

# **Fair Lawn Public Schools**

**Fair Lawn, NJ**

## **6<sup>th</sup> Grade Dynamic Math Connections**

**Adopted August**

# **2015**

**Revised August 2015  
Developed August 2013**

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The 6<sup>th</sup> Grade Dynamic Math Connections course has been designed for the regular math student and is aligned with the Grade 6 Common Core State Standards.

## **DMC 6**

# Fair Lawn School District

## Committee Credits Dynamic Math Connection Teachers

Matt Cecconi, Teacher

Rebecca Erb, Teacher

Ryan Harrington, Teacher

Lisa Levchak, Teacher

Lauren Gimon, Supervisor

**Spring 2015**

## Dynamic Math 6

### I. Course Synopsis

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking. Throughout the course, mathematical concepts will be taught with an emphasis on enduring understandings, essential questions, real-world application, technology, and cross-curricular interaction.

1. Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.
2. Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane.
3. Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as  $3x = y$ ) to describe relationships between quantities.

4. Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

## II. Philosophy & Rationale

Dynamic Math Connections is an engaging program that immerses students in cross-curricular applications of mathematics and shows them how it is used in the real world. The half-year course focuses on project-based learning through the use of various technology, hands-on projects, and manipulatives. Students get to choose what they want to investigate and then analyze data from a topic that truly interests them—such as animation, video gaming and much more.

The purpose of the math curriculum for Sixth Grade Dynamic Math Connections is to help students develop and enhance mathematical abilities. Students should be able to reason logically and apply mathematical skills to real-world activities. Communicating about and through mathematics will enable students to view mathematics as relevant to their lives and understand it as it connects to other areas. Students should be able to make connections among the different strands of mathematics while feeling confident in using quantitative and spatial information to make decisions. The curriculum will enable students to become independent learners with a desire for lifelong learning. Technology will be infused through the curriculum.

*The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see*

*mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).*

**CCSS.MATH.PRACTICE.MP1 - Make sense of problems and persevere in solving them.**

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

**CCSS.MATH.PRACTICE.MP2 - Reason abstractly and quantitatively.**

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

**CCSS.MATH.PRACTICE.MP3 - Construct viable arguments and critique the reasoning of others.**

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning

from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

**CCSS.MATH.PRACTICE.MP4 - Model with mathematics.**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

**CCSS.MATH.PRACTICE.MP5 - Use appropriate tools strategically.**

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

**CCSS.MATH.PRACTICE.MP6 - Attend to precision.**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of

the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

**CCSS.MATH.PRACTICE.MP7 - Look for and make use of structure.**

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see  $7 \times 8$  equals the well-remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  and the 9 as  $2 + 7$ . They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see  $5 - 3(x - y)^2$  as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers  $x$  and  $y$ .

**CCSS.MATH.PRACTICE.MP8 - Look for and express regularity in repeated reasoning.**

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation  $(y - 2)/(x - 1) = 3$ . Noticing the regularity in the way terms cancel when expanding  $(x - 1)(x + 1)$ ,  $(x - 1)(x^2 + x + 1)$ , and  $(x - 1)(x^3 + x^2 + x + 1)$  might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

## II. Scope & Sequence

### Unit 1: Road Trip (2 Weeks):

- Distance Formula
- Measures of Center
- Calculate Elapsed Time
- Line Graph
- Read & Use Map

### Unit 2: Statistics Project (5.5 Weeks):

- Bar Graphs
- Line Graphs
- Circle Graphs
- Box & Whisker Plots
- Scatter Plots
- Measures of Center
- Microsoft Excel
- Tinker Plots
- Microsoft PowerPoint

### Unit 3: Geo Project (6 Weeks):

- Polygon
- Area of Triangles
- Area of Rectangles
- Area of Parallelograms
- Area of Trapezoids
- Area of Circles
- Circumference of Circles
- Area of Irregular Polygons
- Area of Composite Shapes
- Factor Pairs
- Solving Literal Equations
- Geometer's Sketchpad

### Unit 4: Iditarod (3 Weeks):

- Distance Formula
- Distance, Rate & Time
- Elapsed Time
- Unit Conversions
- Microsoft Excel

## IV. Unit Descriptions

### Unit 1: Road Trip

#### Enduring Understanding

1. Finding shortest route between various locations will conserve travel time, fuel and lodging costs.
2. Time can be represented in various ways: 9 hours and 30 minutes, 9.5 hours and 570 minutes.
3. Salary is based on number of hours worked but does not include breaks and lunch.
4. Measures of Center can be utilized to analyze important workplace data.

