Orange Public Schools

Office of Curriculum & Instruction
2019-2020 Mathematics Curriculum Guide

7th Grade Mathematics (Accelerated)

Math in Focus - Unit 3: Sampling and Inference

January 31, 2020 – April 9, 2020

Board Approved: 1.14.2020

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From the New Jersey Student Learning Standards:

Traditional Pathway Accelerated 7th Grade

In **Accelerated 7th Grade,** instructional time should focus on four critical areas: (1) Rational Numbers and Exponents; (2) Proportionality and Linear Relationships; (3) Introduction to Sampling Inference; (4) Creating, Comparing, and Analyzing Geometric Figures

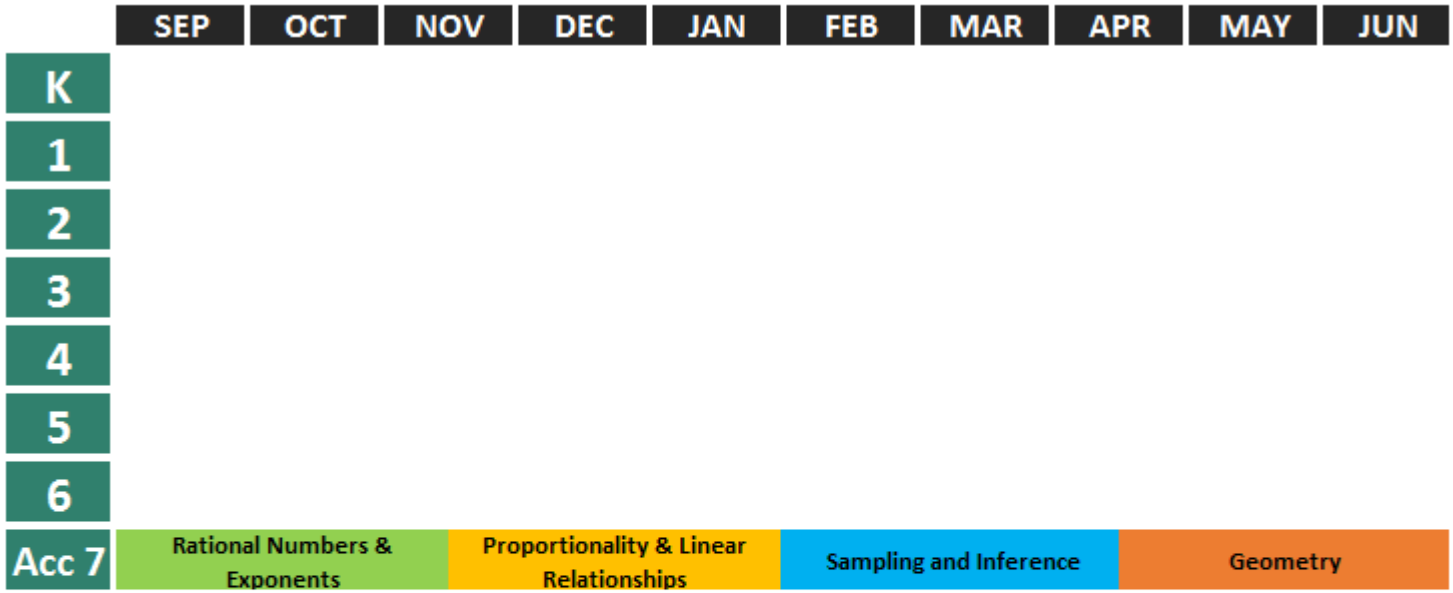
1. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation.

2. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y= mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \times A$. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

3. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences

4. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real- world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

A STORY OF UNITS



Rational Numbers and Exponents: Operations with rational numbers, learn of irrational numbers, expressions and equations work with radical and integer exponents

Proportionality and Linear Relationships: Analyze proportional relationships, generate equivalent expressions using properties of operations, and understand connections between proportional relationships and

Sampling and Inference: Use random sampling, draw inferences, investigate chance processes, develop, use, and evaluate probability models

Geometry: construct geometrical figures, understand congruence and similarity using physical models, and solve real-life problems involving angle measure, area, surface area and volume

Table of Contents

References

"Math in Focus" *Houghton Mifflin Harcourt.* 2015 <https://my.hrw.com>

I. Unit Overview

Chapter 9: Statistics: In this chapter, students will learn to identify measures of variation. They divide a data set into quartiles and identify the interquartile range. Students draw and interpret stem-and-leaf plots and box-and-whisker plots. They learn to find the mean absolute deviation. In addition, they learn about populations and samples. They understand and apply different random sampling methods, use statistics from a sample to make inferences about population, and use an inference to estimate a population mean.

