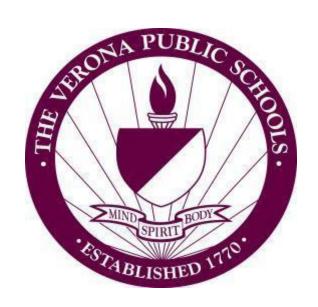# Verona Public School District
# Curriculum Overview

# <u>Pre-Algebra 7 (Math 7/8)</u>

**Curriculum Committee Members:**
Jullianne Curro
Colleen Fernandez
Danielle Kelly
Karolina Siwek

**Supervisor:**
Glen Stevenson

**Verona Public Schools**
**121 Fairview Ave., Verona, NJ 07044**
**www.veronaschools.org**

**Verona Public Schools Mission Statement:**
The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

**Course Description:**
A new concept for the 8th grade level is the idea of a function. Students define what a function is and evaluate and compare different types of functions. They describe functions mathematically as relationships between quantities. Students apply their experience with proportional relationships to understand lines and linear equations, specifically with slope and the Pythagorean Theorem. They solve single and simultaneous pairs of linear equations and interpret the meaning of those equations. Students use their experience comparing features of geometrical figures in earlier grades to explore congruence and similarity with physical and digital models.

**Prerequisite(s):**
7th Grade Math

## Standard 8: Technology Standards

The curricular expectation for the Standard 8: Computer Science and Design Thinking standards in classes that are not specifically focused on computer science or engineering is infusion and integration throughout the curriculum. These are not intended to be standards for separate, stand alone lessons. The computer science and design thinking standards and practices are to be incorporated into other disciplines and contexts as appropriate.

| 8.1: Computer Science | 8.2: Design Thinking |
|---|---|
| Computing Systems (CS) <br> Networks and the Internet (NI) <br> Impacts of Computing (IC) <br> Data & Analysis (DA) <br> Algorithms & Programming (AP) | Engineering Design (ED) <br> Interaction of Technology and Humans (ITH) <br> Nature of Technology (NT) <br> Effects of Technology on the Natural World (ETA) <br> Ethics and Culture (EC) |

### Computer Science and Design Thinking Practices

1. Fostering an Inclusive Computing and Design Culture
2. Collaborating Around Computing and Design
3. Recognizing and Defining Computational Problems
4. Developing and Using Abstractions
5. Creating Computational Artifacts
6. Testing and Refining Computational Artifacts
7. Communicating About Computing and Design

## SEL Competencies and Career Readiness, Life Literacies, and Key Skills Practices

The curricular expectation for the Standard 9: Career Readiness, Life Literacies, and Key Skills standards is infusion and integration throughout the curriculum. These are not intended to be standards for separate, stand alone lessons. The CLKS are to be incorporated into other disciplines and contexts as appropriate.

**Social and Emotional Learning Core Competencies:** *These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities*

**Career Readiness, Life Literacies, and Key Skills Practices:** *Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind 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. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.*

| Competency | Practices |
|---|---|
| **Self-awareness:** The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism. | CLKS6 Model integrity, ethical leadership, and effective management. <br> CLKS7 Plan education and career paths aligned to personal goals. |
| **Self-management:** The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals. | CLKS2 Attend to financial well-being. <br> X CLKS4 Demonstrate creativity and innovation. <br> X CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them. <br> X CLKS8 Use technology to enhance productivity, increase collaboration, and communicate effectively. |
| **Social awareness:** The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports. | X CLKS1 Act as a responsible and contributing community member and employee. <br> CLKS6 Model integrity, ethical leadership, and effective management. |
| **Relationship skills:** The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed. | CLKS6 Model integrity, ethical leadership, and effective management. <br> X CLKS9 Work productively in teams while using cultural global competence. |
| **Responsible decision making:** The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others. | CLKS3 Consider the environmental, social, and economic impact of decisions. <br> X CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them. <br> CLKS6 Model integrity, ethical leadership, and effective management. |

## Course Materials

| **Core Instructional Materials**: *These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.* | **Differentiated Resources**: *These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.* |
|---|---|
| ● Big Ideas Math Advanced 2 | ● New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf <br> ● Howard County MD Mathematics 8 https://hcpss.instructure.com/courses/161 <br> ● Khan Academy 8th Grade Math https://www.khanacademy.org/math/cc-eighth-grade-math <br> ● Math Assessment Project Resources http://map.mathshell.org/ <br> ● Promoting Inquiry in Mathematics and Science Education Across Europe http://www.primas-project.eu/en/index.do <br> ● YouCubed.org |