#### Essential Question(s)

1. Why is it necessary to find the shortest distance between two locations?
2. What would be the best financial decision for you personally when given salary options?
3. What are the measures of center for the statistical data of your new job?
4. What are graphical representations for data gleaned from your new employment?

#### Learning Objectives

Students will be able to:

1. Find the shortest route between two or more locations.
2. Accurately read and use a map.
3. Calculate elapsed time.
4. Calculate decimal form of minutes as a fraction of an hour.
5. Calculate a fraction of an hour in terms of minutes.
6. Calculate payment for a given number of hours and minutes.
7. Find measures of center for a given set of data.
8. Create a bar graph given a set of data.
9. Use the distance formula ( $d=r*t$ ) to calculate elapsed time given the distance and rate.

#### Common Core State Standards

- **6.RP.A.2** Understand the concept of a unit rate  $a/b$  associated with a ratio  $a:b$  with  $b \neq 0$ , and use rate language in the context of a ratio relationship. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is  $3/4$  cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”
- **6.RP.A.3d** Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
- **6.NS.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

- **6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- **6.SP.B.5c** Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

### Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
  - a. Finding shortest distance between select cities on a United States map.
  - b. Calculate decimal form of time worked.
  - c. Compute daily and weekly salary with consideration of breaks and lunches.
  - d. Find measures of center to analyze work data.
2. English Language Learners.
  - a. Read written instructions.
  - b. Students may be provided with note organizers / study guides to reinforce key topics.
  - c. Model and provide examples
  - d. Extended time on assessments when needed.
  - e. Establish a non-verbal cue to redirect student when not on task.
  - f. Students may use a bilingual dictionary.
  - g. Pair Visual Prompts with Verbal Presentations
  - h. Highlight Key Words & Formulas
  - i. Repetition and practice to calculator decimal form of time worked.
3. Special Education/504 Students.
  - a. Students may be provided with note organizers / study guides to reinforce key topics.
  - b. Extended time on assessments when needed.
  - c. Preferred seating to be determined by student and teacher.
  - d. Provide modified assessments when necessary.
  - e. Student may complete assessments in alternate setting when requested.
  - f. Establish a non-verbal cue to redirect student when not on task.
  - g. Maintain strong teacher / parent communication.
  - h. Repetition and practice
  - i. Pair Visual Prompts with Verbal Presentations
  - j. Provide Formulas
  - k. Check Use of Agenda
4. Gifted and Talented Students.
  - a. Use of Higher Level Questioning Techniques

- b. Extension/Challenge Questions
- c. Provide Assessments at a Higher Level of Thinking

#### New Jersey Core Curriculum Content Standards – Technology

- **8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

#### Career Readiness Practices

- **CRP6.** Demonstrate creativity and innovation.

#### NJCCSS 9.2 - Career Awareness, Exploration, and Preparation

- **9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

#### Career & Technical Education Content Area: 21<sup>st</sup> Century Life and Careers Standards

- **9.3.12.BM.1** Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision-making in business.
- **9.3.12.ED.1** Apply communication skills with students, parents and other groups to enhance learning and a commitment to learning.

### **Unit 2: Statistics Project**

#### Enduring Understanding

1. Understand that data can be represented in a variety of ways and determine which graphical representation is most appropriate.
2. Bar graphs, line graphs, histogram and circle graphs are created not only by hand but also in Microsoft Excel.
3. Survey data and its results can be analyzed to create powerful visual representations.
4. Results can be effectively and efficiently shared with an audience through a visual presentation (Microsoft Power Point or Google Slides).

#### Essential Question(s)

1. Why are different types of graphs used?
2. When are line graphs used to display a set of data?
3. When are bar graphs used to display a set of data?
4. When are circle graphs used to display a set of data?
5. How are points plotted on a coordinate plane?
6. How are different types of graphs created on Microsoft Excel?
7. How are data values entered into Tinker Plots?
8. How are graphs analyzed using Tinker Plots?