Chapter 10: Probability: In this chapter, students learn about chance processes and measuring the likelihood of events. Students learn to distinguish between theoretical and experimental probability. Students begin to recognize that as the number of trails increases in an experiment with a chance process, the experimental probability measures tend to approach the values of theoretical probability measures.

Essential Questions

- How can we make generalizations from a sample to a population?
- How can random sampling be used to draw inferences about a population?
- How can we analyze data/graphs and describe patterns?
- What influences the probability that a given event will occur?
- What is the difference between experimental and theoretical probability?
- What determines whether an event is dependent or independent?
- How can we use modeling to form a prediction?
- Can we construct more than one kind of graph from the same set of data?
- How do you determine which measures of variability should be used to draw informal comparative inferences?
- How are lists, tables, tree diagrams or simulation used to find the probability of an event?
- How is probability used to predict frequency of an event?

Enduring Understanding

- Reading, understanding, interpreting, and communicating data are critical in modeling a variety of real-world situations, drawing appropriate inferences, making informed decisions, and justifying those decisions.
- Probability quantifies the likelihood that something will happen and enables us to make predictions and informed decisions.
- The chance of an event happens may be represented by use of decimals, fractions, and or percentages.
- Compare two data distributions and address questions about differences between populations.
- Begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Chapter 9 Opener	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	1
Chapter 9 Pre-Test (MIF)	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	**1**
9.1- Interpreting Quartiles & Interquartile Range	7.SP.1	2
9.2- Stem and Leaf Plot	7.SP.1	2
9.3- Understand Box Plot & Mean Absolute Deviation	7.SP.1	3
9.4 - Understanding Random Sampling Method	7.SP.1; 7.SP.2;	2
9.5 - Making Inferences About Populations	7.SP.3; 7.SP.4;	2
Chapter 9 Wrap Up/ Review Lesson	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	1
Chapter 9 Test (MIF) *Optional*	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	**1**
Performance Task 1	7.SP.3; 7.SP.4;	**1**
Chapter 10 Opener	7.SP.5; 7.SP.6; 7.SP.7	1
Chapter 10 Pre-Test (MIF)	7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	**1**
10.1 - Defining Outcomes, Events, and Sample Space	7.SP.7; 7.SP.8	2
10.2 - Finding Probability of Event	7.SP.5;	3
10.3 - Approximating Probability & Relative Frequency	7.SP.6;	2
10.4 - Developing Probability Models	7.SP.7;	2
Chapter 10 Wrap Up/ Review Lesson	7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	1
Chapter 10 Test (MIF) *Optional*	7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	**1**
Performance Task 2	7.SP.6;	**1**
Unit 3 Review Lesson	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	1
Unit 3 Assessment	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	**1**
Solidify Unit 3 Concepts / Project Based Learning		5
Total Time		**37 Blocks**

Major Work Supporting Content Additional Content

III. Pacing Calendar

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide)*.

FEBRUARY						
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
				1	**2**	**3**
4	**5**	**6**	**7**	**8**	**9**	**10**
11	**12**	**13**	**14**	**15**	**16**	**17**
18	**19**	**20**	**21**	**22**	**23**	**24**
25	**26**	**27**	**28**			

MARCH

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

IV. NJSLA Assessment Evidence Statements

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
7.SP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.		MP. 4	Yes
7.SP.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.		MP. 4	Yes
7.SP.3	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.	i) Tasks may use mean absolute deviation, range, or interquartile range as a measure of variability	MP. 4	Yes
7.SP.4	Use measures of center & measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. E.g., decide whether the words in a chapter of a seventh grade science book are generally longer than the words in a chapter of a fourth grade science book.		MP. 4	Yes

7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.	i) Tasks may involve probabilities that are certain (1) or impossible (0).	MP. 4	Yes
7.SP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.	i) Tasks require the student to make a prediction based on long-run relative frequency in data from a chance process.	MP. 4	Yes
7.SP.7a	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.	i) Simple events only	MP. 4	Yes
7.SP.7b	Develop a probability model & use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement isn't good, explain possible sources of the discrepancy. b. Develop a probability model (may not be uniform) by observing frequencies in data generated from a chance process. e.g. find the approximate probability that a spinning penny will land heads up or a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear equally likely based on the observed frequencies?		MP. 4	Yes

7.SP.8a	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs		MP. 4 MP. 5	Yes
7.SP.8b	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space, which compose the event		MP. 4 MP. 5	Yes
7.SP.8c	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. c. Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?		MP. 4 MP. 5	Yes
7.G.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.	i) Tasks may or may not have context	MP.2 MP.5	No
7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	i) Tasks do not have a context. ii) Most of tasks should focus on the drawing component of this evidence statement.	MP. 3 MP. 5 MP. 6	Yes

