

Fair Lawn

Public Schools

Fair Lawn, NJ

7th Grade

Dynamic

Math

Connections

Adopted August

2015

Revised August 2015
Developed August 2013

The 7th grade Dynamic Mathematics Connections course has been designed for the regular math student and is aligned with the Grade 7 Common Core State Standards.

DMC 7

Fair Lawn School District

Committee Credits Dynamic Math Teachers

Matt Cecconi, Teacher

Rebecca Erb, Teacher

Ryan Harrington, Teacher

Lisa Levchak, Teacher

Lauren Gimon, Supervisor

Spring 2015

Dynamic Math 7

I. Course Synopsis

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

1. Students extend their understanding of ratios and develop understanding of proportionality to solve single- and multi-step problems. Students use their understanding of ratios and proportionality to solve a wide variety of percent problems, including those involving discounts, interest, taxes, tips, and percent increase or decrease. Students solve problems about scale drawings by relating corresponding lengths between the objects or by using the fact that relationships of lengths within an object are preserved in similar objects. Students graph proportional relationships and understand the unit rate informally as a measure of the steepness of the related line, called the slope. They distinguish proportional relationships from other relationships.
2. 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.
3. 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 in Grade 8 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.
4. 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.

Throughout the course, mathematical concepts will be taught with an emphasis on enduring understandings, essential questions, real-world application, technology, and cross-curricular interaction.

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 seventh grade 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 7×8 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 2×7 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.

III. Scope & Sequence

Unit 1: House Design Project (6 Weeks):

Similar Figures
Area and Perimeter
Scale Measurements
Ratio
Proportions
Measurement

Unit 2: Probability (4 Weeks):

Theoretical Probability
Experimental Probability
Simple Probability
Compound Probability
Expected Probability

Unit 3: Advertising Project (5 Weeks):

Biased Vs. Unbiased
Creating Surveys
Collating Data
Interpreting Data
Reading and Interpreting Graphs
Creating Graphs

Unit 4: Number Wars (3 Weeks):

Addition of Integers
Subtraction of Integers
Multiplication of Integers
Division of Integers
Properties of Numbers
Associative Property Addition/Multiplication
Commutative Property of Addition/Multiplication
Identity Property of Addition/Multiplication

IV. Unit Descriptions

Unit 1: House Design Project

Enduring Understanding

1. Similar Figures are shapes that have congruent angles and proportional sides.
2. Perimeter is the linear distance around a shape.
3. Area is the space inside a shape, measured in square units.
4. A scale can be used to create a scale drawing.
5. Proportions can be used to represent and solve missing sides of similar figures.

Essential Question(s)

1. What are similar figures?
2. How can you determine if two figures are similar?
3. How can measurements (including fractions of an inch) be drawn accurately using a ruler?
4. Where do similar figures occur in everyday situations?
5. What is the difference between similarity and congruence?
6. What is perimeter?
7. How is the perimeter of an object calculated?
8. What is area?
9. How is the area of an object calculated?
10. How is a scale drawing created?
11. How can measurements be converted between units/scales?

Learning Objectives

Students will be able to:

1. Set up and solve proportions given a picture of similar figures.
2. Set up and solve proportions given a word problem.
3. Define similar figures.
4. State the requirements for two figures to be similar.
5. Use a ruler to draw measurements accurately.
6. Utilize formulas in Microsoft Excel to calculate scale measurements and sums.
7. Find the area and perimeter of regular figures.
8. Calculate the area and perimeter of irregular figures.
9. Use stencils to place scaled furniture in the rooms of the house.
10. Construct doors and windows within the house using stencils and a ruler.
11. Label rooms names and objects within the room with a certain height.
12. Recall real-life situations in which similar figures exist.

Common Core State Standards

- **7.RP.A.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- **7.RP.A.2** Recognize and represent proportional relationships between quantities.
- **7.RP.A.2a** Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
- **7.RP.A.2b** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- **7.RP.A.3** Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
- **7.G.A.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.
- **7.G.A.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.
- **7.G.B.4** Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
- **7.G.B.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.