### Learning Objectives

Students will be able to:

1. Read and create bar graphs.
2. Read and create single and double line graphs.
3. Read and create circle graphs.
4. Determine when to use each type of graph.
5. Create bar, line, and circle graphs using Microsoft Excel.
6. Plot points and recall the placement of the x and y axes on a coordinate plane.
7. Name the four quadrants and their location within a coordinate plane.
8. Design an Excel spreadsheet to keep track of survey results.
9. Input survey data into Tinker Plots.
10. Calculate averages and medians using Tinker Plots.
11. Analyze survey data and create visual representations in Tinker Plots.
12. Create and present a Microsoft PowerPoint presentation on survey results.

### Common Core State Standards

- **6.SP.A.1** Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
- **6.SP.A.3** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
- **6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- **6.SP.B.5** Summarize numerical data sets in relation to their context, such as by:
  - **6.SP.B.5a** Reporting the number of observations.
  - **6.SP.B.5b** Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
  - **6.SP.B.5c** Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
  - **6.SP.B.5d** Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

### Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
  - a. Read and create bar graphs, line graphs, circle graphs and histograms.
  - b. Create a survey in Microsoft Excel.
  - c. Input and analyze survey data in Tinker Plots.

- d. Create presentation on survey results and present to class.
2. English Language Learners.
  - a. Read written instructions.
  - b. Students may be provided with note organizers / study guides to reinforce key topics.
  - c. Model and provide examples
  - d. Extended time on assessments when needed.
  - e. Establish a non-verbal cue to redirect student when not on task.
  - f. Students may use a bilingual dictionary.
  - g. Pair Visual Prompts with Verbal Presentations
  - h. Highlight Key Words & Formulas
  - i. Provide flow chat for project completion.
3. Special Education/504 Students.
  - a. Students may be provided with note organizers / study guides to reinforce key topics.
  - b. Extended time on assessments when needed.
  - c. Preferred seating to be determined by student and teacher.
  - d. Provide modified assessments when necessary.
  - e. Student may complete assessments in alternate setting when requested.
  - f. Establish a non-verbal cue to redirect student when not on task.
  - g. Maintain strong teacher / parent communication.
  - h. Repetition and practice
  - i. Pair Visual Prompts with Verbal Presentations
  - j. Provide Formulas
  - k. Check Use of Agenda
4. Gifted and Talented Students.
  - a. Use of Higher Level Questioning Techniques
  - b. Extension/Challenge Questions
  - c. Provide Assessments at a Higher Level of Thinking
  - d. Input additional technological components to create an overly effective presentation.
  - e. Extension activities with Microsoft Excel.

#### New Jersey Core Curriculum Content Standards – Technology

- **8.1.8.A.2** Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
- **8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results.

### Career Readiness Practices

- **CRP6.** Demonstrate creativity and innovation.
- **CRP11.** Use technology to enhance productivity.

### NJCCSS 9.2 - Career Awareness, Exploration, and Preparation

- **9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

### Career & Technical Education Content Area: 21<sup>st</sup> Century Life and Careers Standards

- **9.3.12.ED.2** Demonstrate effective oral, written and multimedia communication in multiple formats and contexts.

## **Unit 3: Geo-Project**

### Enduring Understanding

1. Ordered pairs are directly related to a coordinate plane.
2. Area is the number of square units that a figure covers.
3. Area can be calculated with the appropriate formula and factor pairs can be utilized to create polygons with given areas.
4. Circles do not meet the polygon criteria and utilize circumference rather than perimeter.
5. An irregular figure is comprised of multiple polygons and circles; its area can be found by calculating the sum of each individual area.

### Essential Question(s)

1. What is a polygon?
2. How can vertices of a polygon be plotted on a coordinate plane?
3. What is area and how is it calculated in polygons and circles?
4. How can formulas be utilized to derive area formulas of other polygons?
5. How can side lengths be adjusted to create polygons of the same area?
6. What makes a shape irregular and how can its area be determined?