Accelerated 7th (MIF) Unit 3: Sampling and Inference

7.G.4-1	Know the formulas for the area and circumference of a circle and use them to solve problems.	i) Tasks may or may not have context. ii) Tasks may require answers to be written in terms of π	MP. 4 MP. 5	Yes
7.G.4-2	Give an informal derivation of the relationship between the circumference and area of a circle.	i) Tasks require students to identify or produce a logical conclusion about the relationship between the circumference and the area of a circle.	MP. 2 MP. 5	Yes
7.G.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	i) Tasks may or may not have context. ii) Tasks involving writing or solving an equation should not go beyond the equation types described in 7.EE.4a. [px +q = r and p(x + q) = r where p, q, and r are specific rational numbers.]	MP. 5 MP. 6	Yes
7.G.6	Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	i) Tasks may or may not have context	MP.2 MP.5	No
7.D.1	Solve multi-step contextual word problems with degree of difficulty appropriate to Grade 7, requiring application of knowledge and skills articulated in Type I, Sub-Claim A Evidence Statements.	i) Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7. ii) Tasks involving writing or solving an equation should not go beyond the equation types described in 7.EE.4a. (px +q = r and p(x + q) = r where p, q, and r are specific rational number	MP.1 MP.2 MP.4 MP.5 MP.7	Yes
7.D.2	Solve multi-step contextual problems with degree of difficulty appropriate to grade 7, requiring application of knowledge and skills articulated in 6.RP.A, 6.EE.C, 6.G.	i) Tasks may have scaffolding, if necessary, in order to yield a degree of difficulty appropriate to grade 7.	MP.1 MP.2 MP.4 MP.5 MP.7	Yes

V. Differentiated Instruction

Chapter 9

Assessment and Intervention

	ASSESSMENT	RtI STRUGGLING LEARNERS
DIAGNOSTIC	• Quick Check in Recall Prior Knowledge in Student Book B, pp. 178–181 • Chapter 9 Pre-Test in *Assessments*	• Skills 44–46 in *Transition Guide, Course 2*
ON-GOING	• Guided Practice • Lesson Check • Ticket Out the Door	• *Reteach* worksheets • *Extra Practice* worksheets • *Activity Book*, Chapter 9
END-OF-CHAPTER	• Chapter Review/Test • Chapter 9 Test in *Assessments* • ExamView® Assessment Suite CD-ROM Course 2	• *Reteach* worksheets

ELL ENGLISH LANGUAGE LEARNERS

Review the terms *mean, median,* and *quartile.*

Model Write the following set of 11 values on the board. 4, 12, 1, 19, 20, 11, 3, 14, 8, 2, 16

Say There are many way to describe a set of numbers. One way is to identify the center. One measure of the center of a set is the *mean.* (Demonstrate how to calculate the mean, 10.) Another measure of the center is the *median. Median* means "middle number." (Order the values and identify the median, 11.) The median divides a set into two equal parts. Half the numbers are less than the median. Half the numbers are greater than the median.

Say You also can divide a set into equal fourths. Find the median of each half. (Count to identify Q_1 as 3 and Q_3 as 16) The points that divide a set of numbers into equal fourths are called *quartiles.* Like the word *quarter, quartile* means "one-fourth."

For definitions, see Glossary, page 321, and Online Multi-Lingual Glossary.

ADVANCED LEARNERS

- Students can explore how changes to a data set affect the MAD. Give them a problem like the one below.

  Arthur lives 10 miles away from an amusement park. Roya lives 2 miles away. Tony lives 1 mile away. Chrissy lives 7 miles away. And Luis lives 5 miles away. Plot the distances on a number line. Identify the mean, and find the MAD. *(5 miles; 2.8 miles)*

- After they have solved the problem, have students revise the data set twice. In both revisions the mean should remain the same. In one set, the new MAD should be less than the original MAD. In the other, the new MAD should be greater than the original MAD.

- As needed, provide direction for students, such as telling them that the way to maintain the mean is to make sure the sum of their changes to the lower half of the data set is the opposite of the sum of the changes to the upper half of the data set.

