



# Park Hill School District

Building Successful Futures • Each Student • Every Day

## High School Topics Algebra IA Curriculum

**Course Description:** The course is designed to cover the first half of the Algebra I curriculum. This course will include operations on real numbers, solve equations and inequalities, analyze various forms of functions (linear, quadratic, absolute value, exponential and sequences) and use introductory statistics to organize and make predictions.

### Scope and Sequence:

| Timeframe                            | Unit                           | Instructional Topics                                                                                                                                                           |
|--------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 46 class periods<br>68 class periods | Linear Equations and Functions | Topic 1: Number Sense and Operations<br>Topic 2: Solving Equations<br>Topic 3: Graphing Linear Equations<br>Topic 4: Writing Linear Equations<br>Topic 5: Systems of Equations |
| 5 class periods<br>10 class periods  | One-Variable Inequalities      | Topic 1: 1 Variable Inequalities                                                                                                                                               |
| 10-11 class periods                  | Exponentials                   | Topic 1: Properties of Exponents<br>Topic 2: Radical Expressions                                                                                                               |
| 9 class periods                      | Polynomials                    | Topic 1: Polynomials                                                                                                                                                           |
| 10 class periods                     | Data and Patterns              | Topic 1: Data<br>Topic 2: Patterns                                                                                                                                             |

*\*This document contains the entire High School Topics Algebra IA curriculum that is taught in a regular education setting. Items that are highlighted in yellow have been designated as priority information that should be taught in the HS Topics Algebra IA class.*

# Unit 1: Linear Equations and Functions

**Subject:** Algebra 1A

**Grade:** 8, 9, 10, 11, 12

**Name of Unit:** Linear Equations and Functions

**Length of Unit:** 46 class periods 68 class periods

**Overview of Unit:** Students will start by learning the fundamentals of algebra including number sense and operations. They will then learn how to solve, write, graph and compare linear equations and functions. Students will also use various methods of solving systems of linear equations.

## Priority Standards for unit:

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.CED.A.2: **Create and graph linear**, quadratic and exponential equations in two variables.
- Alg1.LQE.A.3: **Construct linear**, quadratic and exponential equations given graphs, verbal descriptions or tables.
- Alg1.IF.C.1: Graph functions expressed symbolically and identify and interpret key features of the graph.
- Alg1.DS.A.6: Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.
- Alg1.REI.C.1: Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.
- Alg1.IF.A.1: Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.
- Represent a function using function notation.
- Understand that the graph of a function labeled  $f$  is the set of all ordered pairs  $(x, y)$  that satisfy the equation  $y=f(x)$ .
- Alg1.IF.B.1: Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.

### Supporting Standards for unit:

- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
- Identify, label and use appropriate units of measure within a problem.
- Convert units and rates.
- Use units within problems.
- Choose and interpret the scale and the origin in graphs and data displays.
- Alg1.BF.A.1: Analyze the effect of translations and scale changes on functions.
- Alg1.IF.B.2: Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
- Alg1.IF.B.4: Interpret the parameters of a linear or exponential function in terms of the context.
- Alg1.IF.C.3: Compare the properties of two functions given different representations.
- Alg1.IF.B.3: Determine the average rate of change of a function over a specified interval and interpret the meaning.
- Alg1.DS.A.1: Analyze and interpret graphical displays of data.
- Alg1.IF.C.2: Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context.
- Alg1.CED.A.4 Solve literal equations and formulas for a specified variable that highlights a quantity of interest.
- Alg1.DS.A.7: Determine and interpret the correlation coefficient for a linear association.
- Alg1.DS.A.5: Construct a scatter plot of bivariate quantitative data describing how the variables are related; determine and use a function that models the relationship.
- Alg1.IF.A.2: Use function notation to evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- Alg1.REI.B.3: Justify that the technique of linear combination produces an equivalent system of equations.
- ISTE-COMPUTATIONAL THINKER.5.C - break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