| Mathematical Practice Standards (Revised for Readability*) |
|---|
| Math Practice 1: Make sense of mathematics. Mathematically proficient students begin a problem with a strategy in mind, but can also revise it until they get the result they are looking for. They feel comfortable representing their thinking using pictures, numbers, symbols, and/or words and can compare their method to other problem-solving strategies. |
| Math Practice 2: Add or remove context to solve problems. Mathematically proficient students understand what the numbers, symbols, pictures, words, etc. in their work represent. They feel comfortable switching back and forth between a problem's context and its representation and use the form that best fits the situation. |
| Math Practice 3: Explain and defend your reasoning. Mathematically proficient students can convince others that their reasoning is correct. This includes convincing others who have not solved the problem as well as those who have solved it but reached different conclusions. |
| Math Practice 4: Ask and answer questions about the world. Mathematically proficient students ask and answer questions about the world. They begin with a question in mind, determine what information is needed to answer it, and get the information. Next, they use that information to create a mathematical representation to answer the question. Then, they verify whether their representation works or needs improvement. If necessary, they repeat this process, adjusting both what information they use and how they use it until they sufficiently answer the question. |
| Math Practice 5: Use tools to make sense of mathematics. Mathematically proficient students use tools when they are helpful with making sense of mathematics. This includes physical tools (such as rulers, calculators, and manipulatives), virtual tools (such as graphing software and spreadsheets), or self-created tools (such as tables to organize data or estimation to see if an answer is reasonable). |
| Math Practice 6: Communicate precisely. Mathematically proficient students communicate precisely with others. This includes using proper definitions, defining their variables, specifying their units, and labeling axes. |
| Math Practice 7: Simplify problems by using their structure. Mathematically proficient students use patterns and structure to strategically transform complicated problems into one or more simpler problems. For example, a student may think of 99 + 46 as 100 + 45 or find the area of a complicated shape by breaking it into multiple simpler shapes. |
| Math Practice 8: Simplify problems by noticing patterns. Mathematically proficient students notice patterns and use them to simplify problems. For example, a student may notice repeated addition and multiply instead or may create a function to represent a repeated operation. |
| *Disclaimer These are not the actual Standards for Mathematical Practice. This revised version is Robert Kaplinsky's attempt at making them readable by as many people as possible. Download your copy at https://www.robertkaplinsky.com/smp. |

| Unit 1: Geometry | Unit Duration: 7 weeks |
|---|---|

## Stage 1: Desired Results

### Established Goals (NJSLS):
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 (with technology, with ruler and protractor as well as freehand) 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.A.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

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.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.

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.

8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations.
   a. Lines are transformed into lines and line segments to line segments of the same length
   b. Angles are transformed to angles of the same measure
   c. Parallel lines are transformed to parallel lines

8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.

8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.

8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

### Interdisciplinary Standards (NJSLS):
NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence

RH.6-8.5. Describe how a text presents information (e.g., sequentially, comparatively, causally).

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

### Technology Integration (NJSLS 8):
**8.2.8.C.5.a** Create a technical sketch of a product with materials and measurements labeled.

**8.2.8.E.4** Use appropriate terms in conversation

**8.2.8.E.3** Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.

### 21st Century Skills Integration (NJSLS 9):
CLKS1 Act as a responsible and contributing community member and employee.

CLKS4 Demonstrate creativity and innovation.

CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them.

CLKS8 Use technology to enhance productivity, increase collaboration and communicate effectively.

CLKS9 Work productively in teams while using cultural/global competence.

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

### Transfer Goal:
Students will be able to independently use their learning to accurately describe and model transformations.

Students use geometric concepts, properties, and relationships in one, two, and three dimensions to model and solve problems. They communicate their reasoning used to solve these problems

### Students will understand that:
- Geometry and spatial sense offer ways to interpret and reflect on our physical environment.
- Angles make up geometric figures as well as appear in our environment in real life objects
- As a geometric figure is dilated the area will change more than the perimeter.
- Surface area and volume provide important real world measurements of 3-D figures such as home improvement projects, video game designs, and packing.
- Transformations of the plane (2D) lead to transformations of space (3D), which are crucial to understanding how modern computer graphics systems work.
- A clear classification system of transformations enables identification of symmetric patterns.
- Transformations occur everywhere around us.
- Students should understand the difference between surface area and volume of 3-D figures.
- Linear measure, area, and volume are fundamentally different but may be related to one another in ways that permit calculation of one given the other.

### Essential Questions:
- How do geometric models describe spatial relationships?
- Why are angles a fundamental building block?
- How does what we measure influence how we measure?
- How does volume and surface area relate to profitability?
- How do transformations play a part in your life?
- How does volume and surface area relate to profitability?
- How does what we measure affect how we measure?
- How can space be defined through numbers/ measurement?

### Students will know:
- adjacent angles share a common ray
- vertical angles are opposite angles formed by intersection of two line and are always congruent.
- complementary angles add up to 90 degrees, while supplementary angles add up to 180 degrees
- triangles can be classified using side lengths and angle measures
- angles in a triangle add up to 180 degrees
- quadrilaterals can be classified by angles and side lengths(trapezoid, parallelogram, kite, rectangle, square, rhombus)
- angles in a quadrilateral add up to 360 degrees
- diameter is twice the radius of a given circle
- circumference can be found using
- $C = 2\pi r$ or $C = \pi d$
- perimeter of a composite figure can be found by adding all the sides and arcs together
- area of a circle can be found using the formula $A = \pi r^2$

### Students will be able to:
- will identify adjacent or vertical angles.
- classify several pairs of angles as complementary or supplementary.
- classify triangles by side lengths and angle measures
- find the missing angle measure of a triangle
- classify quadrilaterals by the attributes they possess.
- use a scale drawing to find a missing measure.
- use the formula for circumference to solve real-life problems.
- use formulas to find the perimeter of composite figures.
- use the formula for area of a circle to solve real-life problems.
- divide composite figures into familiar geometric shapes and use known area formulas to find the total area.
- compute surface area of a prism, pyramids, and cylinders using formulas as well as nets
- compute volume of prisms and pyramids to solve problems
- describe cross sections of three-dimensional figures.
- apply geometric knowledge to real life application problems.