To provide additional challenges use:

- *Enrichment*, Chapter 9
- Student Book B, Brain@Work problem

Chapter 10

Assessment and Intervention

	ASSESSMENT	RtI STRUGGLING LEARNERS
DIAGNOSTIC	• Quick Check in Recall Prior Knowledge in Student Book B, pp. 241–244 • Chapter 10 Pre-Test in *Assessments*	• Skills 47–51 in *Transition Guide, Course 2*
ON-GOING	• Guided Practice • Lesson Check • Ticket Out the Door	• *Reteach* worksheets • *Extra Practice* Worksheets, Chapters 9–10 Cumulative Practice worksheets • *Activity Book*, Chapter 10
END-OF-CHAPTER	• Chapter Review/Test • Chapter 10 Test, End-of-Course Test in *Assessments* • ExamView® Assessment Suite CD-ROM Course 2	• *Reteach* worksheets

ELL ENGLISH LANGUAGE LEARNERS

Review the terms *impossible*, *certain*, and *likely*.

Model Copy the number line from page 251 of the student book. Draw a bag with 4 white marbles.

Ask What is the chance of picking a red marble from the bag? *(No chance)*

Say It is *impossible* to pick a red marble. The chance is $\frac{0}{4}$, 0, or 0%.

Ask What is the chance of picking a white marble from the bag? *(4 out of 4)*

Say The chance of picking a white marble from the bag is certain. The chance is $\frac{4}{4}$, 1, or 100%. (Draw 1 black marble inside the bag.)

Ask Now what is the chance of picking a white marble from the bag? *(4 out of 5)*

Say It is *likely* that you will pick a white marble. The chance is $\frac{4}{5}$, 0.80, or 80%. It is greater than 50%.

Continue the process, to include *unlikely* and 50%.

For definitions, see Glossary, page 321, and Online Multi-Lingual Glossary.

ADVANCED LEARNERS

- Students can conduct an experiment or otherwise collect observed frequency data in order to compare the theoretical probability of outcomes to their experimental probability.
- Have students design a simple experiment or a survey question, identify all the possible outcomes, and find the theoretical probability of each. Then have students conduct the experiment or survey, collect observed frequency data, and calculate the relative frequency of each expected outcome.
- As needed, provide direction for students, such as reminding them to choose an experiment or survey question for which they can first calculate theoretical probability. For example, students can flip a coin, toss a number die (or two), or survey students about their month of birth.

To provide additional challenges use:

- *Enrichment*, Chapter 10
- Student Book B, Brain@Work problem

Pacing

If pacing is a challenge, consider the following modifications and omissions. Depending on students' strengths, consider consolidating Lessons 5 and 6. In Lesson 5, omit Problem 1 of the Concept Development, and move directly into renaming with the algorithm after Problem 2. Use the Problem Set from Lesson 6 for independent student practice. Consider consolidating Lessons 7 and 8 as well. Ask students to estimate the product beginning with the Concept Development of Lesson 7, and then use the Problem Set from Lesson 8 for student practice. Similarly, Lessons 11 and 12 can also be consolidated. Use estimation from the outset, and have students practice with the Problem Set from Lesson 12.

It is not recommended to omit any lessons from Topic D as it is a foundation for work later in the year. Students convert measurement units from small to large and from large to small using multiplication. This significantly expedites their understanding of and fluency with conversion and fraction multiplication as the year continues. In Lesson 14, students multiply whole numbers by unit fractions, which they learned to do in Grade 4 Module 5. If necessary, consider moving the fluency activity, "Multiply Unit Fractions," from Lesson 14 to Topic C to provide a few extra days of practice prior to beginning Lesson 14.

Scaffolds

The Common Core State Standards for Mathematics require that "all students must have the opportunity to learn and meet the same high standards if they are to access the knowledge and skills necessary in their post school lives." The writers of A Story of Units agree and feel strongly that accommodations cannot be just an extra set of resources for particular students. Instead, scaffolding must be folded into the curriculum in such a way that it is part of its very DNA. Said another way, faithful adherence to the modules IS the primary scaffolding tool.

See *III. The Common Core Approach to Differentiating Instruction (Pg. 14)* for additional information.

Use the links below for support with specific groups of learners.

Scaffolds for English Language Learners (Pg. 16-17)

Scaffolds for Students with Disabilities (Pg. 17-18)

Scaffolds for Students Performing Below Grade Level (Pg. 19)

Scaffolds for Students Performing Above Grade Level (Pg. 20)

Scaffolding Instruction for English Language Learners: A Resource Guide for Mathematics

VI. Vocabulary

Term	Definition
Chapter 9	
biased sample	A sample in which members are not randomly selected.
box plot	A graphical display of the 5-point summary.
box-and-whisker plot	Also known as the box plot.
first quartile	Also known as the lower quartile; it is the median of the lower half of a data set
5-point summary	Consists of five data values: the lower extreme value, the first quartile, the median, the third quartile, and the upper extreme value.
inference	A conclusion about a population, made by projecting the results of a representative sample onto the whole population.
interquartile range	The difference between the first and the third quartiles.
Chapter 10	
biased	A sample space in which one or more outcomes are favored.
complementary event	The complement of an event E consists of all the outcomes in the sample space that are not in event E.
event	A collection of outcomes from an activity
experimental probability	Probability based on data collected or observations made in an experiment.
fair	An experiment in which the probability of each outcome is the same.
mutually exclusive events	Two events that cannot happen at the same time.
nonuniform probability model	A probability model in which the outcomes do not necessarily have equal probabilities

