's, or 10's?*
- *How are addition, multiplication and division related?*
- *What easier multiplication combinations helped you solve this problem?*
- *How do you know the dimensions of an array by looking at the multiplication fact?*
- *How does an array help you identify prime and square numbers?*
- *What strategies did you use to solve the division problem?*

#### ***Ten Minute Math and Classroom Routines***

#### **Continue from previous units**

Classroom Routines: What's the Temperature?  
Ten Minute Math: What Time Is It?

#### **New in this unit**

Ten Minute Math: Counting Around the Class

Grade 3 begins Ten Minute Math activities. Ten Minute Math activities and Classroom Routines 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 3: Please review pages 25-26, for the new Ten Minute Math activity in this unit "Counting Around the Class".

## 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  $< \dots >$  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:

- Demonstrate an understanding of multiplication and division as involving groups of equal groups.
- Solve multiplication combinations and related division problems by using skip counting or known multiplication combinations.
- Interpret and use multiplication and division notation.
- Demonstrate fluency with multiplication and division notation.
- Demonstrate fluency with multiplication combinations with products up to 50 (by the end of Grade 3)

## Math Content Standards:

- (3.N.6) Select, use, and explain various meanings and models of multiplication (through  $10 \times 10$ ). Relate multiplication problems to corresponding division problems, e.g., draw a model to represent  $5 \times 6$  and  $30 \div 6$ .
- (3.N.7) Use the commutative (order) and identity properties of addition and multiplication on whole numbers in computations and problem situations, e.g.,  $3+4+7=3+7+4=10+7$
- (3.N.8) Select and use appropriate operations (addition, subtraction, multiplication, and division) to solve problems, including those involving money
- (3.N.9) Know multiplication facts through  $10 \times 10$  and related division facts, e.g.,  $9 \times 8 = 72$  and  $72 \div 8 = 9$ . Use these facts to solve related problems, e.g.,  $3 \times 5$  is related to  $3 \times 50$ .
- (3.N.10) Add and subtract (up to four-digit numbers) and multiply (up to two-digit numbers by a one-digit number) accurately and efficiently.
- (3.P.3) Determine the value of variable (through 10) in simple equations involving addition, subtraction, or multiplication, e.g.,  $2 + \_ = 9$ ;  
 $5 \times \_ = 35$
- (3.P.4) Write number sentences using  $+$ ,  $-$ ,  $\times$ ,  $\div$ ,  $<$ ,  $=$ , and/or  $>$  to represent mathematical relationships in everyday situations.
- (3.M.5) Identify and use appropriate metric and US Customary (English) units and tools (e.g., ruler, scale, thermometer, clock) to estimate, measure, and solve problems involving length, area, weight, temperature, and time.

## Performance Standards:

- (M1a) Adds, subtracts, multiplies, and divides whole numbers, with and without a calculator.
- (M3b) Represent relationships with tables, graphs, and verbal or symbolic rules.
- (M3b) Find solutions for unknown quantities in linear equations and in simple equations and inequalities.
- (M5a) Given the basic statement of a problem situation, uses strategies, such as using manipulatives and drawing sketches, to model problems.
- (M5b) Makes the basic choices involved in planning and carrying out a solution.
- (M6f) Uses  $+$ ,  $-$ ,  $\times$ , and  $/$  correctly in number sentences and expressions.

UNIT: EQUAL GROUPS

End-of-Unit Project

GRADE: 3

**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.

Imagine grade 3 is invited to watch a play in our gym. We need several chairs for everyone in the audience.

- A. If we have 36 chairs, how many different ways can we arrange them for the audience to watch the play? Make sure to label each array.
- B. Once the arrays are made, make sure to list the factors of 36.
- C. Explain how you know you have found all of the factors?

Use pictures, numbers, and words to explain your strategies. Remember to use your math vocabulary.

# UNIT: EQUAL GROUPS

Investigation 1 (1.1 – 1.9)

DAYS: 9

GRADE: 3

<p><b>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio</b></p> <p><b>Vocabulary</b> – multiplication, multiplication notation, skip counting, product, repeated addition, equal groups, equation (3R)</p> <p><b>Work Time</b> – Student Sheets 1-9 (3R)</p> <p><b>Journal Entries</b> – (MNB) *Maximum of 5 minutes</p> <p><b>Inv. 1.1</b> Give 3 examples and draw an illustration of things that come in groups.</p> <p><b>Inv. 1.2</b> Draw 4 groups of 5 pennies. How many pennies altogether?</p> <p><b>Inv. 1.3</b> Write the equation and draw the picture for 3 groups of 4. What is the product?</p> <p><b>Reflection</b> – (P) *Maximum of 15 minutes</p> <p>How would you explain multiplication to a second grader? Use numbers, pictures and words to show your thinking.)</p>
<p><b>Accountable Talk</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><i>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:</i></p> <p>How did you know that? How can you use ...? Can you show another way? What convention did you use?</p> <p><i>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.</i></p>