- area of composite figures can be found by finding areas of separate figures and adding them altogether
- surface areas of prism, pyramids and cylinders can be found by adding all the individual faces
- volume of prisms can be found using $V=Bh$, where B is the area of the base and h is height
- volume of pyramid can be found using $V=\frac{1}{3}Bh$, where B is the area of the base and h is height
- vocabulary: ,, slant height, cross section

| | |
|---|---|
| Line | Congruent Segments |
| Plane | Congruent Angles |
| Line Segment | Corresponding Parts |
| Ray | Side-Side-Side |
| Collinear | Side-Angle-Side |
| Coplanar | Angle-Side-Angle |
| Perpendicular Lines | Coordinate Plane |
| Parallel Lines | Ordered Pair |
| Skew Lines | Line Symmetry |
| Angle (Acute, Right, Obtuse, Straight) | Transformation |
| Adjacent Angles | Pre-image |
| Vertical Angles | Image |
| Supplementary Angles | Reflection |
| Complementary Angles | Translation |
| Transversal | Rotation |
| Alternate Interior Angles | Similar Figures |
| Alternate Exterior Angles | Dilations |
| Corresponding Angles | Scale Factor |
| Triangles (Acute, Obtuse, Right, Equilateral, Isosceles, Scalene) | lateral surface area |
| | regular pyramid |
| cross secttion | slant height |

- prove triangle are congruent using SSS, SAS, and ASA
- perform translation, rotations, reflections, and dilations of different shapes
- find volume of 3-D figures using the formulas
- Classify triangles
- Identify and name congruent polygons.
- Identify and plot points in a coordinate plane.
- Reflect figures
- Identify lines of symmetry
- Translate figures in a coordinate plane.
- Rotate figures in a coordinate plane.
- Use similar polygons to find missing measures.
- Dilate figures in a coordinate plane

---

## Stage 2: Acceptable Evidence

**Transfer Task and Unit Assessments:**

Department Developed Performance Task and Unit Assessment

**Other Evidence:**

Formal:
- Providing written/oral response to the EQs
- Unit quizzes (approx. 2-3)
- Unit test
- Project

Informal:
- Daily warm-ups
- Homework
- Class discussion
- Exit cards

---

## Reference Materials

Big Ideas Math Support Materials
New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf
Khan Academy 7th Grade Math - Geometry - https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-geometry
Khan Academy 8th Grade Math- Geometry: https://www.khanacademy.org/math/cc-eighth-grade-math
Math Assessment Project Resources http://map.mathshell.org/

---

## Accommodations and Modifications

**Differentiation for Students with IEPs, 504s, and/or Students at Risk of Failure (IEP/504/RF)**

1. Preferential Seating
2. Allow for movement breaks, as necessary
3. Provide visual cues for orally presented information when possible
4. Extended time on tests, quizzes, and projects, as necessary
5. Partial credit for incomplete work
6. Provide study guides, if available
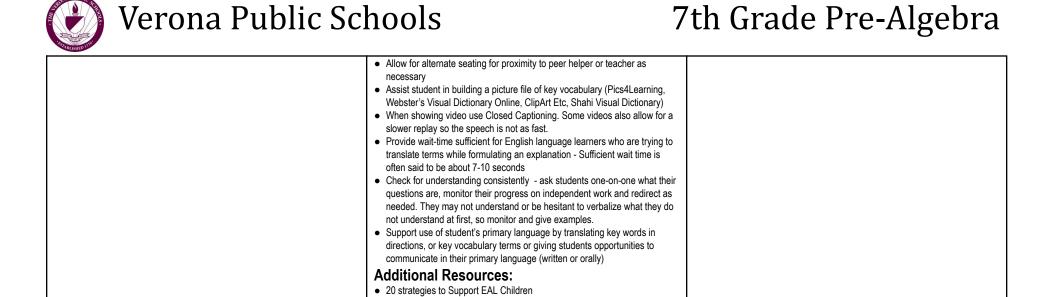7. Provide class notes, if available
8. Provide assessments with fewer questions on page
9. Breakdown tasks into manageable units
10. Provide a word bank, if possible, for short answer or fill-in tasks on assignments and tests
11. Periodically review notes for accuracy and completeness
12. Teachers will reword, clarify, or repeat instructions or items on assignments and/or tests as needed.
13. Student will be redirected when necessary
14. Provide frequent feedback and check often for understanding
15. Modify homework, tests, or quizzes as necessary
16. Test and quiz questions to be read aloud as necessary
17. Allow use of calculator, multiplication table, manipulatives as necessary

**Differentiation for English Language Learners**

- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Provide word banks / word walls
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Allow students to use eDictionaries
- Avoid slang and idiomatic expressions.
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Sensory Supports (Real-life objects, Manipulatives, Pictures & photographs, Illustrations, Diagrams, & drawings, Magazines & newspapers, Physical activities, Videos & films, Broadcasts, Models & figures)
- Provide Graphic Supports (Charts, Graphic organizers, Tables, Graphs, Timelines, Number lines)
- Provide Interactive Supports(Pair or Partner work, Group work, Peer Mentor)
- Simplify the language, format, and directions of the assessment
- Accept correct answers on test or worksheets in any written form such as lists, phrases, or using inventive spelling
- Allow editing and revision before grading
- Design projects and assessment for student that require reduced sentence or paragraph composition
- Give alternative homework or class work assignments suitable to the student's linguistic ability for activities and assessments
- Utilize alternate reading assignments/materials at the student's reading level.

**Differentiation for Enrichment:**

1. Provide more challenging math tasks
2. Focus on the overall trends, patterns and themes rather than small details and facts
3. Study problems that do not have a clear solution
4. Offer leveled projects
5. Allow students to create their own problems
6. Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
7. Encourage students to explore concepts in depth and encourage independent studies or investigations.
8. Reduced amounts of drill and practice

**Additional Resources:**

- Serving Gifted Students in General Ed Classrooms
- Practical Recommendations and Interventions: Gifted Student

- Allow for alternate seating for proximity to peer helper or teacher as necessary
- Assist student in building a picture file of key vocabulary (Pics4Learning, Webster's Visual Dictionary Online, ClipArt Etc, Shahi Visual Dictionary)
- When showing video use Closed Captioning. Some videos also allow for a slower replay so the speech is not as fast.
- Provide wait-time sufficient for English language learners who are trying to translate terms while formulating an explanation - Sufficient wait time is often said to be about 7-10 seconds
- Check for understanding consistently  - ask students one-on-one what their questions are, monitor their progress on independent work and redirect as needed. They may not understand or be hesitant to verbalize what they do not understand at first, so monitor and give examples.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally)