VII. Assessment Framework

Unit 3 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Chapter 9 Pretest (Beginning of Unit) *Math in Focus*	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	½ Block	Individual	Yes (No Weight)
Chapter 9 Test (Beginning of Unit) *Math in Focus*	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4;	½ Block	Individual	Yes
Chapter 10 Pretest (After Chapter 9) *Math in Focus*	7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	½ Block	Individual	Yes (No Weight)
Chapter 10 Test (After Chapter 9) *Math in Focus*	7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	½ Block	Individual	Yes
Unit 3 Assessment (After Chapter 10) *District Assessment - Optional*	7.SP.1; 7.SP.2; 7.SP.3; 7.SP.4; 7.SP.5; 7.SP.6; 7.SP.7; 7.SP.8	½ Block	Individual	Yes
Acc Grade 7 Interim Assessment 3 (Late March) *District Assessment*	7.RP.1; 7.RP.2; 7.RP.3	1 Block	Individual	Yes

Unit 3 Performance Assessment / PBL Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 3 Performance Task 1 (Mid-May) *College Athletes*	7.SP.3; 7.SP.4	1 Block	Individual	Yes; Rubric
Unit 3 Performance Task 2 (Mid-June) *Rolling Dice*	7.SP.6	1 Block	Individual w/ Interview Opportunity	Yes; Rubric
Extended Constructed Response (ECR)* (click here for access)	Dependent on unit of study & month of administration	Up to 30 minutes	Individual	Yes; Rubric

* Use the following links to access ECR protocol and district assessment scoring documents:

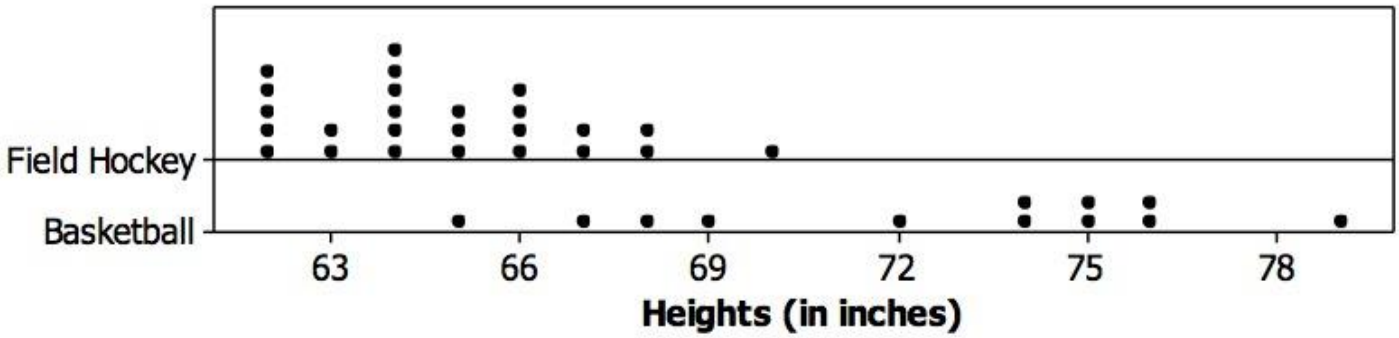
- *Assessment & Data in Mathematics Bulletin*
- *Extended Constructed Response Protocol*

Name _____ Block _____ Date _____

College Athletes (7.SP.3, 7.SP.4)

Below are the heights of the players on the University of Maryland women's basketball team for the 2012-2013 season and the heights of the players on the women's field hockey team for the 2012 season.

Field Hockey Player Heights (inches)	Basketball Player Heights (inches)
66	75
64	65
66	76
63	75
67	76
62	72
62	67
64	69
64	74
64	68
65	74
66	79
65	
64	
63	
62	
62	
68	
68	
66	
70	
67	
65	
62	
64	



a. Based on visual inspection of the dot plots, which group appears to have the larger average height? Which group appears to have the greater variability in the heights?

b. Compute the mean and mean absolute deviation (MAD) for each group. Do these values support your answers in part (a)?

c. How many of the 12 basketball players are shorter than the tallest field hockey player?

d. Imagine that an athlete from one of the two teams told you she needs to go to practice. You estimate that she is about 65 inches tall. If you had to pick, would you think that she was a field hockey player or that she was a basketball player? Explain your reasoning.

e. The women on the Maryland field hockey team are not a random sample of all female college field hockey players. Similarly, the women on the Maryland basketball team are not a random sample of all female college basketball players. However, for purposes of this task, suppose that these two groups can be regarded as random samples of all female college field hockey players and all female college basketball players, respectively. If these were random samples, would you think that female college basketball players are typically taller than female college field hockey players? Explain your decision using answers to the previous questions and/or additional analysis.

