



# Holyoke Public Schools Mathematics Curriculum Map Grade 3

## Surveys and Line Plots

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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

## Surveys and Line Plots

### Probing Questions for Accountable Talk

As students progress through this unit, they should be asked the following questions to assess their knowledge about problem situations that involve data.

- Why is the key (legend) of a graph important?
- How can you describe the data in the graph?
- What is typical about the data?
- What are some important things to remember when collecting data?

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

##### **Continue From Last Unit**

Classroom Routines: What's the Temperature: Session 1.1  
Ten Minute Math: More or Less?

##### **New to this Unit**

Ten Minute Math: Guess My Rule: Session 1.3  
Ten Minute Math: Today's Number: 1.6

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, 26 - 29, 35, 36, for the 3 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:

- Organize, represent, and describe categorical data, choosing categories that help make sense of the data.
- Interpret a bar graph.
- Make a line plot for a set of numerical data.
- Make a line plot for a set of numerical data.
- Describe the shape of the data for a numerical data set, including where data are concentrated, where there are few data, what the lowest and highest values are, what the mode is, and where there is an outlier.
- Summarize a set of data, describing concentrations of data and what those concentrations mean in terms of the situation the data represent.

## Math Content Standards:

- (3.D.1) Collect and organize data using observations, measurements, surveys, or experiments, and identify appropriate ways to display the data.
- (3.D.2) Match representations of a data set in the forms of tables, line plots, pictographs, tallies, or bar graphs with the actual data set.
- (3.D.3) Construct and draw conclusions from representations of data sets in the forms of tables, line plots, pictographs, tallies and bar graphs.
- (3.M.1) Demonstrate an understanding of the attributes of length, area, and weight, and select the appropriate type of unit for measuring each attribute using both the U.S. Customary (English) and metric systems.
- (3.M.2) Carry out simple unit conversions within a system of measurement, e.g., hours to minutes, cents to dollars, yards to feet or inches, etc.
- (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:

- (M4a) Collects and organizes data to answer a question or test a hypothesis by comparing sets of data.
- (M4b) Displays data in line plots, graphs, tables and charts.
- (M4c) Makes statements and draws simple conclusions based on data
- (M4d) Gathers data about an entire group or by sampling group members to understand the concept of sample, i.e., that a large sample leads to more reliable information, e.g., when flipping coins.
- (M2g) Uses basic ways of estimating and measuring the size of figures and objects in the real world, including length, width, perimeter, and area.
- (M2i) Carries out simple unit conversions, such as between cm and m, and between hours and minutes.

UNIT: Surveys and Line Plots  
End-of-Unit Project

GRADE: 3

**End-of-Unit  
Project (P)**

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

**\*Please refer to the section in  
the Teacher’s Unit Guide  
entitled, “Professional  
Development” for benchmark  
criteria and examples of student  
work for this project.**

The project is the culminating  
assessment which will allow students  
to apply what they learned data. It is  
written in MCAS form to give  
students the experience of answering  
an open-response question.

Resources Binder, End-of-Unit Assessment, M20

**UNIT: SURVEYS AND LINE PLOTS**  
**Investigation 1 (1.1 – 1.8)                      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><b>Vocabulary</b> – data, categories, bar graph, double bar graph, key, scale, interval, survey, compare, mode, less than half, more than half, (3R)</p> <p><b>Work Time</b> – Student Sheets 1 – 20 (3R)</p> <p><b>Journal Entries</b> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 1.3</b> Write at least two sentences about what you can see in your data.</p> <p><b>Inv. 1.4</b> Why is a graph without a title and labels difficult to interpret?</p> <p><b>Inv. 1.7</b> What is the mode and what does it tell you?</p> <p><b>Reflection</b> – What did you learn about collecting data? Is there anything you would do differently if we gathered this data again? (P)</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 be found at the beginning of the map and on the probing question sheet in the district mathematics guide.</i></p>

**UNIT: SURVEYS AND LINE PLOTS**  
**Investigation 2 (2.1 – 2.7)                      DAYS: 7**

**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> – line plot, data, category, mode, range, outlier, survey, median, scale, typical, atypical (3R)</p> <p><i>Work Time</i> – Student Sheets 21 - 43 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes</p> <p><b>Inv. 2.1</b> What does the X on the line plot represent?</p> <p><b>Inv. 2.3</b> What was your question at first? How did you change it? Why did you make those changes?</p> <p><b>Inv. 2.4</b> How will someone know what your question was from looking at your graph?</p> <p><i>Reflection</i> – If you were going to do your survey again, are there things you would change about how you collected your data or how you represented it? Explain and give examples.(P)</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: SURVEYS AND LINE PLOTS**  
**Investigation 3 (3.1 – 3.5)                      DAYS: 5**