| <b>Unwrapped Concepts (Students need to know)</b>                                                                                                                                    | <b>Unwrapped Skills (Students need to be able to do)</b> | <b>Bloom's Taxonomy Levels</b> | <b>Webb's DOK</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------|-------------------|
| the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.                                                                    | Interpret                                                | Understand                     | 2                 |
| that linear functions change by equal differences over equal intervals.                                                                                                              | Determine                                                | Analyze                        | 2                 |
| <b>linear</b> , quadratic and exponential equations in two variables.                                                                                                                | Create                                                   | Create                         | 3                 |
| <b>linear</b> , quadratic and exponential equations in two variables.                                                                                                                | Graph                                                    | Apply                          | 2                 |
| <b>linear</b> , quadratic and exponential equations given graphs, verbal descriptions or tables.                                                                                     | Construct                                                | Create                         | 3                 |
| functions expressed symbolically and                                                                                                                                                 | Graph                                                    | Apply                          | 2                 |
| key features of the graph.                                                                                                                                                           | Identify                                                 | Remember                       | 1                 |
| key features of the graph.                                                                                                                                                           | Interpret                                                | Understand                     | 2                 |
| the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.                                                                         | Interpret                                                | Understand                     | 3                 |
| that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.                                                            | Explain                                                  | Understand                     | 2                 |
| how each step taken when solving an <b>equation</b> or inequality in one variable creates an equivalent <b>equation</b> or inequality that has the same solution(s) as the original. | Explain                                                  | Understand                     | 2                 |
| that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.                                                 | Understand                                               | Understand                     | 2                 |
| a function using function notation.                                                                                                                                                  | Represent                                                | Remember                       | 1                 |
| that the graph of a function labeled $f$ is the set of all ordered pairs $(x, y)$ that satisfy the equation $y=f(x)$ .                                                               | Understand                                               | Understand                     | 2                 |
| tables, graphs and verbal descriptions                                                                                                                                               | Use                                                      | Analyze                        | 2                 |
| key characteristics of a function that models the relationship between two quantities.                                                                                               | Interpret                                                | Understand                     | 3                 |
| <b>equations</b> and inequalities in one variable                                                                                                                                    | Create                                                   | Create                         | 3                 |

**Essential Questions:**

1. How do you evaluate algebraic expressions?
2. How do you solve linear equations with variables on both sides?
3. How do you represent functions?
4. How do you solve systems of linear equations?
5. How do you write a linear equation given two points?

**Enduring Understanding/Big Ideas:**

1. Substitute a value into the expression and follow order of operations.
2. Get the variables together on one side; isolate the variable by using inverse operations.
3. By using Tables, Rules, Graphs.
4. By using graphing, substitution and elimination methods.
5. Find the slope, then write equation in all three forms.

**Unit Vocabulary:**

| <b>Academic Cross-Curricular Words</b>                                                                  | <b>Content/Domain Specific</b>                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ratios<br>Rate of change<br>Solve<br>Variable<br>Independent variable<br>Dependent variable<br>Constant | Algebraic expression<br>Equation<br>Linear<br>Domain<br>Range<br>Function<br>Proportions<br>Evaluate<br>Simplify<br>Parallel<br>Perpendicular<br>Solution<br>Slope<br>Y-intercept<br>Standard form<br>Point slope form<br>Slope intercept form<br>Line of Best Fit/Trend Line<br>Scatter plot<br>Direct variation<br>Rational Number<br>Irrational Number<br>Real Number System |

|  |                                                                                                                                                                              |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Whole Number<br>Integer<br>Percent of Change<br>Absolute Value<br>Distribute<br>Like terms<br>Coefficient<br>Square root<br>Perfect square<br>Identity<br>System of equation |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Resources for Vocabulary Development:** textbook

## Topic 1: Number Sense and Operations

### **Engaging Experience 1**

**Title:** Number Sense Game

**Suggested Length of Time:** 20 minutes

#### **Standards Addressed**

*Priority:*

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.

*Supporting:*

- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.

**Detailed Description/Instructions:** The students will cut out numbers from the real number system and sort them according to their number classification (integer, whole, irrational, rational). The instructions and examples can be found in Secondary Math Curriculum Group in Schoology.

**Bloom's Levels:** Understand

**Webb's DOK:** 2

### **Engaging Experience 2**

**Title:** Student white board with distributive property and combining like terms

**Suggested Length of Time:** 25 minutes RESOURCE MODIFICATION: 1 day

#### **Standards Addressed**

*Priority:*

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.DS.A.6: Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.