Accelerated 7th (MIF) Unit 3: Sampling and Inference

College Athletes – Rubric Name: _____ Date: _____

NJSLS: 7.SP.3; 7.SP.4 Type:_____ Teacher: _____

Task Description	• Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams. • Clearly constructs and communicates a complete response by ➢ using a logical approach based on a conjecture and/or stated assumptions ➢ providing an efficient and logical progression of steps ➢ using grade-level vocabulary, symbols, and labels ➢ providing a justification of a conclusion with minor computational error ➢ evaluating, interpreting and critiquing the validity and efficiency of others' responses				
Command Level Description	***Level 5:*** ***Distinguished Command*** Perform the task items accurately or with minor computation errors.	***Level 4:*** ***Strong Command*** Perform the task items with some non-conceptual errors	***Level 3:*** ***Moderate Command*** Perform the task items with minor conceptual errors and some computation errors.	***Level 2:*** ***Partial Command*** Perform the task items with some errors on both math concept and computation.	***Level 1:*** ***No Command*** Perform the task items with serious errors on both math concept and computation.
Score range	*11-12 pts*	*8-10 pts*	*5-7 pts*	*2-4 pts*	*0-1 pts*
Task Score & PLD Assigned					

College Athletes – Rubric **NAME: _____**

#	Answer	Scoring
Part A	The center of the basketball distribution is much higher on the number line than the center of the field hockey distribution, so at first glance, it appears that the basketball group has the higher average. Similarly, the values for the basketball distribution appear to have a greater range and are less concentrated than the field hockey distribution, so it appears that the basketball group has greater variability in its observations.	1 point for correctly identifying higher average 1 point for correctly identifying the greater variability **2 TOTAL POINTS**
Part B	Field Hockey: mean = 64.76, MAD = 1.75; Basketball: mean = 72.5, MAD = 3.58. These values do support the conjectures from Part (a).	2 points for correctly finding the mean of both teams 2 points for the correctly finding the MAD of both teams 1 point for stating that it supports observations in Part A **5 TOTAL POINTS**
Part C	The tallest field hockey player is 70 inches. Four of the basketball players are less than 70 inches (65, 67, 68, and 69).	1 point for the correct statement **1 TOTAL POINTS**
Part D	At 65 inches, she is more likely to be a field hockey player. Using the summary measures, 65 inches is approximately the mean for the field hockey players, so she would be a field hockey player of average height. A height of 65 inches is more unusual for the basketball team as that value is just over 2 MAD's below the mean. When using the raw data, there are only 4 athletes who are 65 inches tall, and 3 of them are field hockey players (75%) while only 1 of them is a basketball player (25%).	1 point for the correct response 1 point for the appropriate reasoning **2 TOTAL POINTS**
Part E	Yes, it appears that women's college basketball players are typically taller than women's college field hockey players. In addition to any arguments/statements made earlier regarding the dot plots and summary measures, one could also mention that 23 of the basket players are taller than the tallest field hockey player (and similar comparative arguments).	1 point for the correct response 1 point for the appropriate reasoning **2 TOTAL POINTS**

Name _____ Block _____ Date _____

Rolling Dice (7.SP.6)

Roll two dice 10 times. After each roll, note whether any sixes were observed and record your results in the table below.

Roll	Any Sixes? (Y/N)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

a. What fraction of the 10 rolls resulted in at least one six?

b. Combine your results with those of your classmates. What fraction of all the rolls in the class resulted in at least one six?

c. Make a list of all the different possible outcomes that might be observed when two dice are rolled. (Hint: There are 36 different possible outcomes.)

d. What fraction of the 36 possible outcomes result in at least one six?

e. Suppose you and your classmates were able to roll the two dice many thousands of times. What fraction of the time would you expect to roll at least one six?