### Learning Objectives

Students will be able to:

1. Review geometry vocabulary and polygon area formulas.
2. Investigate the concept of area.
3. Derive triangle area formula from rectangle area formula.
4. Use the appropriate formulas to calculate area of rectangles and triangles.
5. Understand why different shapes utilize different/similar terminology.
6. Derive trapezoid area formula from parallelogram area formula.
7. Define and create polygons while investigating Geometer's Sketchpad.
8. Find factors.
9. Solve formulas for missing dimensions of polygons given the polygon area.

10. Analyze areas and find corresponding dimensions of given polygons while playing Battleshapes on Geometer's Sketchpad.
11. Differentiate between a regular and irregular polygon.
12. Understand circumference and its application.
13. Use appropriate formulas to calculate circumference and area of circles.
14. Calculate the area of irregular figures by deconstructing a student created Geo-Creature.

#### Common Core State Standards

- **6.G.A.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
- **6.G.A.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas  $V = lwh$  and  $V = bh$  to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- **6.G.A.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
- **6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

#### Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
  - a. Plot ordered pairs on a coordinate plane; recognize quadrants.
  - b. Polygon Area Formula Resource Sheets & Practice Worksheets
  - c. Polygon Set-Up in Geometer's Sketchpad.
  - d. Creating irregular figures by combining multiple polygons.
  - e. Find total area of irregular figure.
2. English Language Learners.
  - a. Read written instructions.
  - b. Students may be provided with note organizers / study guides to reinforce key topics.
  - c. Model and provide examples
  - d. Extended time on assessments when needed.
  - e. Establish a non-verbal cue to redirect student when not on task.

- f. Students may use a bilingual dictionary.
  - g. Pair Visual Prompts with Verbal Presentations
  - h. Highlight Key Words & Formulas
3. Special Education/504 Students.
- a. Students may be provided with note organizers / study guides to reinforce key topics.
  - b. Extended time on assessments when needed.
  - c. Preferred seating to be determined by student and teacher.
  - d. Provide modified assessments when necessary.
  - e. Student may complete assessments in alternate setting when requested.
  - f. Establish a non-verbal cue to redirect student when not on task.
  - g. Maintain strong teacher / parent communication.
  - h. Repetition and practice
  - i. Pair Visual Prompts with Verbal Presentations
  - j. Provide Formulas
  - k. Check Use of Agenda
  - l. Establish personal expectations for assignment requirements
4. Gifted and Talented Students.
- a. Use of Higher Level Questioning Techniques
  - b. Extension/Challenge Questions
  - c. Provide Assessments at a Higher Level of Thinking
  - d. Higher level thinking needed to create more complex shapes.
  - e. Irregular figure should be comprised of additional figures.

#### New Jersey Core Curriculum Content Standards – Technology

- **8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.
- **8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory.

#### Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

#### NJCCSS 9.2 - Career Awareness, Exploration, and Preparation

- **9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

#### Career & Technical Education Content Area: 21<sup>st</sup> Century Life and Careers Standards

- **9.3.12.AR-VIS.3** Analyze and create two and three-dimensional visual art forms using various media

## Unit 4: Iditarod

### Enduring Understanding

1. The Iditarod is a dog sled race in Alaska to commemorate the Great Race of Mercy.
2. Distance can be found by multiplying the rate and time.
3. The inverse function is also valid; time equals distance divided by rate.
4. Elapsed time can be found by adding travel time to the start time.

### Essential Question(s)

1. What is the Iditarod?
2. How is the distance formula related to the Iditarod dog sled race in Alaska?
3. How are distance, rate, and time related?
4. How can Microsoft Excel be used to calculate large amounts of information?
5. How can I determine the validity of information found on the Internet?

### Learning Objectives

Students will be able to:

1. Use the distance formula ( $d=r*t$ ) to calculate elapsed time given the distance and rate.
2. Utilize Microsoft Excel to track their progress of the race.
3. Apply changes in rate and time daily.
4. Calculate elapsed time.
5. Recall real-world applications of the distance formula.
6. Complete a web quest answering questions on the Iditarod using reputable websites and information.