*Supporting:*

- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.

**Detailed Description/Instructions:** Teacher will provide problems; students will solve those on individual white boards so teacher can check for understanding.

**Bloom's Levels:** Understand

**Webb's DOK:** 2

## Topic 2: Solving Equations

### **Engaging Experience 1**

**Title:** Lotus Diagram - Solving Equations

**Suggested Length of Time:** 25-30 minutes **RESOURCE MODIFICATION:** 2 days

### **Standards Addressed**

#### *Priority:*

- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.

**Detailed Description/Instructions:** Students will choose a value for  $x$ , then create a problem for each of the 8 boxes (one-step, two step, multi-step, word problem, etc.) where the solution to the problem is the value they choose for  $x$ . This resource can be found in Secondary Math Curriculum Group in Schoology.

**Bloom's Levels:** Understand

**Webb's DOK:** 2

## Topic 3: Graphing Linear Equations

### **Engaging Experience 1**

**Title:** Find Your Partner

**Suggested Length of Time:** 20 minutes RESOURCE MODIFICATION: 1 day

### **Standards Addressed**

#### *Priority:*

- Alg1.CED.A.2: **Create and graph linear** equations in two variables.
- Alg1.DS.A.6: Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.
- Alg1.IF.C.1: Graph functions expressed symbolically and identify and interpret key features of the graph.
- Alg1.REI.C.1: Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.

#### *Supporting:*

- Alg1.CED.A.4: Solve literal equations and formulas for a specified variable that highlights a quantity of interest.

**Detailed Description/Instructions:** Pass out a half-sheet of paper with an equation or graph on it to every student. Have students identify important information from the equation or graph they were given. Then allow students time to wander around the room and find their “partner” with the equivalent equation or graph.

**Bloom’s Levels:** Create, Understand

**Webb’s DOK:** 3

## Topic 4: Writing Linear Equations

### **Engaging Experience 1**

**Title:** Foldable

**Suggested Length of Time:** 15-20 mins **RESOURCE MODIFICATION:** 1-2 days

### **Standards Addressed**

#### *Priority:*

- Alg1.LQE.A.3: Construct linear equations given graphs, verbal descriptions or tables.
- Alg1.IF.B.1: Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
- Alg1.IF.A.1: Understand that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.
  - c. Represent a function using function notation.
  - d. Understand that the graph of a function labeled  $f$  is the set of all ordered pairs  $(x, y)$  that satisfy the equation  $y=f(x)$ .

#### *Supporting:*

- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  - d. Choose and interpret the scale and the origin in graphs and data displays.

**Detailed Description/Instructions:** The class will create a foldable together. The foldable will be split up into 3 parts: point-slope form, slope intercept form, standard form. Students will be writing equations given a slope and a point, and two points, in all three forms. They will also write the equation in function notation.

**Bloom's Levels:** Create

**Webb's DOK:** 3

## Topic 5: Systems of Equations

### **Engaging Experience 1**

**Title:** Alien Systems Picture

**Suggested Length of Time:** 20-30 minutes

### **Standards Addressed**

*Priority:*

- Alg1.REI.B.1: Solve a system of linear equations algebraically and/or graphically.

*Supporting:*

- Alg1.REI.B.3: Justify that the technique of linear combination produces an equivalent system of equations.

**Detailed Description/Instructions:** Students will solve systems of equations problems and find their answers in the answer bank. Each answer will correspond with a certain letter. Students find that letter in the “picture” and color it a certain way. The resulting picture will show an image. This resource can be found in Secondary Math Curriculum Group in Schoology.

**Bloom’s Levels:** Analyze

**Webb’s DOK:** 3

## Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

**The Big Race:** Students will be given data on six children who are participating in a race on tricycles. With this given information the students will create a graph to represent the data and write equations in slope-intercept form. After completing the graph, the students will work to analyze the data to answer questions such as who won, places tied, speed of the rider, and the total distance traveled. This activity can be found on in the Secondary Math Curriculum Group in Schoology. Students will need to track test scores throughout the course to be used in the Engaging Scenario in Unit 5. RESOURCE MODIFICATION: additional scaffolding and support for students may be required.