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. Similar Figure Practice
 - b. Introduction to House Design and Architecture...What makes a building a house?
 - c. Using a scale to convert actual size to scale size
 - d. Using rulers to accurately draw the rooms of a house.
 - e. Find the area and perimeter of all rooms of a house.
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. Students are encouraged to incorporate architectural elements common to their home country (various room shapes, names, function)
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. Students work at their own pace to create a house containing a maximum of 8 rooms.
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. Students are encouraged to create houses containing rooms that are not rectangular. They should also create rooms containing at least 8 rooms.

New Jersey Core Curriculum Content Standards - Technology

- **8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results
- **8.2.8.D.1** Design and create a product that addresses a real world problem using a design process under specific constraints.

Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP 8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **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: 21st Century Life and Careers Standards

- **9.3.12.AC.1** Use vocabulary, symbols and formulas common to architecture and construction.
- **9.3.12.AC.6** Read, interpret and use technical drawings, documents and specifications to plan a project.
- **9.3.12.AC-DES.6** Apply the techniques and skills of modern drafting, design, engineering and construction to projects.

Unit 2: ProbabilityEnduring Understanding

1. Probability is the likelihood that an event will occur.
2. Theoretical probability is found by dividing the likelihood an event will occur by the number of possible outcomes.
3. Experimental probability is found by dividing the number of positive outcomes by the number of times an experiment was performed.
4. Sample space is the set of all possible outcomes.
5. A tree diagram is a visual representation of all possible outcomes.

Essential Question(s)

1. What is probability?
2. How do we determine probability?
3. How can I use probability to make wise decisions in my life?

Learning Objectives

Students will be able to:

1. Define important terms such as probability, sample space, etc.
2. Calculate both simple and compound probabilities
3. Differentiate between experimental and theoretical probability
4. Extrapolate data based on given probabilities of specific events
5. Construct and interpret tree diagrams
6. Use Excel to organize, calculate, and interpret data

Common Core State Standards

- **7.SP.C.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.

- **7.SP.C.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.*
- **7.SP.C.7** 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.
- **7.SP.C.7a** 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.*
- **7.SP.C.7b** Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
- **7.SP.C.8** Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
- **7.SP.C.8a** 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.
- **7.SP.C.8b** 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.
- **7.SP.C.8c** 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?*

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. Introduction and Notes for Simple and Compound Probability
 - b. Probability Carnival Activities
 - a. Coin Toss
 - b. Rock, Paper, Scissors (with Lizard and Spock for G&T)

- c. Spinner and Tiles
 - d. Dice and Cards
 - e. "Pair-a-dice"
 - c. Rolling Number Cubes (SE, 504 modification)
 - d. Probability Quiz
 - e. Paired Worksheet Review (G&T)
 - f. Create your own Spinner - NCTM website (SE, 504 modification)
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 vocabulary by use of graphic organizers - this can be used as a reference sheet throughout the project.
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.
- e. Use of Higher Level Questioning Techniques
 - f. Extension/Challenge Questions
 - g. Provide Assessments at a Higher Level of Thinking
 - h. Exploration Problems/Proofs

New Jersey Core Curriculum Content Standards - Technology

- **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.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP 8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **CRP11.** Use technology to enhance productivity.
- **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: 21st 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.

Unit 3: Advertising Project

Enduring Understanding

1. There are different types of graphic representations, and each serves a unique purpose for displaying data.
2. Advertising bias can be used to change the perspective of an audience.
3. Recognizing biased and unbiased advertisements is a valuable tool for a consumer.
4. A research-based presentation is a way to convey the information from your research to a wide audience.

Essential Question(s)

1. What is advertising?
2. What are statistics?
3. How can statistical information be used in advertisements?
4. Are statistics misleading?
5. What is market research?
6. Why is it important to understand the difference between possible biases?

