

FOUNDATIONS OF MATHEMATICS GRADES 11-12

THE EWING PUBLIC SCHOOLS
2099 Pennington Road
Ewing, NJ 08618

Board Approval Date: December 16, 2019
Written by: EHS Mathematics Department

Michael Nitti
Superintendent

In accordance with The Ewing Public Schools' Policy 2230, Course Guides, this curriculum has been reviewed and found to be in compliance with all policies and all affirmative action criteria.

Table of Contents

	<u>Page</u>
Course Description and Rationale	3
21 st Century Life and Skills	4
Scope of Essential Learning:	
Unit 1: Types of Numbers and Numeration System (11 Days)	7
Unit 2: Ratios, Proportions and Percents (11 Days)	10
Unit 3: Geometric Properties (11 Days)	13
Unit 4: Principles of Measurement (11 Days)	16
Unit 5: Statistical Distribution (11 Days)	19
Unit 6: Inductive Reasoning (11 Days)	22
Unit 7: Algebraic Concepts (11 Days)	25
Sample Standards Integration	28

Course Description and Rationale

This course will provide at-risk New Jersey Student Learning Assessment (NJSLA) math students with an intensive program of preparation for the NJSLA and Portfolio Review Process. It is designed to promote confidence in taking standardized tests in mathematics. In addition, it will strengthen the students' ability in the mathematics standards covered in the NJSLA.

The New Jersey Student Learning Assessment is a graduation test required of all New Jersey public school students. It includes mathematics from all the mathematics standards. The NJSLA has been developed to show whether or not a student has a satisfactory level of achievement in specified areas. This assessment is a test of the students' ability to do higher order thinking and to integrate topics of mathematics.

The Ewing Public Schools' Math Vision

The Ewing Public Schools will deliver an instructional program in mathematics where students are actively engaged in the discovery of math concepts and are applying these concepts in ways that they find meaningful and relevant.

Ewing students will be mathematical thinkers who can reason, communicate and solve problems.

Ultimately, Ewing students will master and will be able to utilize these math concepts and skills throughout their lives.

21st Century Skills - During this course, students will work on developing, to an age appropriate level, the following 21st century skills:

Career Readiness Pathways:

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP12. Work productively in teams while using cultural global competence.

Learning and Innovation Skills

Creativity and Innovation

Think Creatively

- Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Work Creatively with Others

- View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

CRITICAL THINKING AND PROBLEM SOLVING

Reason Effectively

- Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation

Use Systems Thinking

- Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems

Make Judgments and Decisions

- Effectively analyze and evaluate evidence, arguments, claims and beliefs
- Synthesize and make connections between information and arguments
- Interpret information and draw conclusions based on the best analysis

Solve Problems

- Identify and ask significant questions that clarify various points of view and lead to better solutions

COMMUNICATION AND COLLABORATION

Communicate Clearly

- Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact
- Communicate effectively in diverse environments (including multi-lingual)

Collaborate with Others

- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

Information, Media, and Technology Skills

Informational Literacy

Access and Evaluate Information

- Evaluate information critically and competently

Use and Manage Information

- Use information accurately and creatively for the issue or problem at hand

Life and Career Skills

Social and Cross-Cultural Skills

Interact Effectively with Others

- Know when it is appropriate to listen and when to speak

Work Effectively in Diverse Teams

- Respond open-mindedly to different ideas and values

Be Responsible to Others

- Act responsibly with the interests of the larger community in mind

Technology Integration

8.1 Educational Technology

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

ELA Integration:

SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on *grades 11–12 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

- A. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well reasoned exchange of ideas.
 - B. Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and establish individual roles as needed.
 - C. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
 - D. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.
- SL.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11-12.3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

Unit 1: Types of Numbers and Numeration System (11 Days)

Why Is This Unit Important?

This introductory unit will serve to develop an understanding of types of numbers, our numeration system, and the ways they are used and applied in real-world situations. The big idea embedded through this unit is: The number system.