## Summary of Engaging Learning Experiences for Topics

| Topic                       | Engaging Experience Title                                               | Description                                                                                                                                                                                                                                                                                             | Suggested Length of Time |
|-----------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Number Sense and Operations | Number Sense Game                                                       | The students will cut out numbers from the real number system and sort them according to their number classification (integer, whole, irrational, rational). The instructions and examples can be found in Secondary Math Curriculum Group in Schoology.                                                | 20 minutes               |
| Number Sense and Operations | Student white board with distributive property and combining like terms | Teacher will provide problems; students will solve those on individual white boards so teacher can check for understanding.                                                                                                                                                                             | 25 minutes               |
| Solving Equations           | Lotus Diagram - Solving Equations                                       | Students will choose a value for $x$ , then create a problem for each of the 8 boxes (one-step, two step, multi-step, word problem, etc.) where the solution to the problem is the value they choose for $x$ . This resource can be found in Secondary Math Curriculum Group in Schoology.              | 25-30 minutes            |
| Graphing Linear Equations   | Find Your Partner                                                       | Pass out a half-sheet of paper with an equation or graph on it to every student. Have students identify important information from the equation or graph they were given. Then allow students time to wander around the room and find their “partner” with the equivalent equation or graph.            | 20 minutes               |
| Writing Linear Equations    | Foldable                                                                | The class will create a foldable together. The foldable will be split up into 3 parts: point-slope form, slope intercept form, standard form. Students will be writing equations given a slope and a point, and two points, in all three forms. They will also write the equation in function notation. | 15-20 minutes            |

|                                     |                                      |                                                                                                                                                                                                                                                                                                                                                     |                          |
|-------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <p>Systems<br/>of<br/>Equations</p> | <p>Alien<br/>Systems<br/>Picture</p> | <p>Students will solve systems of equations problems and find their answers in the answer bank. Each answer will correspond with a certain letter. Students find that letter in the “picture” and color it a certain way. The resulting picture will show an image. This resource can be found in Secondary Math Curriculum Group in Schoology.</p> | <p>20-30<br/>minutes</p> |
|-------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|

## Unit 2: One-Variable Inequalities

**Subject:** Algebra 1A

**Grade:** 8, 9, 10, 11, 12

**Name of Unit:** One-Variable Inequalities

**Length of Unit:** 5 class periods **RESOURCE MODIFICATION:** 10 class periods

**Overview of Unit:** Students will write, solve and graph simple one-variable inequalities. Students will also write, solve and graph compound inequalities.

**Priority Standards for unit:**

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

**Supporting Standards for unit:**

- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  - a. Identify, label and use appropriate units of measure within a problem.
  - b. Convert units and rates.
  - c. Use units within problems.
  - d. Choose and interpret the scale and the origin in graphs and data displays.
- ISTE-EMPOWERED LEARNER1.C - use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- ISTE-GLOBAL COLLABORATOR.7.C - contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

| Unwrapped Concepts (Students need to know)                                                                        | Unwrapped Skills (Students need to be able to do) | Bloom's Taxonomy Levels | Webb's DOK |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-------------------------|------------|
| the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions. | Interpret                                         | Understand              | 2          |

|                                                                                                                                                                        |         |            |   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------|---|
| equation and inequalities in one variable and use them to model and/solve problems.                                                                                    | Create  | Create     | 3 |
| how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original. | Explain | Understand | 2 |

**Essential Questions:**

1. How do you solve and graph a multi-step linear inequality?
2. How do you solve and graph a compound inequality?
3. How do you solve and graph an absolute value inequality?
4. How do you determine the solution to a linear inequality with two variables?

**Enduring Understanding/Big Ideas:**

1. Isolate the variable by using inverse operations. Graph on a number line.
2. Use the rules for and/or to isolate the variable. Graph on a number line.
3. Isolate the absolute value part, then use the rules for compound inequalities.
4. Graph the lines and shade the appropriate region.