### Additional Resources:

- 20 strategies to Support EAL Children
- What English Language Learners Wish Teachers Knew - Education Week
- A Starting Point: Tips and resources for working with ESL newcomer

| **Unit 2: Exponents and Real Numbers** | **Unit Duration: 7 weeks** |

## Stage 1: Desired Results

### Established Goals (NJSLS):

**8.NS.1**-Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.

**8.NS.2**-Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., $\pi^2$). For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

**8.EE.A.1**-Know and apply the properties of integer exponents to generate equivalent numerical expressions.

**8.EE.A.2**-Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where $p$ is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

**8.EE.A.3**-Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

**8.EE.B.4**-Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities

**8.G.B.6**- Explain a proof of the Pythagorean Theorem and its converse.

**8.G.B.7** -Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

**8.G.B.8**- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

### Interdisciplinary Standards (NJSLS):

MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence

RH.6-8.5. Describe how a text presents information (e.g., sequentially, comparatively, causally).

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

### Technology Integration (NJSLS 8):

**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.

**8.2.8.E.4** Use appropriate terms in conversation

**8.2.8.C.4** Identify the steps in the design process that would be used to solve a designated problem.

**8.2.8.E.3** Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.

**8.2.8.B.2** Identify the desired and undesired consequences from the use of a product or system.

### 21st Century Skills Integration (NJSLS 9):

CLKS1 Act as a responsible and contributing community member and employee.

CLKS4 Demonstrate creativity and innovation.

CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them.

CLKS8 Use technology to enhance productivity, increase collaboration and communicate effectively.

CLKS9 Work productively in teams while using cultural/global competence.

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

### Transfer Goal:

Students will be able to independently interpret how exponents and scientific notation can be used to compare magnitude of numbers

Students make connections between concepts and procedures to effectively use computational skills to solve problems. They use appropriate techniques for the problem or situation (for example: estimation, mental math, paper and pencil, calculators, computers). They communicate their reasoning used to solve these problems.

### Students will understand that:

- Students will understand the number system by constructing meanings for the following:
    - Exponents
    - Roots
    - Numbers represented in scientific notation
- The student will use and explain procedures for performing calculations involving addition, subtraction, multiplication, division, and exponentiation with integers and all
- Computational fluency includes understanding not only the meaning, but also the appropriate use of numerical operations.
- The magnitude of numbers affects the outcome of operations on them.
- Knowing the reasonableness of an answer comes from using good number sense and estimation strategies.
- Exponents represent repeated multiplication.
- "Laws of exponents" are a consistent set of rules (addition, subtraction, multiplication, and division) used to solve equations.
- Decimals and scientific notation are exercises with exponents.

### Essential Questions:

- What makes a computational strategy both effective and efficient?
- How do operations affect numbers?
- How do mathematical representations reflect the needs of society across cultures?
- Why do we need to represent numbers using exponents
- What is special about the "Laws of Exponents"?
- Why do we represent quantity in multiple ways?
- What makes a solution optimal?

### Students will know:

- Square root,
- Difference between rational and irrational numbers,
- Pythagorean theorem,
- radical expression,
- scientific notation

### Students will be able to:

- Students will be able to: multiply and divide expressions with negative exponents.
- Read and write numbers in scientific notation.
- Solve problems using square roots and the Pythagorean theorem. Students will know what exponents are.
- Divide using whole numbers,
- Evaluate and simplify expressions by combining like terms.

## Stage 2: Acceptable Evidence

**Transfer Task and Unit Assessments:**
Department Developed Performance Task and Unit Assessment

**Other Evidence:**
Formal:
- Providing written/oral response to the EQs
- Unit quizzes (approx. 2-3)
- Unit test

Informal:
- Daily warm-ups
- Homework
- Class discussion
- Exit cards

## Reference Materials

Big Ideas Math Support Materials
New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf
Khan Academy 7th Grade Math - Geometry - https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-geometry
Khan Academy 8th Grade Math- Geometry: https://www.khanacademy.org/math/cc-eighth-grade-math
Math Assessment Project Resources http://map.mathshell.org/

## Accommodations and Modifications

**Differentiation for Students with IEPs, 504s, and/or Students at Risk of Failure (IEP/504/RF)**
1. Preferential Seating
2. Allow for movement breaks, as necessary
3. Provide visual cues for orally presented information when possible
4. Extended time on tests, quizzes, and projects, as necessary
5. Partial credit for incomplete work
6. Provide study guides, if available
7. Provide class notes, if available
8. Provide assessments with fewer questions on page
9. Breakdown tasks into manageable units
10. Provide a word bank, if possible, for short answer or fill-in tasks on assignments and tests
11. Periodically review notes for accuracy and completeness
12. Teachers will reword, clarify, or repeat instructions or items on assignments and/or tests as needed.
13. Student will be redirected when necessary
14. Provide frequent feedback and check often for understanding
15. Modify homework, tests, or quizzes as necessary
16. Test and quiz questions to be read aloud as necessary
17. Allow use of calculator, multiplication table, manipulatives as necessary

