



Holyoke Public Schools
Mathematics Curriculum Map
Grade 3

Finding Fair Shares

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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

Artifact	K - 1	2 - 5	6 - 8
<i>3 Ring Binder (3R)*</i>	<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>
<i>Marble Notebook (MNB)</i>	<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>
<i>Portfolio³ (P)</i>	<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

Finding Fair Shares Probing Questions for Accountable Talk

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

- What are equivalent fractions?
- Which fraction is larger, how do you know?
- How are fractions and division related?
- How do you make equal or fair shares?
- How did you use fraction notation to represent a share?

Classroom Routines and Ten-Minute Math

Continued from previous units

Classroom Routines: What's the Temperature?

Ten-Minute Math: Today's Number

Ten-Minute Math: What Time Is It?

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 24, 35-38, for the 2 Ten Minute Math activities in this unit and pg. 40-42 for Classroom Routines: "What's the Temperature".

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:

- Divide a single whole or a quantity into equal parts, and name those parts as fractions or mixed numbers.
- Identify equivalent fractions (e.g., $3/6 = 1/2$ and $1/3 = 2/6$)
- Find combinations of fractions that are equal to one and to other fractions (e.g., $3/6 + 1/2 = 1$; $1/6 + 1/6 = 1/3$; and $1/3 + 1/6 = 1/2$)

Math Content Standards:

- (3.N.3) Identify and represent fractions (between 0 and 1 with denominators through 10) as parts of unit wholes and parts of groups. Model and represent a mixed number (with denominator 2, 3, or 4) as a whole number and a fraction, e.g., $1 \frac{2}{3}$, $3 \frac{1}{2}$.
- (3.N.13) Use concrete objects and visual models to add and subtract (only when the answer is greater than or equal to zero) common fractions (halves, thirds, fourths, sixths and eighths) with like denominators
- (3.G.7) Predict and explain the results of taking apart and combining two-dimensional shapes.

Performance Standards:

- (M1d) Describes and compares quantities by using concrete and real world models of simple fractions.
- (M1e) - Describes and compares quantities by using simple decimals; that is recognizes relationships among simple fractions, decimals, and percents, i.e. that $1/2$ is the same as 0.5, and $1/2$ is the same as 50% with concrete materials, diagrams and in real world situations.

UNIT: Finding Fair Shares

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.

4 students solved this problem: How would 4 people share 7 candy bars?

They got four different answers for one person's share. Which answers are correct? Make a drawing of each solution and justify whether it is a correct solution or not?

Joe: $\frac{7}{4}$

Sam: $1\frac{3}{4}$

Kate: $1 + \frac{1}{2} + \frac{1}{4}$

Sue: $\frac{3}{2} + \frac{1}{4}$

UNIT: FINDING FAIR SHARES
Investigation 1 (1.1 – 1.6) DAYS: 6

GRADE: 3

<p>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) – marble notebook; (P) – portfolio</p> <p><i>Vocabulary</i> – fraction, denominator, numerator (3R)</p> <p><i>Work Time</i> – Student Sheets 1 – 17 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p>Inv. 1.1 How can you prove the shares are equal? Inv. 1.2 What strategy did you use to order the fractions from smallest to largest? Inv. 1.3 What fractions did you combine to make a whole? Give two examples. Inv. 1.4 What strategy did you use to find the fractional part of 12 objects? Inv. 1.5 How did you make sure you made equal shares?</p> <p>Reflection – List four fractions that equal $\frac{1}{2}$. Explain your reasoning in words, pictures, and numbers. (P)</p>
<p>Accountable Talk</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>Is that fraction more or less than 1? $\frac{1}{2}$? Where would that fraction be placed on the number line? Can you show another way? Can you draw two different models for the fraction?</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: FINDING FAIR SHARES
Investigation 2 (2.1 – 2.4) DAYS: 5

GRADE: 3

<p>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</p> <p><i>Vocabulary</i> – equivalent fractions, hexagon, rhombus, improper fraction, halves, thirds</p> <p><i>Work Time</i> – Student Sheets 18-27 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p>Inv. 2.1 Explain how you can make half of a hexagon cookie. Describe using fraction names.</p> <p>Inv. 2.2 How do you know that two fractions are equivalent? Give an example and prove it.</p> <p>Inv. 2.3 None due to assessment.</p> <p>Inv. 2.4 How do you know that exactly half of your design is yellow?</p> <p><i>Reflection</i> – Explain in numbers and pictures, 2 ways you made a whole with the hexagon cookies. (P)</p>
<p>Accountable Talk</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 can fractions look different but represent the same amount? What is a mixed number? What is an improper fraction?</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: FINDING FAIR SHARES
Investigation 3 (3.1 – 3.4) DAYS: 5

GRADE: 3

<p>Evidence of Learning Artifacts</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>(3R) – 3 ring binder; (MNB) –marble notebook; (P) – portfolio</p> <p>Vocabulary – decimal point, decimal, tenths*, hundredths* (3R) *please use tenths and hundredths vocabulary instead of “point 25” for (.25)</p> <p>Work Time – Student Sheets 29 - 40 (3R)</p> <p>Journal Entries – (MNB) *Maximum 5 minutes</p> <p>Inv. 3.1 What does the decimal point tell you? Inv. 3.2 What strategy did you use to share the money equally? Inv. 3.3 What pattern did you notice in the fractions that all equal 0.5?</p> <p>Reflection – The smaller fraction, one fourth, has two numbers (digits) after the decimal point – 0.25. But one half only has one number -0.5. Why do you think that is? (P)</p>
<p>Accountable Talk</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 are the fraction and decimal equivalent? How can the calculator help you change a fraction to a decimal? How can you describe that using division?</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>

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 fractions. 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.**

4 students solved this problem: How would 4 people share 7 candy bars?

They got four different answers for one person's share. Which answers are correct? Make a drawing of each solution and justify whether it is a correct solution or not?

Joe: $\frac{7}{4}$

Sam: $1\frac{3}{4}$

Kate: $1 + \frac{1}{2} + \frac{1}{4}$

Sue: $\frac{3}{2} + \frac{1}{4}$

On-Demand Assessments

(To be filed in portfolio)

Finding Fair Shares 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: FINDING FAIR SHARES

On-Demand Assessments

GRADE: 3

On-Demand Assessments (P)

Finding Fair Shares 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 1.6, M13**

Inv. 2: Resource Binder: Session 2.3, M11 & Assessment Checklist M17*

Inv 3: Resource Binder: Session 3.5, M19**

***Assessment Checklist should be kept with tracking sheet.**

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

Name _____

Date _____



Finding Fair Shares

Assessment: Sharing Four Brownies



If 8 people share 4 brownies equally, how much will each person get?

Show how you figured this out.



Assessment Checklist: Many Ways to Make a Share

Student	Knows these fractions equal to $\frac{1}{2}$:	Knows these fractions equal to 1 (e.g. $\frac{2}{2}$, $\frac{3}{3}$):	Knows these equivalencies (e.g. $\frac{1}{3} = \frac{2}{6}$):	Combines fractions to equal 1 (check)	Combines fractions to equal other fractions (check)

Sessions 2.3, 2.4

Unit 7

M17



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