**Unit Vocabulary:**

| Academic Cross-Curricular Words | Content/Domain Specific                                                   |
|---------------------------------|---------------------------------------------------------------------------|
|                                 | Inequality<br>Compound Inequality<br>Absolute Value<br>Absolute Deviation |

**Resources for Vocabulary:** textbook

# Topic 1: 1 Variable Inequalities

## **Engaging Experience 1**

**Title:** Desmos - One Variable Inequalities

**Suggested Length of Time:** 30 minutes RESOURCE MODIFICATION: 1 day

### **Standards Addressed**

#### *Priority:*

- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

#### *Supporting:*

- ISTE-EMPOWERED LEARNER1.C - use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.

**Detailed Description/Instructions:** Students will work through the Desmos activity to deepen their understanding of solving and graphing inequalities in one variable. This resource can be found in Secondary Math Curriculum Group in Schoology.

**Bloom's Levels:** Create

**Webb's DOK:** 2

## **Engaging Experience 2**

**Title:** Inequalities Row Game

**Suggested Length of Time:** 15-20 minutes RESOURCE MODIFICATION: 1 day

### **Standards Addressed**

#### *Priority:*

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

#### *Supporting:*

- ISTE-GLOBAL COLLABORATOR.7.C - contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

**Detailed Description/Instructions:** Students complete a worksheet with a partner - one is partner A and one is partner B. One student solves and graphs their inequality - then compares their answer with their partner. Even though they started out with different questions, their answers (and graphs) should be the same. If they agree, they move on to the next problem. This resource can be found in Secondary Math Curriculum Group in Schoology.

**Bloom's Levels:** Understand, Create

**Webb's DOK:** 2, 3

## Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

**You're the Teacher:** You are the math teacher of an Algebra 1A class. Your students just took a test on solving and graphing inequalities and you are beginning to grade them. A fictional student assessment will be graded by the "teacher" with feedback included on each question that is missed. At the end of grading, the "teacher" must create 3 additional questions that will help the student practice what he or she missed.

## Summary of Engaging Learning Experiences for Topics

| Topic                 | Engaging Experience Title          | Description                                                                                                                                                                                                                                                                                                                                                                                                              | Suggested Length of Time |
|-----------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Variable Inequalities | Desmos - One Variable Inequalities | Students will work through the Desmos activity to deepen their understanding of solving and graphing inequalities in one variable. This resource can be found in Secondary Math Curriculum Group in Schoology.                                                                                                                                                                                                           | 30 minutes               |
| Variable Inequalities | Inequalities Row Game              | Students complete a worksheet with a partner - one is partner A and one is partner B. One student solves and graphs their inequality - then compares their answer with their partner. Even though they started out with different questions, their answers (and graphs) should be the same. If they agree, they move on to the next problem. This resource can be found in Secondary Math Curriculum Group in Schoology. | 15-20 minutes            |

## Unit 3: Exponentials

**Subject:** Algebra 1A

**Grade:** 8, 9, 10, 11, 12

**Name of Unit:** Exponentials

**Length of Unit:** 10-11 class periods

**Overview of Unit:** Students will use properties of exponents to simplify monomial expressions. Students will also learn to simplify radical expressions.

**Priority Standards for unit:**

- Alg1.NQ.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.
- Supporting Standards for unit:
- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  - a. Identify, label and use appropriate units of measure within a problem.
  - b. Convert units and rates.
  - c. Use units within problems.
  - d. Choose and interpret the scale and the origin in graphs and data displays.
- Alg1.BF.A.1: Analyze the effect of translations and scale changes on functions.
- Alg1.IF.B.2: Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
- Alg1.IF.B.4: Interpret the parameters of a linear or exponential function in terms of the context.
- Alg1.IF.C.3: Compare the properties of two functions given different representations.
- Alg1.IF.B.3: Determine the average rate of change of a function over a specified interval and interpret the meaning.
- Alg1.DS.A.1: Analyze and interpret graphical displays of data.

| <b>Unwrapped Concepts (Students need to know)</b>                                                                                          | <b>Unwrapped Skills (Students need to be able to do)</b> | <b>Bloom's Taxonomy Levels</b> | <b>Webb's DOK</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------|-------------------|
| expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1 | Rewrite                                                  | Remember                       | 1                 |

**Essential Questions:**

1. How do you apply properties of exponents to simplify expressions?
2. How are exponents and scientific notation related?
3. How do you simplify a radical expression?