**Differentiation for English Language Learners**
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Provide word banks / word walls
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Allow students to use eDictionaries
- Avoid slang and idiomatic expressions.
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Sensory Supports (Real-life objects, Manipulatives, Pictures & photographs, Illustrations, Diagrams, & drawings, Magazines & newspapers, Physical activities, Videos & films, Broadcasts, Models & figures)
- Provide Graphic Supports (Charts, Graphic organizers, Tables, Graphs, Timelines, Number lines)
- Provide Interactive Supports(Pair or Partner work, Group work, Peer Mentor)
- Simplify the language, format, and directions of the assessment
- Accept correct answers on test or worksheets in any written form such as lists, phrases, or using inventive spelling
- Allow editing and revision before grading
- Design projects and assessment for student that require reduced sentence or paragraph composition
- Give alternative homework or class work assignments suitable to the student's linguistic ability for activities and assessments
- Utilize alternate reading assignments/materials at the student's reading level.
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- Assist student in building a picture file of key vocabulary (Pics4Learning, Webster's Visual Dictionary Online, ClipArt Etc, Shahi Visual Dictionary)
- When showing video use Closed Captioning. Some videos also allow for a slower replay so the speech is not as fast.
- Provide wait-time sufficient for English language learners who are trying to translate terms while formulating an explanation - Sufficient wait time is often said to be about 7-10 seconds
- Check for understanding consistently - ask students one-on-one what their questions are, monitor their progress on independent work and redirect as needed. They may not understand or be hesitant to verbalize what they do not understand at first, so monitor and give examples.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally)

**Additional Resources:**
- 20 strategies to Support EAL Children
- What English Language Learners Wish Teachers Knew - Education Week
- A Starting Point: Tips and resources for working with ESL newcomer

**Differentiation for Enrichment:**
1. Provide more challenging math tasks
2. Focus on the overall trends, patterns and themes rather than small details and facts
3. Study problems that do not have a clear solution
4. Offer leveled projects
5. Allow students to create their own problems
6. Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
7. Encourage students to explore concepts in depth and encourage independent studies or investigations.
8. Reduced amounts of drill and practice

**Additional Resources:**
- Serving Gifted Students in General Ed Classrooms
- Practical Recommendations and Interventions: Gifted Student

| **Unit 3: Solving Equations & Inequalities** | **Unit Duration: 6 weeks** |
|---|---|

## Stage 1: Desired Results

### Established Goals (NJSLS):

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.4.A Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

7.EE.B.4.B Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, *and describe the solutions*.

8.EE.C.7 Solve linear equations in one variable.
  a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers)
  b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

### Interdisciplinary Standards (NJSLS):

MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object

MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence

RH.6-8.5. Describe how a text presents information (e.g., sequentially, comparatively, causally).

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

### Technology Integration (NJSLS 8):

**8.2.8.E.4** Use appropriate terms in conversation

**8.2.8.C.4** Identify the steps in the design process that would be used to solve a designated problem.

**8.2.8.E.3** Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.

### 21st Century Skills Integration (NJSLS 9):

CLKS1 Act as a responsible and contributing community member and employee.

CLKS4 Demonstrate creativity and innovation.

CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them.

CLKS8 Use technology to enhance productivity, increase collaboration and communicate effectively.

CLKS9 Work productively in teams while using cultural/global competence.

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

### Transfer Goal:

Students will be able to independently use their learning of number properties to write and/or solve any linear equation or inequality regardless of the form or the number of steps.
Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

| **Students will understand that:** | **Essential Questions:** |
|---|---|
| • Students will understand that complex problems and expressions are easier to solve when simplified. <br> • With the development of mathematical reasoning, comes the recognition that many real life situations can be quantified <br> • Inequalities can simplify real world situations involving limitations | • Why do we simplify algebraic expressions? <br> • In what scenarios can algebra be utilized to solve problems in your life? <br> • How can you model and represent real world situations involving inequalities? <br> • How can change be described mathematically? |

| **Students will know:** | **Students will be able to:** |
|---|---|
| • coefficient, <br> • constant, <br> • variable, <br> • classify, <br> • like terms/unlike terms, <br> • basic properties of numbers, <br> • monomials/polynomials, <br> • order of operations, <br> • expression/equations, <br> • simplify, <br> • evaluate | • Use the Distributive Property to simplify expressions. <br> • Identify and combine like terms. <br> • Solve addition, subtraction, multiplication, and division equations. <br> • Solve 2-step equations. <br> • Write and solve two-step equations. <br> • Write and solve equations to find the cost of different pizzas. <br> • Solve multi-step equations. <br> • Solve equations with variables on both sides. <br> • Identify equations that are identities and have no solution. <br> • Solve equations with fractions and decimals. <br> • Use addition, subtraction, multiplication and division to solve inequalities. <br> • Solve multi-step inequalities <br> • Write and solve multi-step inequalities. |

## Stage 2: Acceptable Evidence

| **Transfer Task and Unit Assessments:** | **Other Evidence:** |
|---|---|
| Department Developed Performance Task and Unit Assessment | Formal: <br> • Providing written/oral response to the EQs <br> • Unit quizzes (approx. 2-3) <br> • Unit test <br> Informal: <br> • Daily warm-ups |

- Homework
- Class discussion
- Exit cards

## Reference Materials

Big Ideas Math Support Materials
New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf
Khan Academy 7th Grade Math - Geometry - https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-geometry
Khan Academy 8th Grade Math- Geometry: https://www.khanacademy.org/math/cc-eighth-grade-math
Math Assessment Project Resources http://map.mathshell.org/

## Accommodations and Modifications

### Differentiation for Students with IEPs, 504s, and/or Students at Risk of Failure (IEP/504/RF)

1. Preferential Seating
2. Allow for movement breaks, as necessary
3. Provide visual cues for orally presented information when possible
4. Extended time on tests, quizzes, and projects, as necessary
5. Partial credit for incomplete work
6. Provide study guides, if available
7. Provide class notes, if available
8. Provide assessments with fewer questions on page
9. Breakdown tasks into manageable units
10. Provide a word bank, if possible, for short answer or fill-in tasks on assignments and tests
11. Periodically review notes for accuracy and completeness
12. Teachers will reword, clarify, or repeat instructions or items on assignments and/or tests as needed.
13. Student will be redirected when necessary
14. Provide frequent feedback and check often for understanding
15. Modify homework, tests, or quizzes as necessary
16. Test and quiz questions to be read aloud as necessary
17. Allow use of calculator, multiplication table, manipulatives as necessary