Rolling Dice – Rubric Name: _____ Date: _____

NJSLS: 7.SP.6 Type:_____ Teacher: _____

Task Description	• Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams. • Clearly constructs and communicates a complete response by ➢ using a logical approach based on a conjecture and/or stated assumptions ➢ providing an efficient and logical progression of steps ➢ using grade-level vocabulary, symbols, and labels ➢ providing a justification of a conclusion with minor computational error ➢ evaluating, interpreting and critiquing the validity and efficiency of others' responses				
Command Level Description	***Level 5:*** ***Distinguished Command*** Perform the task items accurately or with minor computation errors.	***Level 4:*** ***Strong Command*** Perform the task items with some non-conceptual errors.	***Level 3:*** ***Moderate Command*** Perform the task items with minor conceptual errors and some computation errors.	***Level 2:*** ***Partial Command*** Perform the task items with some errors on both math concept and computation.	***Level 1:*** ***No Command*** Perform the task items with serious errors on both math concept and computation.
Score range	*6 pts*	*4-5 pts*	*3pts*	*2pts*	*0-1pts*
Task Score & PLD Assigned					

Rolling Dice – Rubric **NAME: _____**

<table>
<tr><th>#</th><th>Answer</th><th>Scoring</th></tr>
<tr><td>Part A</td><td>Answers will vary, but should be centered around 11/36 (roughly 0.306)</td><td>1 point for correct response

1 TOTAL POINTS</td></tr>
<tr><td>Part B</td><td>Combing results from the entire class should produce a result closer to the theoretical value, around 11/36 (roughly 0.306).</td><td>1 point for correct response

1 TOTAL POINTS</td></tr>
<tr><td>Part C</td><td>The table below gives all possible outcomes of rolling two dice. Rolls resulting in at least one six are bold.

(1,1) (1,2) (1,3) (1,4) (1,5) (1,6)
(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)
(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)
(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)
(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)
(6,1) (6,2) (6,3) (6,4) (6,5) (6,6)</td><td>1 point for listing all possible outcomes

1 point for correctly identifying results with at least one six

2 TOTAL POINTS</td></tr>
<tr><td>Part D</td><td>11/36, or approximately 0.306.</td><td>1 point for correct response

1 TOTAL POINTS</td></tr>
<tr><td>Part E</td><td>11/36, or approximately 0.306.</td><td>1 point for correct response

1 TOTAL POINTS</td></tr>
</table>

IX. Modifications

Special Education/ 504:	English Language Learners:
-Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Implement supports for students with disabilities (click here) - Make use of strategies imbedded within lessons -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) - Strategies for students with 504 plans	- Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During i-Ready lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	**Students at Risk for Failure:**
- Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as: ● Application / Conceptual Development ● Are you ready for more? - Provide opportunities for math competitions - Alternative instruction pathways available - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20)	- Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Peer Support - Constant parental/ guardian contact - Provide academic contracts to students & guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Plan to address students at risk in your learning tasks, instructions, and directions. Anticipate where the needs will be, then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

21st Century Life and Career Skills:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

https://www.state.nj.us/education/cccs/2014/career/9.pdf

- **CRP1**. Act as a responsible and contributing citizen and employee.
- **CRP2**. Apply appropriate academic and technical skills.
- **CRP3**. Attend to personal health and financial well-being.
- **CRP4**. Communicate clearly and effectively and with reason.
- **CRP5**. Consider the environmental, social and economic impacts of decisions.
- **CRP6**. Demonstrate creativity and innovation.
- **CRP7**. Employ valid and reliable research strategies.
- **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP9**. Model integrity, ethical leadership and effective management.
- **CRP10**. Plan education and career paths aligned to personal goals.
- **CRP11**. Use technology to enhance productivity.
- **CRP12**. Work productively in teams while using cultural global competence.

Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.
https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:	
English Language Arts:	
L.7.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
W.7.1	Write arguments to support claims with clear reasons and relevant evidence.

X. Core Instruction & Supplemental Resources

Core Instruction

MATH IN FOCUS v. 2015
(HOUGHTON MIFFLIN HARCOURT)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
2-5	• **Teacher Edition (A & B)** • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Transition Guides • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit • Fact Fluency • Online Interactive Whiteboard Lessons	• Student Texts (A & B) • Student Workbooks • Online Student Technology Kit • Student Interactivities
6-7	• **Teacher Edition (A & B)** • Implementation Guide • Assessment Package • Enrichment Bundle • Extra Practice Guide • Transition Guides • Reteaching Guide • Home -to- School Connection Book • Online Teacher Technology Kit	• Student Texts (A & B) • Online Student Interactive Manipulatives

ENGAGE NY v. 2015
(GREAT MINDS)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
6 (v. 2015)	• **Teacher Edition: Module 1-6**	• Student Material Set: Module 1-6
7	• **Teacher Edition: Module 1-6**	• Student Material Set: Module 1-6
8	• **Teacher Edition: Module 1-7**	• Student Material Set: Module 1-7

5 Practices for Orchestrating Productive Mathematics Discussions

Anticipate

Consider how students might mathematically interpret a problem, the array of strategies—both correct and incorrect—that they might use to tackle it, and how those strategies and interpretations might relate to the mathematical concepts, representations, procedures, and practices that you would like the students to learn.