**Enduring Understanding/Big Ideas:**

1. Use the properties of exponents to decide whether to add, subtract, multiply.
2. Scientific notation uses powers of 10 to write very large or very small numbers.
3. By finding a perfect square factor.

**Unit Vocabulary:**

| Academic Cross-Curricular Words | Content/Domain Specific                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|                                 | Exponent<br>Base<br>Scientific notation<br>Growth<br>Decay<br>Radical<br>Square root<br>Compound interest<br>Pythagorean theorem |

**Resources for Vocabulary Development:** textbook

## Topic 1: Properties of Exponents

### **Engaging Experience 1**

**Title:** Exponents Tarsia Puzzle

**Suggested Length of Time:** 15-20 minutes

### **Standards Addressed**

*Priority:*

- Alg1.NQ.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.

**Detailed Description/Instructions:** Students will cut out the puzzle pieces and then work to put the puzzle pieces together - matching question and answer together. This resource can be found in Secondary Math Curriculum Group in Schoology.

**Bloom's Levels:** Remember

**Webb's DOK:** 1

## Topic 2: Radical Expressions

### **Engaging Experience 1**

**Title:** Student whiteboard practice to simplify radical expressions

**Suggested Length of Time:** 25 minutes

### **Standards Addressed**

*Priority:*

- Alg1.NQ.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.

**Detailed Description/Instructions:** Teacher will provide problems; students will solve those on individual white boards so teacher can check for understanding.

**Bloom's Levels:** Remember

**Webb's DOK:** 1

## Engaging Scenario

### **Engaging Scenario**

**Exponents Project:** Students will create a project to show mastery of the Rules/Laws of Exponents. Students can create a display either on a poster or digitally, create and perform a song, or create a children's storybook. Refer to the Secondary Math Curriculum Group in Schoology for more information.

**Rubric for Engaging Scenario:** the rubric for this activity can be found in the Secondary Math Curriculum group in Schoology.

## Summary of Engaging Learning Experiences for Topics

| <b>Topic</b>            | <b>Engaging Experience Title</b>                            | <b>Description</b>                                                                                                                                                                                           | <b>Suggested Length of Time</b> |
|-------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Properties of Exponents | Exponents Tarsia Puzzle                                     | Students will cut out the puzzle pieces and then work to put the puzzle pieces together - matching question and answer together. This resource can be found in Secondary Math Curriculum Group in Schoology. | 15-20 minutes                   |
| Radical Expressions     | Student whiteboard practice to simplify radical expressions | Teacher will provide problems; students will solve those on individual white boards so teacher can check for understanding.                                                                                  | 25 minutes                      |

## Unit 4: Polynomials

**Subject:** Algebra 1A

**Grade:** 8, 9, 10, 11, 12

**Name of Unit:** Polynomials

**Length of Unit:** 9 class periods

**Overview of Unit:** Students will learn how to classify, add, subtract, and multiply polynomial expressions. They will also learn the beginning steps of factoring and how to solve equations in factored form.

### Priority Standards for unit:

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.SSE.A.2: Analyze the structure of polynomials to create equivalent expressions or equations.
- Alg1.APR.A.1: Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.

### Supporting Standards for unit:

- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
- Identify, label and use appropriate units of measure within a problem.
- Convert units and rates.
- Use units within problems.
- Choose and interpret the scale and the origin in graphs and data displays.
- Alg1.BF.A.1: Analyze the effect of translations and scale changes on functions.
- Alg1.IF.B.2: Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
- Alg1.IF.B.4: Interpret the parameters of a linear or exponential function in terms of the context.
- Alg1.IF.C.3: Compare the properties of two functions given different representations.
- Alg1.IF.B.3: Determine the average rate of change of a function over a specified interval and interpret the meaning.
- Alg1.DS.A.1: Analyze and interpret graphical displays of data.