### Differentiation for English Language Learners

- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Provide word banks / word walls
- Prepare and distribute advance notes
- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Allow students to use eDictionaries
- Avoid slang and idiomatic expressions.
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Sensory Supports (Real-life objects, Manipulatives, Pictures & photographs, Illustrations, Diagrams, & drawings, Magazines & newspapers, Physical activities, Videos & films, Broadcasts, Models & figures)
- Provide Graphic Supports (Charts, Graphic organizers, Tables, Graphs, Timelines, Number lines)
- Provide Interactive Supports(Pair or Partner work, Group work, Peer Mentor)
- Simplify the language, format, and directions of the assessment
- Accept correct answers on test or worksheets in any written form such as lists, phrases, or using inventive spelling
- Allow editing and revision before grading
- Design projects and assessment for student that require reduced sentence or paragraph composition
- Give alternative homework or class work assignments suitable to the student's linguistic ability for activities and assessments
- Utilize alternate reading assignments/materials at the student's reading level.
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- Assist student in building a picture file of key vocabulary (Pics4Learning, Webster's Visual Dictionary Online, ClipArt Etc, Shahi Visual Dictionary)
- When showing video use Closed Captioning. Some videos also allow for a slower replay so the speech is not as fast.
- Provide wait-time sufficient for English language learners who are trying to translate terms while formulating an explanation - Sufficient wait time is often said to be about 7-10 seconds
- Check for understanding consistently - ask students one-on-one what their questions are, monitor their progress on independent work and redirect as needed. They may not understand or be hesitant to verbalize what they do not understand at first, so monitor and give examples.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally)

### Additional Resources:

- 20 strategies to Support EAL Children
- What English Language Learners Wish Teachers Knew - Education Week
- A Starting Point: Tips and resources for working with ESL newcomer

### Differentiation for Enrichment:

1. Provide more challenging math tasks
2. Focus on the overall trends, patterns and themes rather than small details and facts
3. Study problems that do not have a clear solution
4. Offer leveled projects
5. Allow students to create their own problems
6. Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
7. Encourage students to explore concepts in depth and encourage independent studies or investigations.
8. Reduced amounts of drill and practice

### Additional Resources:

- Serving Gifted Students in General Ed Classrooms
- Practical Recommendations and Interventions: Gifted Student

| Unit 4: Functions | Unit Duration: 10 weeks |
|---|---|

## Stage 1: Desired Results

### Established Goals (NJSLS):

**8.F.1**- Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

**8.F.2**- Compare properties (e.g., rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change

**8.F.3**-Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

**8.F.4**-Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

**8.F.5**- Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

**8.SP.1**- Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

**8.SP.2** –Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g., line of best fit) by judging the closeness of the data points to the line

**8.SP.3**- Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

**8.SP.4**- Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

### Interdisciplinary Standards (NJSLS):

MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object

MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RH.6-8.5. Describe how a text presents information (e.g., sequentially, comparatively, causally).

NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

### Technology Integration (NJSLS 8):

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.

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

8.2.8.C.4 Identify the steps in the design process that would be used to solve a designated problem.

8.2.8.E.3 Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.

8.2.8.E.4 Use appropriate terms in conversation

### 21st Century Skills Integration (NJSLS 9):

CLKS1 Act as a responsible and contributing community member and employee.

CLKS4 Demonstrate creativity and innovation.

CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them.

CLKS8 Use technology to enhance productivity, increase collaboration and communicate effectively.

CLKS9 Work productively in teams while using cultural/global competence.

9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

### Transfer Goal:

Students will be able to _independently_ use their learning to make sense of the relationship between 2 variables.

Students use algebraic methods to solve problems by exploring, modeling, and describing patterns and relations involving numbers, shapes, data, and graphs. They communicate their reasoning used to solve these problems

### Students will understand that:

- Functional relationships can be expressed in real contexts, graphs, algebraic equations, tables, and words; each representation of a given function is simply a different way of expressing the same idea.
- A function can be used to express a cause and effect relationship between two variables.

### Essential Questions:

- How do you know when a pattern is linear or nonlinear?
- How can you use a linear function to describe a linear pattern?
- What does the rate of change mean in terms of a given situation?
- How do you identify linear relationships?
- How do you interpret linear relationships in tables, graphs, and equations
- How are patterns of change related to the behavior of functions?

### Students will know:

- The connection between linear equations and patterns
- How to make decisions about linear relationships using information given in tables and graphs to solve problems
- Recognize problem situations in which two or more variables have a linear relationship
- Relation, function, domain, range, slope, linear, x-intercept, y-intercept, scatterplot, correlation, slope-intercept form

### Students will be able to:

- Construct tables, graphs, and equations to express linear relationships.
- Translate information about linear relations given in a table, a graph, or an equation to one of the other forms
- To solve problems and make decisions about linear relationships using information given in tables and graphs.
- Construct tables, graphs, and equations to express linear relationships.
- Recognize problem situations in which two or more variables have a linear relationship to each other

## Stage 2: Acceptable Evidence

| | |
|---|---|
| **Transfer Task and Unit Assessments:**<br>Department Developed Performance Task and Unit Assessment | **Other Evidence:**<br>Formal:<br>● Providing written/oral response to the EQs<br>● Unit quizzes (approx. 2-3)<br>● Unit test<br>Informal:<br>● Daily warm-ups<br>● Homework<br>● Class discussion<br>● Exit cards |