Enduring Understandings: Students will understand:

- How to understand types of Real Numbers
- How to use and calculate Powers, Roots, Exponents and Scientific Notation
- How to evaluate Absolute Value
- Properties of Arithmetic Operations and Equivalence Relations
- Properties of Primes, Factors and Multiples

Essential Questions:

- What is a rational number? What is an irrational number?
- What is an exponent? How is scientific notation expressed as a product of two factors? When do you use scientific notation?
- What is the meaning of absolute values?
- What are the properties of arithmetic operations and equivalence relations?
- What is the difference between prime and composite numbers?
- When would you need to use least common multiples and greatest common factors?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Order numbers from least to greatest
- Plot rational and irrational numbers on a number line
- Utilize divisibility rules
- Calculate quotients by use of scientific notation
- Use least common multiples and greatest common factors in real life situations
- Decide if two whole numbers are relatively prime

Acquired Skills: After studying the material of this unit, students will be able to:

- Identify rational and irrational numbers
- Identify prime and composite numbers
- Find least common multiples and greatest common factors
- Solve absolute value problems
- Convert scientific notation to extended form
- Apply properties of arithmetic operations and equivalent relations

Differentiation:

Enrichment:

- Find palindromes that are between two specific large numbers
- Find two sets of three numbers that satisfies specific clues

Supplement:

- Run backwards, rewind odometers, discuss distances that cannot be negative
- Reflexive, Symmetric and Transitive Properties of parallel and perpendicular lines
- Divide up varieties of flowers based on greatest common factors

Assessments:

Formative Assessments:

- Assessment Checklist for Absolute Value
- Assessment Checklist for Primes, Factors, and Multiples
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Identify rational and irrational numbers
 - Identify prime and composite numbers
 - Find least common multiples and greatest common factors
 - Solve absolute value problems
 - Convert scientific notation to extended form
 - Apply properties of arithmetic operations and equivalent relations

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.N-Q.1-3
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Write the numbers 1-100 and cross out all multiples of 2, 3, 4, 5, etc.
- Students measure negative distances with a ruler

In-Class Activities:

- Round table discussions using rubrics
- List all factors of 2, 3, 4, 5, 6, etc.
- List all multiples of 5, 8, 11, 14, 20, etc.

Technology:

- Internet
- Calculators

Websites:

- <http://www.math-aids.com/Factors/>
- <http://www.worksheetworks.com/math/exponents/scientific.html>
- <http://www.mathworksheets4kids.com/absolute-value/graph-inequality-1.pdf>
- <http://www.onlinemathlearning.com/transitive-reflexive-property.html>

Unit 2: Ratios, Proportions and Percents (11 Days)

Why Is This Unit Important?

This unit will serve to develop the application of ratios, proportions and percents to a variety of situations. The big idea embedded through this unit is: Percents in real world situations.

Enduring Understandings: Students will understand:

- How to represent ratios
- How to find a unit rate
- How to evaluate percent and its relationship to a number to 100
- How to apply the formula to find percentages

Essential Questions:

- What is a rate? What is a proportion?
- What is a percent?
- How is percent used in simple interest, compound interest, discount and tax?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Find a reduced price
- Find a percent increase
- Find and compare unit rates
- Find a percent of an already reduced item
- Know the equivalent fraction or decimal to percent

Acquired Skills: After studying the material of this unit, students will be able to:

- Solve a proportion
- Calculate commission
- Calculate and apply tax rates
- Find the individual shares of a company whose shares are proportionally different
- Use a map and scale to find distance
- Compare costs per unit

Differentiation:

Enrichment:

- Decide to which order, if any, discounts should be applied first
- Compare sales and percent decreases of those sales to find the most cost efficient item

Supplement:

- Go through sales circulars and compare percent decrease
- Use grocery circulars to find the best unit rates of specific items
- Design a scale model of your bedroom using feet to inches

Assessments:

Formative Assessments:

- Assessment Checklist for Ratios
- Assessment Checklist for Unit Rates
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Solve a proportion
 - Calculate commission
 - Calculate and apply tax rates
 - Find the individual shares of a company whose shares are proportionally different
 - Use a map and scale to find distance
 - Compare costs per unit

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.N-Q.1-3
- NJSLS.N-RN.1-3
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Compare boys to girls in class and then compare boys to girls in the whole school population
- Measure the classroom in feet and draw the outline of the classroom in inches using a fixed scale

In-Class Activities:

- Compare sales circulars
- Present model of their bedroom in scaled-down version
- Create their own sales advertisement and anticipate cost of each item after percents are applied

Technology:

- Internet
- Calculators
- Rulers

Websites:

- http://www.ezschoo1.com/EZSheets/Number_Sense/Ratio/index.html
- <http://www.kutasoftware.com/FreeWorksheets/PreAlgWorksheets/Proportion%20Word%20Problems.pdf>
- http://www.mathgoodies.com/worksheets/pdf/unit10_wks1.pdf
- <http://www.mathgoodies.com/lessons/percent/change.html>

Unit 3: Geometric Properties (11 Days)

Why Is This Unit Important?

This unit will serve to develop the properties and relationships in geometry. The big idea embedded through this unit is: Spatial sense and geometry.