- Alg1.IF.C.2: Translate between different but equivalent forms of a function to reveal and explain properties of the function and interpret these in terms of a context.

| <b>Unwrapped Concepts (Students need to know)</b>                                                                 | <b>Unwrapped Skills (Students need to be able to do)</b> | <b>Bloom's Taxonomy Levels</b> | <b>Webb's DOK</b> |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------|-------------------|
| the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions. | Interpret                                                | Understand                     | 2                 |
| the structure of polynomials                                                                                      | Analyze                                                  | Analyze                        | 2                 |
| equivalent expressions or equations                                                                               | Create                                                   | Create                         | 2                 |
| polynomials                                                                                                       | Add, subtract and multiply                               | Apply                          | 2                 |
| that polynomials follow the same general rules of arithmetic and are closed under these operations.               | Understand                                               | Understand                     | 3                 |

**Essential Questions:**

1. How do you classify polynomials?
2. How do you simplify polynomial expressions?
3. How do you factor polynomials?

**Enduring Understanding/Big Ideas:**

1. Number of terms (monomial, binomial, trinomial) and degree (linear, quadratic, cubic)
2. Add, subtract, multiply, divide
3. GCF, difference of squares, grouping, factoring trinomials, perfect square trinomials

**Unit Vocabulary:**

| <b>Academic Cross-Curricular Words</b> | <b>Content/Domain Specific</b>                                                                                                 |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                                        | Polynomial<br>Monomial<br>Binomial<br>Trinomial<br>Linear<br>Quadratic<br>Cubic<br>Degree<br>Like terms<br>Leading coefficient |

|  |                                                                                                                                                                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Roots<br/>Vertical motion model<br/>Factor<br/>Perfect square trinomial<br/>Terms<br/>Rational expressions<br/>Difference of squares<br/>Greatest common factor<br/>Quadratic formula<br/>Completing the square<br/>max/min value<br/>Parabola<br/>Vertex<br/>zeros/roots/x-intercepts/solutions<br/>Axis of symmetry<br/>Discriminant</p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Resources for Vocabulary Development:** textbook

## Topic 1: Polynomials

### **Engaging Experience 1**

**Title:** Polynomial Dice Activity

**Suggested Length of Time:** 20-30 minutes

### **Standards Addressed**

*Priority:*

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.SSE.A.2: Analyze the structure of polynomials to create equivalent expressions or equations.
- Alg1.APR.A.1: Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.

**Detailed Description/Instructions:** Students will use a Smart Notebook file to roll two different colored dice. A chart will be provided which relates each of the two-colored dice to a certain polynomial expression. Teachers will decide whether the students will use those two polynomials to add, subtract, or multiply. This Smart Notebook file can be found in the Secondary Math Curriculum course located in Schoology.

**Bloom's Levels:** Apply, Understand

**Webb's DOK:** 2, 3

## Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

**FACEing Math Polynomial Operations:** Students complete the polynomial problems (adding, subtracting, multiplying, factoring) on a worksheet and find the answer from the two choices. The answer designates which “item” they draw on the attached face. The result is a picture of a face created and colored.

## Summary of Engaging Learning Experiences for Topics

| <b>Topic</b> | <b>Engaging Experience Title</b> | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                              | <b>Suggested Length of Time</b> |
|--------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Polynomials  | Polynomial Dice Activity         | Students will use a Smart Notebook file to roll two different colored dice. A chart will be provided which relates each of the two-colored dice to a certain polynomial expression. Teachers will decide whether the students will use those two polynomials to add, subtract, or multiply. This Smart Notebook file can be found in the Secondary Math Curriculum course located in Schoology. | 20-30 minutes                   |

## Unit 5: Data and Patterns

**Subject:** Algebra 1A

**Grade:** 8, 9, 10, 11, 12

**Name of Unit:** Data and Patterns

**Length of Unit:** 10 class periods

**Overview of Unit:** Students will learn how to find measures of center. Students will display data by using various methods. They will also learn how to write the recursive, explicit and continuous forms of a sequence.

### Priority Standards for unit:

- Alg1.DS.A.8: Distinguish between correlation and causation.