**UNIT: EQUAL GROUPS**  
**Investigation 2 (2.1 – 2.8)                      DAYS: 8**

**GRADE: 3**

<p><b>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</b></p> <p><i>Vocabulary</i> – multiple, row, column, patterns, factor, even, odd, diagonal (3R)</p> <p><i>Work Time</i> – Student Sheets 11- 25 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p style="padding-left: 20px;"><b>Inv. 2.1</b> Describe the patterns you see for the multiples of 2 or 5 or 10.</p> <p style="padding-left: 20px;"><b>Inv. 2.2</b> Describe the patterns you see for the multiples of 3 and 6.</p> <p style="padding-left: 20px;"><b>Inv. 2.3</b> Prove that <math>5 \times 3 = 15</math></p> <p style="padding-left: 20px;"><b>Inv. 2.4</b> How can <math>4 \times 6 = 24</math> help you solve <math>8 \times 6</math>?</p> <p><i>Reflection</i> – (P) *Maximum 15 minutes</p> <p style="padding-left: 20px;">List the first 5 multiples of 20? What is your strategy for finding the multiples and what patterns do you notice?</p>
<p><b>Accountable Talk</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><i>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:</i></p> <p style="padding-left: 40px;">How did you know...?</p> <p style="padding-left: 40px;">Can you solve the problem in a different way?</p> <p style="padding-left: 40px;">Does your answer make sense?</p> <p style="padding-left: 40px;">What was your strategy?</p> <p><i>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.</i></p>

**UNIT: EQUAL GROUPS**  
**Investigation 3 (3.1 – 3.8)                      DAYS: 8**

**GRADE: 3**

<p><b>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</b></p> <p><i>Vocabulary</i> – array, dimension, fact family, length, width, square number, prime number (3R)</p> <p><i>Work Time</i> – Student Sheets 26- 38 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes.</p> <p><b>Inv. 3.1</b> Make and label an array that shows <math>4 \times 3</math>. What shape is it?</p> <p><b>Inv. 3.2</b> List the factors for 5, 9 and 10. Which number 5, 9 or 10 is the prime number? How do you know?</p> <p><b>Inv. 3.3</b> Prove with an array that 16 is a square number.</p> <p><b>Inv. 3.4</b> Why is <math>3 \times 4</math> equal to <math>4 \times 3</math>?</p> <p><i>Reflection</i> – Using arrays and your knowledge of the fact families explain in pictures, numbers, and words how you could show all the ways of arranging 20 chairs</p>
<p><b>Accountable Talk</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><i>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:</i></p> <p>How did you know...?</p> <p>Can you solve the problem in a different way?</p> <p>Does your answer make sense?</p> <p>What was your strategy?</p> <p><i>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.</i></p>

**UNIT: EQUAL GROUPS**  
**Investigation 4 (4.1 – 4.7)                      DAYS: 8**

**GRADE: 3**

<p style="text-align: center;"><b>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</b></p> <p><b>Vocabulary</b> – division, grouping vs. sharing, division notation, divisor, dividend, inverse relationship (3R)</p> <p><b>Work Time</b> – Student Sheets 39-50 (3R)</p> <p><b>Journal Entries</b> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 4.1</b> Describe two strategies to solve a division problem.</p> <p><b>Inv. 4.2</b> How can multiplication help you with division?</p> <p><b>Inv. 4.3</b> No journal question.</p> <p><b>Inv. 4.4</b> How can you figure out how many rows of 4 are in an array of 32?</p> <p><b>Inv. 4.6</b> Write two equations using both division notations for 20 divided by 5? What multiplication fact can help you solve this problem?</p> <p><b>Reflection</b> – Write and solve a multiplication and division problem. Write the equation that represents the problem and show your solution using picture, numbers and words. (P)</p>
<p style="text-align: center;"><b>Accountable Talk</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><i>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:</i></p> <p style="padding-left: 40px;">How did you know...?          Can you solve the problem in a different way?          Does your answer make sense?          What was your strategy?</p> <p><i>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.</i></p>

# 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 multiplication. 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.**

Imagine grade 3 is invited to watch a play in our gym. We need several chairs for everyone in the audience.

- A. If we have 36 chairs, how many different ways can we arrange them for the audience to watch the play? Make sure to label each array.
- B. Once the arrays are made, make sure to list the factors of 36.
- C. Explain how you know you found all of the factors?

Use pictures, numbers, and words to explain your strategies. Remember to use your math vocabulary.

# On-Demand Assessments

(To be filed in portfolio)

## EQUAL GROUPS

### 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: EQUAL GROUPS

## On-Demand Assessments

### GRADE: 3

#### **On-Demand Assessments (P)**

##### EQUAL GROUPS 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.

**Inv. 1:** Resource Binder: Session 1.4, Assessment Activity, "Solving Problems About Our Pictures.

**Inv. 2:** Resource Binder: Session 2.5, M13\*

**Inv. 3:** None

**Inv. 4:** Resource Binder: Session 4.7, End-of-Unit Assessment, M44\*

**\*Please refer to the section in the Teacher's Unit Guide entitled, "Professional Development" for examples of student work for each assessment.**

Name \_\_\_\_\_

Date \_\_\_\_\_



**Equal Groups**

## **Assessment: *Counting Around the Class***

Solve these problems and show your solutions.

### **Problem 1**

Kathryn's class is counting around by 3s.  
What number does the ninth student say?

### **Problem 2**

The students continue counting around.  
What number does the eleventh student say?

Sessions 2.5, 2.6

Unit 5

**M13**

Name \_\_\_\_\_

Date \_\_\_\_\_



**Equal Groups**

## End-of-Unit Assessment

Solve the problems and show your solutions.  
Write equations that represent the problems.

### Problem 1

Insects have 6 legs.

**A.** How many legs are on 3 insects?

**B.** How many legs are on 6 insects?

### Problem 2

Keisha's father baked 36 muffins for the third-grade bake sale. Keisha put the muffins in bags. She put 4 muffins in each bag. How many bags of muffins did she have for the bake sale?

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# 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