Learning Objectives

Students will be able to:

1. To identify important characteristics of memorable commercials and other advertisements.

2. To critique published surveys to determine whether or not the information presented is misleading.
3. To identify sampling and questioning bias and to determine means of limiting bias in the students' surveys
4. To create an unbiased survey, containing a minimum of 13 questions, that will be used to produce the advertising campaign.
5. To accurately use TinkerPlots to gather, organize, and present the survey data.
6. To identify correlations in data collected through the group's survey.
7. To create charts and graphs in TinkerPlots that can be used to justify the direction taken in the students advertisement.
8. To write, act, and produce a commercial or other means of advertisement for the product chosen by the group.

Common Core State Standards

- **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.
- **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.
- **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 10 cm 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.
- **7.SP.4.** Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, 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.

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. Detecting Bias in Advertising

- a. Worksheet
 - b. Internet Website Assessment (G&T)
 - b. Misleading Statistics
 - c. Brainstorming Product Ideas/Create Survey
 - d. Conduct surveys (SE, 504 - 10 surveys as opposed to 20)
 - e. Create/manipulate/interpret data
 - f. Create PowerPoint to show results
 - g. Create Multimedia Commercial and Present
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 vocabulary by use of graphic organizers - this can be used as a reference sheet throughout the project.
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.
- i. Use of Higher Level Questioning Techniques
 - j. Extension/Challenge Questions
 - k. Provide Assessments at a Higher Level of Thinking
 - l. Exploration Problems/Proofs

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.4** Graph and calculate data within a spreadsheet and present a summary of the results
- **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
- **8.2.8.B.6** Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
- **8.2.8.C.1** Explain how different teams/groups can contribute to the overall design of a product.
- **8.2.8.D.1** Design and create a product that addresses a real world problem using a design process under specific constraints.

Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP 8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **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: 21st Century Life and Careers Standards

- **9.3.12.AC-DES.1** Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues
- **9.3.12.AR-AV.4** Design an audio, video, and/or film production.

Unit 4: Number Wars

Enduring Understanding

1. Positive and negative numbers are added, subtracted, multiplied and divided based on a number of integer rules.
2. The sign (positive or negative) of the sum, difference, product or quotient is determined by the sign of the integers as well as the operation being performed.
3. Integers can be manipulated to reach a given outcome by performing mathematical operations.

Essential Question(s)

1. How do you find the sum or difference of integers?
2. How do you find the product or quotient of integers?
3. How do you manipulate integers of the same sign? Different signs?

Learning Objectives

Students will be able to:

1. Add and subtract positive and negative integers by following set rules.
2. Multiply and divide positive and negative integers by following set rules.
3. Recognize solutions as either 'reasonable' or 'not reasonable' when manipulating integers.
4. Identify an integer from a number line.
5. Manipulate integers to reach a given numerical outcome.

Common Core State Standards

- **7.NS.A.1** Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- **7.NS.A.1.A** Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
- **7.NS.A.1.B** Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
- **7.NS.A.1.C** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
- **7.NS.A.1.D** Apply properties of operations as strategies to add and subtract rational numbers.
- **7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- **7.NS.A.2.A** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- **7.NS.A.2.B** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
- **7.NS.A.2.C** Apply properties of operations as strategies to multiply and divide rational numbers.
- **7.NS.A.2.D** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

- **7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers.

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. Integer bingo
 - b. Integer baseball
 - c. Addition and subtraction of integers worksheet (modified in difficulty both for SE and 504 learners and for G&T)
 - d. Multiplication and division of integers worksheet (modified in difficulty both for SE and 504 learners and for G&T)
 - e. Summative review worksheet for integers
 - f. Number Wars game
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
4. Gifted and Talented Students.
 - m. Use of Higher Level Questioning Techniques
 - n. Extension/Challenge Questions

- o. Provide Assessments at a Higher Level of Thinking
- p. Exploration Problems/Proofs

Career Readiness Practices

- **CRP2.** Apply appropriate academic and technical skills.
- **CRP4.** Communicate clearly and effectively and with reason.
- **CRP6.** Demonstrate creativity and innovation.
- **CRP 8.** Utilize critical thinking to make sense of problems and persevere in solving them.
- **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.