**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> – distance, U. S. standard system, metric system, inch, feet, length, yard, typical, atypical(3R)</p> <p><i>Work Time</i> – Student Sheets 44 - 57 (3R)</p> <p><i>Journal Entries</i> – (MNB) *Maximum 5 minutes  <b>Inv. 3.2</b> Describe how you measured a length longer than your measuring tool? Give an example.  <b>Inv. 3.3</b> What is the relationship between feet and inches?</p> <p><i>Reflection</i> – “Pattern Blocks”: Describe the overall shape of the data and what was typical or usual for the class data.</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...?          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 data. 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.**

Here are the answers from a Grade 3 class to the question "What animal would you like to have as a pet?"

On another sheet of paper, organize and represent these data.

Then write about what you found out about this class from the data.

polar bear	cat	goldfish	puppy
octopus	poodle	cat	dog
cat	dog	angelfish	lion
tiger	shark	dog	kitten
horse	puppy	kittens	puppy
dog	turtle	hamster	sea horse

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# On-Demand Assessments

To be filed in portfolio (P)

## Surveys and Line Plots 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: SURVEYS AND LINE PLOTS

## On-Demand Assessments

### GRADE: 3

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

##### Surveys and Line Plots 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: Sessions 1.5 – 1.6 Assessment Checklist, M9\*

**Inv. 2:** Resource Binder: Sessions 2.5, 2.6, 2.7 Assessment Checklist M13\*, M14 and M15\*\*

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

\*Assessment Checklist should be kept with track sheets.

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



# Assessment Checklist: Reading and Interpreting Bar Graphs

Student	Identifies what a single bar on the graph represents (e.g., how many Grade 5 students prefer dinner)	Reads the number of students a single bar represents	Understands why there are two different colors of bars	Compares two groups within a category (e.g., more Grade 5 students than Grade 1 students prefer lunch)



# Assessment Checklist: Data Projects

Student	Develops and revises a survey question	Represents the data clearly	Can describe the data; sees the "big picture" for each group	Uses the data to compare the groups

Sessions 2.5, 2.6, 2.7

Unit 2 **M13**



## Assessment: How Many People Live in Your Home? (page 1 of 2)

The students in Mr. L's Grade 3 class did a survey called "How Many People Live in Your Home?" They collected data from their own class and from Ms. G's Grade 5 class.

Here are the numbers they collected from all of the students. They put the numbers in order.

Grade 3:	2, 2, 2, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 6, 6, 7, 8
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Grade 5:	2, 2, 2, 2, 3, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6, 10
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On another sheet of paper, make line plots to show the data. Make one line plot for Grade 3 and one line plot for Grade 5.

When you have finished your line plots, answer the questions on the next page.



# Assessment: How Many People Live in Your Home?

(page 2 of 2)



Here are some phrases that might help you describe the data:

- The range of the data is . . .
- There is a clump of data . . .
- There are hardly any data points . . .
- More than half the data . . .
- About half the data . . .
- Fewer than half of the data points . . .

**1.** What can you say about the Grade 3 class?

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**2.** What can you say about the Grade 5 class?

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**3.** What is the same or different about the two classes?

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Name \_\_\_\_\_

Date \_\_\_\_\_



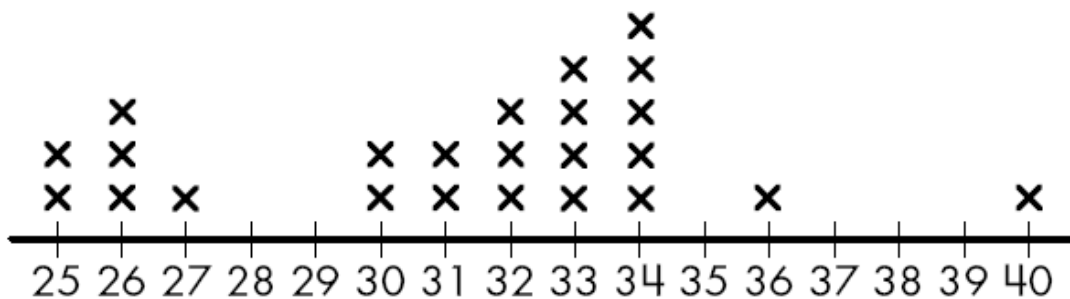
Surveys and Line Plots

# End-of-Unit Assessment (page 1 of 2)



## Problem 1. Jump Distances

On Field Day, Mr. Keith's Grade 3 students recorded the following distances for their standing broad jumps:



How Far We Jumped (in inches)

Write a report to Ms. Brown, the gym teacher, about Mr. Keith's class. Tell her the most important things she should know about their data.

Dear Ms. Brown,

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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