- Solve the problem yourself first. If possible work with colleagues.
- Ask yourself the following questions:
  - What strategies have students used in the past?
  - What representations are students most likely to use?
  - What incorrect or unproductive strategies are students likely to try?
  - What things might get in the way of students being able to engage with the problem? How can you remove those barriers?
  - What questions will you ask those who struggle?

Monitor

Pay close attention to students' mathematical thinking and solution strategies as they work on the task.

- Create a list of strategies the students may produce.
- Circulate the room. Watch and listen to students as they work.
- If any students use strategies you anticipated, write their name or group number on your list.
- Ask questions that will help students make their thinking visible.
- Ask questions that will help students clarify their thinking.
- Press students to consider aspects of the task to which they need to attend.

Select

Select particular students to share their work with the rest of the class to get specific mathematics into the open for discussion. The selection of particular students and their solutions is guided by the previously anticipated strategies and your assessment of how each approach will contribute to that goal.

- Based on the previously anticipated strategies and the mathematical goal of the activity, decide which student strategies to highlight.
- Select students who will share their work with the class.

Sequence

Make purposeful choices about the order in which students' work is shared to maximize the chances of achieving the mathematical goals for the discussion.

- Based on the mathematical goal, decide on the purpose for the sequence of work. For example: least efficient to most efficient, concrete to abstract, misconceptions to conceptions, or building representations.
- Decide in which order students will present their work.

Connect

Help students draw connections between their solutions and other students' solutions as well as the key mathematical ideas in the lesson. Help students to make judgments about the consequences of different approaches for the range of problems that can be solved, one's likely accuracy and efficiency in solving them, and the kinds of mathematical patterns that can be most easily discerned. Know where you want the discussion to "land" and make choices that are likely to get you there. If necessary, you may have to demonstrate an approach that students didn't come up with themselves.

- As students share, ask questions to elicit and clarify student thinking.
- After each student shares, ask questions to connect it to previously shared work or ask a student to summarize what another student said in their own words.
- Ask students to compare and contrast strategies or representations during the discussion.
- If students did not come up with an approach that you need them to see in order for the discussion to "land," demonstrate this approach and connect it to the work that students did.

IDEAL MATH BLOCK

Whole Group Instruction	55min	INSTRUCTION (Grades 3 – 8) Daily Routine: Mathematical Content or Language Routine (7 – 10 min) Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Tech Integration: Digital applets embedded within lessons designed to enhance student learning Collaborative Work* Guided Learning/Guided Practice Independent Work (Demonstration of Student Thinking) Additional Activities / Let's Practice		
Rotation Stations (Student Notebooks & Chromebooks Needed)	1-2X 30 min	STATION 1: Focus on current Grade Level Content STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application) TOOLS/RESOURCES Practice Problems Extra Practice/Enrichment Are you ready for more? Put Your Thinking Cap On	STATION 2: Focus on Student Needs TECH STATION Independent TECH INTEGRATION iReady - *i-Ready* delivers online lessons driven by student data to provide tailored instruction that meets students where they are in their learning trajectory. Dreambox (ELL) – Adaptive online learning platform.	TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies TARGETED INSTRUCTION 4 – 5 Students TOOLS/ RESOURCES Homework Manipulatives Reteach Workbook Transition Guide *all students seen in 2 weeks
Closure	5 min	INSTRUCTION Exit Ticket (Demonstration of Student Thinking) TOOLS/RESOURCES Notebooks or Exit Ticket Slips		

* Promotes discourse and collaboration

Supplemental Resources

Achieve the Core

Tasks - https://achievethecore.org/category/416/mathematics-tasks

Coherence Map - https://achievethecore.org/page/1118/coherence-map

Embarc

https://embarc.online/

Engage NY

https://www.engageny.org/ccss-library/?f%5B0%5D=field_subject%253Aparents_all%3A13601

iReady Digital Platform

https://login.i-ready.com/

Math in Focus

https://my.hrw.com/

Illustrative Mathematics

Content Standard Tasks - https://tasks.illustrativemathematics.org/content-standards

Practice Standard Tasks - https://tasks.illustrativemathematics.org/practice-standards

Open Up Resources - https://access.openupresources.org/sign_in

iM Additional Resources - https://bit.ly/imshare

Khan Academy

https://www.khanacademy.org/math/illustrative-math

NJDOE Digital Item Library

https://nj.digitalitemlibrary.com/home?subject=Math

Ready Teacher Toolbox

https://teacher-toolbox.com/

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