## Reference Materials

Big Ideas Math Support Materials
New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf
Khan Academy 7th Grade Math - Geometry - https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-geometry
Khan Academy 8th Grade Math- Geometry: https://www.khanacademy.org/math/cc-eighth-grade-math
Math Assessment Project Resources http://map.mathshell.org/

## Accommodations and Modifications

### Differentiation for Students with IEPs, 504s, and/or Students at Risk of Failure (IEP/504/RF)
1. Preferential Seating
2. Allow for movement breaks, as necessary
3. Provide visual cues for orally presented information when possible
4. Extended time on tests, quizzes, and projects, as necessary
5. Partial credit for incomplete work
6. Provide study guides, if available
7. Provide class notes, if available
8. Provide assessments with fewer questions on page
9. Breakdown tasks into manageable units
10. Provide a word bank, if possible, for short answer or fill-in tasks on assignments and tests
11. Periodically review notes for accuracy and completeness
12. Teachers will reword, clarify, or repeat instructions or items on assignments and/or tests as needed.
13. Student will be redirected when necessary
14. Provide frequent feedback and check often for understanding
15. Modify homework, tests, or quizzes as necessary
16. Test and quiz questions to be read aloud as necessary
17. Allow use of calculator, multiplication table, manipulatives as necessary

### Differentiation for English Language Learners
● Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
● Substitute a hands-on activity or use of different media in projects for a written activity
● Provide word banks / word walls
● Prepare and distribute advance notes
● Provide model sentence frames and sentence starters for both oral responses and written responses
● Provide additional time to complete assessments and assignments
● Model and use gestures to aid in understanding
● Model tasks by giving one or two examples before releasing students to work independently
● Present instructions both verbally and visually
● Simplify written and verbal instructions
● Allow students to use eDictionaries
● Avoid slang and idiomatic expressions.
● Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
● Provide Sensory Supports (Real-life objects, Manipulatives, Pictures & photographs, Illustrations, Diagrams, & drawings, Magazines & newspapers, Physical activities, Videos & films, Broadcasts, Models & figures)
● Provide Graphic Supports (Charts, Graphic organizers, Tables, Graphs, Timelines, Number lines)
● Provide Interactive Supports(Pair or Partner work, Group work, Peer Mentor)
● Simplify the language, format, and directions of the assessment
● Accept correct answers on test or worksheets in any written form such as lists, phrases, or using inventive spelling
● Allow editing and revision before grading
● Design projects and assessment for student that require reduced sentence or paragraph composition
● Give alternative homework or class work assignments suitable to the student's linguistic ability for activities and assessments
● Utilize alternate reading assignments/materials at the student's reading level.
● Allow for alternate seating for proximity to peer helper or teacher as necessary
● Assist student in building a picture file of key vocabulary (Pics4Learning, Webster's Visual Dictionary Online, ClipArt Etc, Shahi Visual Dictionary)
● When showing video use Closed Captioning. Some videos also allow for a slower replay so the speech is not as fast.
● Provide wait-time sufficient for English language learners who are trying to translate terms while formulating an explanation - Sufficient wait time is often said to be about 7-10 seconds
● Check for understanding consistently - ask students one-on-one what their questions are, monitor their progress on independent work and redirect as needed. They may not understand or be hesitant to verbalize what they do not understand at first, so monitor and give examples.
● Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally)

### Additional Resources:
● 20 strategies to Support EAL Children
● What English Language Learners Wish Teachers Knew - Education Week
● A Starting Point: Tips and resources for working with ESL newcomer

### Differentiation for Enrichment:
1. Provide more challenging math tasks
2. Focus on the overall trends, patterns and themes rather than small details and facts
3. Study problems that do not have a clear solution
4. Offer leveled projects
5. Allow students to create their own problems
6. Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
7. Encourage students to explore concepts in depth and encourage independent studies or investigations.
8. Reduced amounts of drill and practice

### Additional Resources:
● Serving Gifted Students in General Ed Classrooms
● Practical Recommendations and Interventions: Gifted Student

| Unit 5: Solving Systems of Equations | Unit Duration: 4-5 weeks |
|---|---|

## Stage 1: Desired Results

### Established Goals (NJSLS):
**8.EE.C.8** Analyze and solve pairs of simultaneous linear equations.
a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspections.
c. Solve Real-world and mathematical problems leading to two linear equations in two variables.

### Interdisciplinary Standards (NJSLS):
NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence
RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

### Technology Integration (NJSLS 8):
**8.2.8.A.1** Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
**8.2.8.A.3** Investigate a malfunction in any part of a system and identify its impacts.
**8.2.8.C.4** Identify the steps in the design process that would be used to solve a designated problem.
**8.2.8.E.3** Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
**8.2.8.E.4** Use appropriate terms in conversation
**8.2.8.D.5** Explain the impact of resource selection and the production process in the development of a common or technological product or system.

### 21st Century Skills Integration (NJSLS 9):
CLKS1 Act as a responsible and contributing community member and employee.
CLKS4 Demonstrate creativity and innovation.
CLKS5 Utilize critical thinking to make sense of problems and persevere in solving them.
CLKS8 Use technology to enhance productivity, increase collaboration and communicate effectively.
CLKS9 Work productively in teams while using cultural/global competence.
9.4.8.CI.3: Examine challenges that may exist in the adoption of new ideas
9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.
9.4.8.TL.5: Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.
9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

### Transfer Goal:
Students will be able to solve a system of equations using two different methods: graphing, and substitution. They will learn how to set up systems of equations to solve problems in the real world and they will be able to choose the best method depending on the system of the equations.