V. Course Materials

Unit 1: House Design Project

Rulers
Protractors
Copy Paper
Architectural Stencils (Home Furnishing)
Laptops
Microsoft Excel
18" x 24" paper

Design Smart Notebook file (Notes, DO NOWs)
Similar Figures WS
Standard Room Sizes WS
Area and Perimeter WS
Architectural Stencils (Architects and Builders)

Unit 2: Probability

Smart Notebook file (Notes, DO NOWs)
Rolling Numbers Cubes WS
Station Rules
Carnival Packet
Laptops
Microsoft Excel
Simple Probability Notesheet
Simple Probability HW
Counting Principle Tree Diagram
Experimental Probability Notesheet
Tree Diagram Experimental Probability HW
Compound Probability Notesheet
Compound Probability HW

Expected Frequency Guided Practice
Expected Frequency HW
Probability Quiz
Dice
Playing Cards
Tiles (Zomes)
Coins
Rock, Paper, Scissors, Lizard, Spock Diagram
Spinners
Paired Homework Assignment Directions
Polyhedron Dice Experiment
Polyhedron Dice

Unit 3: Advertisement Project

Laptops
Popular Slogans WS
Ad Project Overview and Timeline
Ad Project Brainstorming Sheet
Detecting Bias WS
Ad Project Smart Notebook File (Notes, DO NOWs)

Creating a Survey Template: Microsoft Word document
Final Project Grading Rubric
TinkerPlots Program
TinkerPlots: Combining Cards Help Sheet
Misleading Statistics WS
Microsoft PowerPoint/Google Slides

Unit 4: Number Wars

Smart Notebook File: Introduction to Game

Smart Notebook File: Integer Bingo

Word: Bingo Answers

Word: Mult./Divide Integers WS (Easy)

Word: Mult./Divide Integers WS (diff)

Quiz: Multiply/Divide

Quiz: Add/Subtract

Smart Notebook: Baseball Integer Review

Addition WS (single/double)

Subtraction WS (single/double)

Word: IntegerBingo Workspace

PowerPoint: Integer Properties

IntegerAddition Smart Notebook File

IntegerSubtraction Smart Notebook File

Mult/Div Smart Notebook File

Scoring Sheet (Excel)

Word: Summary Worksheet

Word: Game Rules

Word: Game Board

Dice

VI. Assessments

Unit 1: House Design

- Similar figures worksheet
- Scaling down rooms of a house worksheet
- Area and perimeter of regular figures worksheet
- Extended constructed response questions
- Review games
- Scale drawing of house (final project)

Unit 2: Probability

- Polyhedron dice experiment
- Accompanying worksheets for each probability experiment
- Simple and compound probability worksheet
- Extended constructed response questions
- TenMarks assignment: Probability
- Probability quiz
- Review games

Unit 3: Advertisement

- Bias Vs. Unbiased worksheet
- Misleading statistics packet
- Extended constructed response questions
- Graphing presentation and commercial (final project)
- Review games

Unit 4: Number wars

- Practice games (Integer bingo/ baseball)
- Worksheets
 - Addition and subtraction of integers
 - Multiplication and division of integers
 - Summative review: Integers
 - Integer reflection summary
- Number wars game participation and completion
- Integer practice review game

VII. Cross Curricular Aspects

Unit 1: House Design Project

- Social Studies
 - Examining scale factor through the exploration of Queen Elizabeth's doll house
- Architecture
 - Creating a blue print of a design

Unit 3: Advertising

- Social studies
 - Properties of effective advertising
 - Examining biased vs. unbiased advertising