### Common Core State Standards

- **6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak.” “For every vote candidate A received, candidate C received nearly three votes.”
- **6.RP.3b** Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?
- **6.EE.2a** Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation “Subtract y from 5” as  $5 - y$ .
- **6.EE.2c** Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas  $V = s^3$  and  $A = 6s^2$  to find the volume and surface area of a cube with sides of length  $s = 1/2$ .

- **6.EE.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- **6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
- **6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form  $x + p = q$  and  $px = q$  for cases in which  $p$ ,  $q$  and  $x$  are all nonnegative rational numbers.
- **6.EE.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation  $d = 65t$  to represent the relationship between distance and time.

#### Suggested Activities/Modifications

*Below is a list of suggested activities, modifications, accommodations, and enrichment opportunities. This includes, but is not limited to,:*

1. Activities
  - a. Time Conversion Worksheets
  - b. Distance, Rate, and Time Practice Worksheets
  - c. Daily time calculations to determine the “Time In” at each checkpoint.
  - d. Check Point Challenge Worksheet
  - e. Bar Graph of Musher’s Final run time.
2. English Language Learners.
  - a. Read written instructions.
  - b. Students may be provided with note organizers / study guides to reinforce key topics.
  - c. Model and provide examples
  - d. Extended time on assessments when needed.
  - e. Establish a non-verbal cue to redirect student when not on task.
  - f. Students may use a bilingual dictionary.
  - g. Pair Visual Prompts with Verbal Presentations
  - h. Highlight Key Words & Formulas
3. Special Education/504 Students.
  - a. Students may be provided with note organizers / study guides to reinforce key topics.
  - b. Extended time on assessments when needed.

- c. Preferred seating to be determined by student and teacher.
  - d. Provide modified assessments when necessary.
  - e. Student may complete assessments in alternate setting when requested.
  - f. Establish a non-verbal cue to redirect student when not on task.
  - g. Maintain strong teacher / parent communication.
  - h. Repetition and practice
  - i. Pair Visual Prompts with Verbal Presentations
  - j. Provide Formulas
  - k. Check Use of Agenda
  - l. Establish personal expectations for assignment requirements
4. Gifted and Talented Students.
- a. Use of Higher Level Questioning Techniques
  - b. Extension/Challenge Questions
  - c. Provide Assessments at a Higher Level of Thinking
  - d. Higher level thinking needed to find time in seconds for each check point.
  - e. Researching the Iditarod and creating a PowerPoint presentation of the new data.

#### New Jersey Core Curriculum Content Standards – Technology

- **8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.
- **8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
- **8.1.8.D.4** Assess the credibility and accuracy of digital content.
- **8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

#### Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

#### NJCCSS 9.2 - Career Awareness, Exploration, and Preparation

- **9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

## V. Course Materials

### Unit 1: Road Trip:

Road Trip Packet  
 US map  
 Graph Paper  
 Calculators  
 Graph Paper

Extended Constructed Response  
 Worksheets  
 Smart Notes Road Trip File  
 Tenmarks.com Assignments

### Unit 2: Statistics Project:

Smart Notes: Graphing Intro  
 Smart Notes: Types of Graphs  
 Smart Notes: Measuring Angles  
 Power Point File: Power Point Example  
 Power Point File: How to Create Survey Questions  
 Graph Paper  
 Graphing Coordinate Assignment: He Is King  
 Reading Bar Graphs Worksheet  
 Ice Cream Bar Graph Worksheet  
 Reading Line Graphs Worksheet  
 Measuring Angles Worksheet  
 Reading Circle Graph Worksheet  
 Creating Circle Graph Worksheet

Excel Resource Worksheet  
 Tinker Plots Worksheet  
 Statistics Project Rubric  
 Microsoft Excel  
 Tinker Plots  
 Laptops  
 Printer  
 Rulers  
 Protractors  
 Markers  
 Crayons  
 Deck of Cards  
 Whiteboards  
 Expo Markers & Erasers

### Unit 3: Geo Project:

Word File: Vocabulary Match Cards  
 Smart Notebook File: Intro to Battleshapes  
 Smart Notebook File: AreaRectangleTriangle  
 GSP File: Area of Triangle Derivation  
 Smart Notebook File:  
 AreaParallelogramTrapezoid  
 Smart Notebook File: Coordinate Review  
 Smart Notebook File: Battleground Set-Up  
 GSP File: Geometer's Sketchpad Intro  
 GSP File: BattlegroundBLANK  
 GSP File: BattlegroundExample  
 Smart Notebook File: Factor Pair Area