Enduring Understandings: Students will understand:

- How to describe geometric terms
- How to identify properties of geometric figures
- How to identify geometric relationships of lines and angles
- How to apply inductive and deductive reasoning

Essential Questions:

- What is geometry?
- What is inductive reasoning? What is deductive reasoning?
- What are the names of two-dimensional figures?
- What are the names of three-dimensional figures?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Draw geometric figures
- Calculate complementary and supplementary angles
- Classify quadrilaterals
- Identify angle relationships of parallel lines
- Differentiate between inductive and deductive reasoning

Acquired Skills: After studying the material of this unit, students will be able to:

- Visualize and represent three dimensional figures
- Classify triangles
- Identify shapes
- Calculate the angle measure inside a polygon

Differentiation:

Enrichment:

- Cut out cardboard nets to create three dimensional figures
- Geoboards
- Explain why a pentagon cannot exist with specific measurements

Supplement:

- Use interlocking blocks to create three dimensional solids
- Use a clock to describe supplementary and complementary angles

Assessments:

Formative Assessments:

- Assessment Checklist for Geometric Relationships
- Assessment Checklist for Deductive and Inductive Reasoning
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Visualize and represent three dimensional figures
 - Classify triangles
 - Identify shapes
 - Calculate the angle measure inside a polygon

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.G-CO.1-13
- NJSLS.G-SRT.1-5
- NJSLS.G-GPE.4-6
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Describe all the shapes they can name
- Draw two parallel streets in town and describe what is on each corner

In-Class Activities:

- Use protractors to make hexagons with specific measurements
- Discover measurements inside a polygon by drawing diagonals from one vertex
- Draw top, left and right views of three-dimensional solids

Technology:

- Internet
- Calculators
- Rulers

Websites:

- <http://www.kutasoftware.com/FreeWorksheets/GeoWorksheets/3-Parallel%20Lines%20and%20Transversals.pdf>
- http://www.math-aids.com/cgi/angles_complementary.pl?dec=0&probs=12&language=0&memo=&answer=1&x=148&y=2
- http://www.superteacherworksheets.com/geometry/solid-figures2_TZNDZ.pdf
- http://www.superteacherworksheets.com/geometry/nets1_GEOMN.pdf

Unit 4: Principles of Measurement (11 Days)

Why Is This Unit Important?

This unit will serve to develop the application of measurement and geometry to solve problems using direct and indirect measurement. The big idea embedded through this unit is: Measurement in real world situations.

Enduring Understandings: Students will understand:

- How to find perimeter and circumference
- How to find area and surface area
- How to find volume
- How to use standard and non standard units of measure
- How to apply Pythagorean Theorem and Trigonometry

Essential Questions:

- What is perimeter? What is area?
- How is surface area different than volume?
- What is right triangle trigonometry?
- When would Pythagorean Theorem be needed?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Find perimeter and area of any figure
- Find the surface area and volume of any solid
- Find all sides of a right triangle
- Find all angles of a triangle

Acquired Skills: After studying the material of this unit, students will be able to:

- Solve Pythagorean Theorem
- Calculate composite area
- Calculate volume
- Convert units of measurement

Differentiation:

Enrichment:

- Find the area outside on figure but inside another
- Find the volume outside on solid but inside another
- Use the Pythagorean Theorem in a three-dimensional room

Supplement:

- Use sand and hollowed out solids to discover the volume formula of a square pyramid when only given a square prism
- Convert standard measurement to non standard measurement, using both units
- Go outside to use Pythagorean Theorem on the track

Assessments:

Formative Assessments:

- Assessment Checklist for Perimeter and Area
- Assessment Checklist for Surface Area and Volume
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Solve Pythagorean Theorem
 - Calculate composite area
 - Calculate volume
 - Convert units of measurement

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.F-TF.8
- NJSLS.G-C.1-4
- NJSLS.G-SRT.4-11
- NJSLS.G-GPE.7
- NJSLS.G-GMD.3-4
- NJSLS.G-MG.1
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Count the number of square units in a rectangle before discovering the formula
- Measure the classroom in feet and measure the diagonal to discover the Pythagorean Theorem

In-Class Activities:

- Fill solids with water to distinguish between volume formulas
- Use square units to see if one figure has the same area
- 'Walk' around the room with yarn and compare perimeters around desks

Technology:

- Internet
- Calculators
- Rulers

Websites:

- <http://www.mathsisfun.com/activity/discover-lengths.html>
- <http://www.mathsisfun.com/activity/garden-area.html>
- <http://www.mathsisfun.com/activity/discover-capacity.html>
- <http://www.mathsisfun.com/pythagoras.html>

Unit 5: Statistical Distribution (11 Days)

Why Is This Unit Important?