### Students will understand that:
- DIfferent problem solving scenarios demand different problem solving techniques
- A linear equation in two variables can represent relationships between quantities
- Some real-world situations can be translated into a system of equations
- The solution of a system of equations is the ordered pair that satisfies both equations.
- Some equations must be transformed before the system can be solved
- Some systems have no solution; some have infinite solutions

### Essential Questions:
- Which is the best method to solve a system of equations?
- How do you set up a system of equations to solve a real life problem?
- How do you solve a system of equations?
- What are the advantages and disadvantages of the two methods used to solve a system of equations?
- How can variables and equations be used to represent the relationship between quantities?

### Students will know:
- systems of linear equations,
- consistent independent system,
- inconsistent system,
- consistent dependent system.

### Students will be able to:
- Represent a word problem with a system of equations.
- Solve a system of equations by using the graphing and the substitution methods. They will understand the advantages, and disadvantages of these methods.
- Read and interpret a real-world situation and develop a system of equations that accurately reflects the situation.

## Stage 2: Acceptable Evidence

### Transfer Task and Unit Assessments:
Department Developed Performance Task and Unit Assessment

### Other Evidence:
Formal:
- Providing written/oral response to the EQs
- Unit quizzes (approx. 2-3)
- Unit test

Informal:
- Daily warm-ups
- Homework
- Class discussion
- Exit cards

## Reference Materials

Big Ideas Math Support Materials
New Jersey State Learning Standards- https://www.state.nj.us/education/cccs/2016/math/standards.pdf
Khan Academy 7th Grade Math - Geometry - https://www.khanacademy.org/math/cc-seventh-grade-math/cc-7th-geometry
Khan Academy 8th Grade Math- Geometry: https://www.khanacademy.org/math/cc-eighth-grade-math
Math Assessment Project Resources http://map.mathshell.org/

## Accommodations and Modifications

### Differentiation for Students with IEPs, 504s, and/or Students at Risk of Failure (IEP/504/RF)
1. Preferential Seating
2. Allow for movement breaks, as necessary
3. Provide visual cues for orally presented information when possible
4. Extended time on tests, quizzes, and projects, as necessary

### Differentiation for English Language Learners
- Provide alternate ways for the student to respond (verbal/pictographic answers instead of written)
- Substitute a hands-on activity or use of different media in projects for a written activity
- Provide word banks / word walls
- Prepare and distribute advance notes

### Differentiation for Enrichment:
1. Provide more challenging math tasks
2. Focus on the overall trends, patterns and themes rather than small details and facts
3. Study problems that do not have a clear solution
4. Offer leveled projects
5. Allow students to create their own problems

5. Partial credit for incomplete work
6. Provide study guides, if available
7. Provide class notes, if available
8. Provide assessments with fewer questions on page
9. Breakdown tasks into manageable units
10. Provide a word bank, if possible, for short answer or fill-in tasks on assignments and tests
11. Periodically review notes for accuracy and completeness
12. Teachers will reword, clarify, or repeat instructions or items on assignments and/or tests as needed.
13. Student will be redirected when necessary
14. Provide frequent feedback and check often for understanding
15. Modify homework, tests, or quizzes as necessary
16. Test and quiz questions to be read aloud as necessary
17. Allow use of calculator, multiplication table, manipulatives as necessary

- Provide model sentence frames and sentence starters for both oral responses and written responses
- Provide additional time to complete assessments and assignments
- Model and use gestures to aid in understanding
- Model tasks by giving one or two examples before releasing students to work independently
- Present instructions both verbally and visually
- Simplify written and verbal instructions
- Allow students to use eDictionaries
- Avoid slang and idiomatic expressions.
- Speak clearly and naturally, and try to enunciate words, especially their ending sounds.
- Provide Sensory Supports (Real-life objects, Manipulatives, Pictures & photographs, Illustrations, Diagrams, & drawings, Magazines & newspapers, Physical activities, Videos & films, Broadcasts, Models & figures)
- Provide Graphic Supports (Charts, Graphic organizers, Tables, Graphs, Timelines, Number lines)
- Provide Interactive Supports(Pair or Partner work, Group work, Peer Mentor)
- Simplify the language, format, and directions of the assessment
- Accept correct answers on test or worksheets in any written form such as lists, phrases, or using inventive spelling
- Allow editing and revision before grading
- Design projects and assessment for student that require reduced sentence or paragraph composition
- Give alternative homework or class work assignments suitable to the student's linguistic ability for activities and assessments
- Utilize alternate reading assignments/materials at the student's reading level.
- Allow for alternate seating for proximity to peer helper or teacher as necessary
- Assist student in building a picture file of key vocabulary (Pics4Learning, Webster's Visual Dictionary Online, ClipArt Etc, Shahi Visual Dictionary)
- When showing video use Closed Captioning. Some videos also allow for a slower replay so the speech is not as fast.
- Provide wait-time sufficient for English language learners who are trying to translate terms while formulating an explanation - Sufficient wait time is often said to be about 7-10 seconds
- Check for understanding consistently - ask students one-on-one what their questions are, monitor their progress on independent work and redirect as needed. They may not understand or be hesitant to verbalize what they do not understand at first, so monitor and give examples.
- Support use of student's primary language by translating key words in directions, or key vocabulary terms or giving students opportunities to communicate in their primary language (written or orally)

## Additional Resources:
- 20 strategies to Support EAL Children
- What English Language Learners Wish Teachers Knew - Education Week
- A Starting Point: Tips and resources for working with ESL newcomer

6. Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning.
7. Encourage students to explore concepts in depth and encourage independent studies or investigations.
8. Reduced amounts of drill and practice

## Additional Resources:
- Serving Gifted Students in General Ed Classrooms
- Practical Recommendations and Interventions: Gifted Student