Smart Notebook File: CircleAreaCircumfer.  
 Smart Notebook File: SketchSetUp  
 Smart Notebook File: IrregularShapes  
 Word File: Geometry Match Worksheet  
 Word File: Area of Rectangles and Triangles  
 Word File: Area of Parallelograms & Traps  
 Word File: Graph Activity (A.I. Robot)  
 Word File: Battle Outline  
 Word File: Battleshapes Rubric  
 Word File: Factor Pair (\*Challenge)  
 Word File: PARCC Practice Question  
 Word File: Area and Circumference

Word File: Area & Circumference of Circles  
Word File: Irregular Figures Practice  
Word File: GeoCreature Worksheet  
Area of Polygons Quiz  
Rulers

Protractors  
Markers  
Crayons  
Whiteboards  
Expo Markers & Erasers

#### **Unit 4: Iditarod:**

Iditarod Web Quest  
Microsoft Excel  
It's Decimal Time  
Distance, Rate, Time Worksheet #1  
Distance, Rate, Time Worksheet #2  
Triathlon  
Daily Calculations

Check Point Challenge  
Check Point Time Sheet  
Calculators  
Graph Paper  
Rulers  
Crayons

## **VI. Assessments**

### **Unit 1: Road Trip**

- Road Trip Packet
- Road Trip Time & Money Worksheet: Dunkin Donuts
- Road Trip Time & Money Worksheet: Pizza Parlor
- Measure Of Center Worksheet
- Review Game

### **Unit 2: Statistics**

- Graphing Coordinate Plane Worksheet
- Reading Bar Graphs
- Creating Bar Graph (Paper)
- Reading Line Graphs
- Creating Double Line Graph (Paper)
- Reading Circle Graphs
- Creating Circle Graph (Paper)
- Excel Practice Assessment
- Creation and Completion of Survey
- Tinker Plots Analysis Worksheet
- Statistics Project Rubric
- Extended Constructed Response Questions
- Tenmarks.com Assignment
- Review Game

**Unit 3: Geo-Project**

- Graphing Coordinate Plane Worksheet
- Geometry Match Worksheet
- Area of Rectangles & Triangles Worksheet
- Area of Parallelograms and Trapezoids Worksheet
- Factor Pairs Worksheet
- PARCC Practice Questions
- Area of Polygons Quiz
- Area & Circumference of Circles
- Area of Irregular Figures Worksheet
- Battleshapes Rubric
- Geo-Creature Rubric
- Extended Constructed Response Questions
- Tenmarks.com Assignments
- Review Game

**Unit 4: Iditarod**

- It's Decimal Time Worksheet
- Distance, Rate, Time #1 Worksheet
- Distance, Rate, Time #2 Worksheet
- Triathlon Worksheet
- Daily Calculations Worksheet
- Check Point Challenge Worksheet
- Check Point Time Sheet Worksheet
- Tenmarks.com Assignments

**VII. Cross Curricular Aspects****Unit 1: Road Trip**

- **Social Studies:**  
Students analyze maps and discuss United States geography.
- **Language Arts:**  
Students creatively explain what salary they would choose for their employment with given options. While math work is needed to support their conclusion the persuasive writing component is a key component.

**Unit 2: Statistics**

- **Social Studies:**

Students analyze bar graphs, line graphs and circle graphs that include statistical data regarding recycling, weather, average technology use and average working age in the United States.

- **Language Arts:**

Students provide a persuasive analysis of their survey data. Students then orally present their visual project to educate their class on the habits of the sixth grade class.

### **Unit 3: Geo-Project**

- **Art:**

Students create a creature using geometric shapes and creatively color and decorate their creature.

- **English Language Arts:**

Students write a back story for their Geo-Creature explaining its origin and function.

### **Unit 4: Iditarod**

- **Social Studies:**

Students discuss the historical implications of the diphtheria epidemic of 1925 and further investigate the reasons for the current existence of the race.

- **English Language Arts:**

Students complete a web quest requiring them to gather information from various websites.