This unit will serve to develop the application of statistical distributions to a variety of situations. The big idea embedded through this unit is: Data analysis in real-world situations.

Enduring Understandings: Students will understand:

- How to read a set of data in a correlation
- How to make a scatterplot
- How to solve a direct variation
- How to apply discrete probability distribution

Essential Questions:

- What is a scatterplot? What is a correlation?
- What is discrete probability distribution?
- How is direct and inverse variation different?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Create and evaluate a scatterplot from a data source
- Evaluate the relationship between hours worked and wages paid as a direct variation
- Evaluate the relationship between rate and time as an inverse variation
- Create and evaluate a normal distribution

Acquired Skills: After studying the material of this unit, students will be able to:

- Make a scatterplot
- Solve a direct variation
- Solve an inverse variation
- Find the probability of an event using a normal distribution

Differentiation:

Enrichment:

- Develop peer-based data to use in a scatterplot; i.e., mother's age and age of student
- Create normal distribution curve given the grades on one test in the class

Supplement:

- Use *USA Today* to gather information from unique graphs
- Ask another teacher for a class set of grades and make a scatterplot
- Discuss situations using direct variation and inverse variation

Assessments:

Formative Assessments:

- Assessment Checklist for Variation
- Assessment Checklist for Probability Distribution
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Make a scatterplot
 - Solve a direct variation
 - Solve an inverse variation
 - Find the probability of an event using a normal distribution

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.S-ID.1-4,6-7
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Measure foot size of classmates and use simple probability before developing normal distribution
- Use yarn to measure the diameters and circumferences of different circles and make a scatterplot

In-Class Activities:

- Compare scatterplots
- Chart amount paid versus hours worked
- Discuss different situations using positive correlation, negative correlation and no correlation

Technology:

- Internet
- Calculators
- Rulers

Websites:

- <http://www.shodor.org/interactivate/activities/ScatterPlot/>
- <http://worksheets.tutorvista.com/direct-variation-worksheet.html>
- <http://www.schools.pinellas.k12.fl.us/educators/tec/mincheym/IV.ppt/sld001.htm>

Unit 6: Inductive Reasoning (11 Days)

Why Is This Unit Important?

This unit will serve to develop the application of patterns, sequences and series to a variety of situations. The big idea embedded through this unit is: Patterns in real-world situations.

Enduring Understandings: Students will understand:

- How to find patterns in exponents
- How to list numbers in arithmetic and geometric sequences
- How to list the Fibonacci numbers
- How to apply the formulas of sequences and series

Essential Questions:

- What is a sequence? What is a series?
- What is Fibonacci?
- How are arithmetic and geometric different?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Find the n th term in a sequence or series
- Find the distance a ball travels after six bounces during which it bounces $\frac{2}{3}$ of its height each time
- Find the value after something is depreciated
- Extrapolate a visual pattern
- Know the number of seats in an auditorium using arithmetic sequences

Acquired Skills: After studying the material of this unit, students will be able to:

- List numbers in arithmetic and geometric sequences
- Calculate depreciation
- Evaluate a visual pattern
- Find the units digit in the sequence $81, 82, 8^3, 8^4, \dots 8^n$
- Find the 30th term of the arithmetic sequence $4, 9, 12, 19, 24, \dots$

Differentiation:

Enrichment:

- Decide if an event is a finite or infinite geometric series
- Find the sum of the first 50 odd numbers

Supplement:

- Use M&Ms to depict an arithmetic sequence
- Find patterns in geometric shapes

Assessments:

Formative Assessments:

- Assessment Checklist for Series
- Assessment Checklist for Sequences
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks:

- Tasks on:
 - List numbers in arithmetic and geometric sequences
 - Calculate depreciation
 - Evaluate a visual pattern
 - Find the units digit in the sequence $81, 82, 8^3, 8^4, \dots 8^n$
 - Find the 30th term of the arithmetic sequence 4, 9, 12, 19, 24, ...

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.F-IF.1-3
- NJSLS.F-LE.1-5
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Use M&Ms to depict an arithmetic sequence
- Drop a ball and measure its height and distance traveled after each bounce

In-Class Activities:

- List an arithmetic and geometric sequence and find the sum
- Present model of their bedroom in scaled down version
- Graph 10% decrease and 10% increase of a specific number; continue for another 3 rounds

Technology:

- Internet
- Calculators
- Rulers

Websites:

- <http://www.kutasoftware.com/FreeWorksheets/Alg2Worksheets/Arithmetic%20Sequences.pdf>
- <http://www.kutasoftware.com/FreeWorksheets/Alg2Worksheets/Geometric%20Sequences.pdf>
- [http://www.dadsworksheets.com/v1/Worksheets/Number%20Patterns/Fibonacci Patterns 3 V4.html](http://www.dadsworksheets.com/v1/Worksheets/Number%20Patterns/Fibonacci%20Patterns%203%20V4.html)
- <http://www.mathkinz.com/Geometry/GeometryPattern.html>

Unit 7: Algebraic Concepts (11 Days)

Why Is This Unit Important?