### Supporting Standards for unit:

- Alg1.LQE.B.1: Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms.
- Alg1.LQE.B.2: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers.
- Alg1.LQE.B.3: Find the terms of sequences given an explicit or recursive formula.
- ISTE-EMPOWERED LEARNER1.A - articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.

| Unwrapped Concepts<br>(Students need to know) | Unwrapped Skills<br>(Students need to be able to do) | Bloom's<br>Taxonomy<br>Levels | Webb's<br>DOK |
|-----------------------------------------------|------------------------------------------------------|-------------------------------|---------------|
| between correlation and causation             | Distinguish                                          | Analyze                       | 2             |

### Essential Questions:

- How do you find the distance and midpoint between two points?
- How do you represent a sequence in different forms?

### Enduring Understanding/Big Ideas:

- Use the distance and midpoint formulas.
- Determine whether it is arithmetic or geometric, then write the recursive, explicit and continuous equations.

**Unit Vocabulary:**

| <b>Academic Cross-Curricular Words</b> | <b>Content/Domain Specific</b>                                                                                                                                                                                                                 |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        | Box and whisker<br>Stem and leaf<br>Scatter plot<br>Histogram<br>Mean<br>Median<br>Mode<br>Range<br>Outliers<br>Interquartile range<br>Sample<br>Frequency table<br>Recursive<br>Explicit<br>Continuous<br>Arithmetic<br>Geometric<br>Next-now |

**Resources for Vocabulary Development:** textbook

## Topic 1: Data

### **Engaging Experience 1**

**Title:** Around the Room Rotation Stations

**Suggested Length of Time:** 45 minutes

#### **Standards Addressed**

*Priority:*

- Alg1.DS.A.8: Distinguish between correlation and causation.

*Supporting:*

- Alg1.DS.A.3: Interpret differences in shape, center and spreads in the context of the data sets, accounting for possible effects of outliers.

**Detailed Description/Instructions:** Students will walk around the classroom/hallway solving measures of central tendency or finding the graph to match that measure. Once they find their solution they will need to search around the room/hallway to find their next equation.

**Bloom's Levels:** Analyze

**Webb's DOK:** 2

**Rubric:** Answer Key for questions with matching graph will need to teacher made.

## Topic 2: Patterns

### **Engaging Experience 1**

**Title:** Whiteboard Practice

**Suggested Length of Time:** 15 minutes

#### **Standards Addressed**

*Priority:*

- Alg1.DS.A.8: Distinguish between correlation and causation.

*Supporting:*

- Alg1.LQE.B.1: Write arithmetic and geometric sequences in recursive and explicit forms, and use them to model situations and translate between the two forms.
- Alg1.LQE.B.2: Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the set of integers.
- Alg1.LQE.B.3: Find the terms of sequences given an explicit or recursive formula.

**Detailed Description/Instructions:** Teacher will provide problems; students will write those on individual white boards so teacher can check for understanding.

**Bloom's Levels:** Analyze

**Webb's DOK:** 2

## Engaging Scenario

**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.) This scenario needs to start at the beginning of Algebra course. Students will track their assessment data throughout the course and display it using a bar graph. After the last assessment students will find the measures of central tendency for their data. Students will then display their data by using two different methods. Finally, students will create a PDSA in order to help them prepare for the Final Exam. A detailed description of this scenario can be found in Schoology.

## Summary of Engaging Learning Experiences for Topics

| <b>Topic</b> | <b>Engaging Experience Title</b>  | <b>Description</b>                                                                                                                                                                                                                           | <b>Suggested Length of Time</b> |
|--------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| Data         | Around the Room Rotation Stations | Students will walk around the classroom/hallway solving measures of central tendency or finding the graph to match that measure. Once they find their solution they will need to search around the room/hallway to find their next equation. | 45 minutes                      |
| Patterns     | Whiteboard Practice               | Teacher will provide problems; students will write those on individual white boards so teacher can check for understanding.                                                                                                                  | 15 minutes                      |

## Unit of Study Terminology

**Appendices:** All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

**Assessment Leveling Guide:** A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

**Big Ideas/Enduring Understandings:** Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

**Engaging Experience:** Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

**Engaging Scenario:** This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

**Essential Questions:** Engaging, open-ended questions that teachers can use to engage students in the learning.

**Priority Standards:** What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

**Supporting Standards:** Additional standards that support the learning within the unit.

**Topic:** These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

**Unit of Study:** Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

**Unit Vocabulary:** Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.