This unit will serve to develop the application of algebraic concepts and processes to a variety of situations. The big idea embedded through this unit is: Algebra in real-world situations.

Enduring Understandings: Students will understand:

- How to simplify like terms
- How to solve a linear equation
- How to evaluate an expression
- How to graph a linear inequality

Essential Questions:

- What is an equation? What is an inequality?
- What is an open sentence?

Acquired Knowledge: After studying the material of this unit, students will be able to:

- Solve a linear equation
- Graph a linear inequality
- Find and compare quantities
- Write the expressions for twice a number and five and twice the sum of a number and five

Acquired Skills: After studying the material of this unit, students will be able to:

- Solve an equation
- Graph an inequality
- Balance a visual representation of algebra
- Evaluate using order of operations

Differentiation:

Enrichment:

- Write an expression for the perimeter and area of a rectangle with dimensions $2x$ and $x + 3$
- Graph a number line that shows the graph of $-3 < x < 4$

Supplement:

- Use temperature (below freezing) and how it rises per hour
- Use algebra to solve areas of trapezoids
- Write step by step instructions for solving $4(x + 3) - 6 = 18$

Assessments:

Formative Assessments:

- Assessment Checklist for Expressions
- Assessment Checklist for Equations
- Assessment Checklist for Inequalities
- Teacher's observation of students at work; anecdotal records
- Individual conferences and group discussions
- Students' recording sheets

Summative Assessments:

- Teacher's observation of students at work
- Individual conferences
- Chapter Assessments

Benchmarks

- Tasks on:
 - Solve an equation
 - Graph an inequality
 - Balance a visual representation of algebra
 - Evaluate using order of operations

Alternative Assessments:

- Modified tasks and assessment rubrics
- Performance-based assessment tasks

List of Applicable New Jersey Student Learning Standards (NJSLS) Covered in This Unit:

- NJSLS.A-CED.1-4
- NJSLS.A-REI.1-4
- NJSLS.MP.1-8

Suggested Learning Experiences and Instructional Activities:

Anticipatory Sets:

- Substitute different values for x : $2x + 7$
- Use a balance and boxes and pyramids to figure out weight of a box

In-Class Activities:

- Determine cost of renting a car for a month with monthly fee and per mile expenses
- Discuss why everyone starts with a different number, follows an algebraic method, but then ends up with same answer
- Determine that if a train leaves Monroe towards Jackson 200 miles away at 40 mph and represent how far the train must still travel to reach Jackson if already traveled x miles

Technology:

- Internet
- Calculators
- Rulers

Websites:

- <http://www.kutasoftware.com/free.html>
- <http://www.kutasoftware.com/FreeWorksheets/Alg1Worksheets/Graphing%20Linear%20Inequalities.pdf>
- <http://www.hsunlimited.com/worksheets/simple-exponents>
- <http://www.mathworksheetsgo.com/downloads/algebra/linear-equation/linear-equation-word-problems-worksheet.pdf>

Sample Standards Integration

21st Century Skills & Career Readiness Practices

CRP4. Communicate clearly and effectively and with reason.

For example, in Unit 7 students will justify their reasoning in their car rental analysis project

CRP6. Demonstrate creativity and innovation.

For example, in Unit 3 students will use solution modeling to show differing views of a 3-dimensional solid

CRP7. Employ valid and reliable research strategies.

For example, in Unit 6 students will analyze, interpret and present series and sequences found in real world scenarios.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

For example, in Unit 4 students will work to derive volumes equations.

CRP12. Work productively in teams while using cultural global competence.

For example, in Unit 2 students will work in small teams to develop a sales brochure.

8.1 Educational Technology

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

For example, in Unit 3 students will access, manage, evaluate, and synthesize information to develop a salary analysis.

Interdisciplinary Connections

SL.11-12.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on *grades 11–12 topics, texts, and issues*, building on others' ideas and expressing their own clearly and persuasively.

A. Come to discussions prepared, having read and researched material under

study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well reasoned exchange of ideas.

- B. Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and establish individual roles as needed.
- C. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.
- D. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. SL.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11-12.3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

These standards are met throughout the course. For example, in Unit 1 students will discuss their solutions from a round table discussion on utilizing rubrics.