Seventh Grade Algebra
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use procedures to transform algebraic expressions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.A.1.1. Students are able to write and evaluate algebraic expressions using the set of whole numbers.** **Example:** Write and evaluate the expression needed to solve the problem: Mary's hockey team won twice as many games as they lost. They lost 5 games. How many games did they win? • Use replacement values for variables. Examples: 1) Evaluate $2x^2 + 7$ if $x = 4$ 2) Evaluate $\frac{8b}{a}$ if $a = 6$ and $b = 3$ • Use order of operations. Example: Evaluate $9a - (4b + 2c)$ if $a = 6, b = 3$, and $c = 7$
(Knowledge)	**7.A.1.2. Students are able to identify associative, commutative, distributive, and identity properties involving algebraic expressions.** **Examples**: Name the property shown by the statements in the problems below. 1) $5s + 9 = 9 + 5s$ 2) $(7a)b = 7(ab)$ 3) $22 \bullet 1 = 22$ 4) $x + 0 = x$ 5) $5(a + b) = 5a + 5b$ √ *Use the associative, commutative, distributive, and identity properties.*

Indicator 2: Use a variety of algebraic concepts and methods to solve equations and inequalities.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.A.2.1. Students are able to write and solve one-step 1st degree equations, with one variable, using the set of integers and inequalities, with one variable, using the set of whole numbers.** **Examples:** 1) Solve $-3x = 15$ 2) Solve $3x \geq 6$ **Examples:** Write and solve 1) Eight less than a number is –5. 2) The sum of a number and 6 is greater than 12. • Addition property of equality. • Multiplication property of equality. • Inverse operations.

Indicator 3: Interpret and develop mathematical models.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.A.3.1. Students are able to identify and graph ordered pairs on a coordinate plane and inequalities on a number line.** • Quadrants I-IV • Use a scatterplot to draw an approximate line of best fit in a coordinate plane.
(Application)	**7.A.3.2. Students are able to model and solve multi-step problems involving rates.** • Better buy Example: Which represents the least expensive price per candy bar? a. 3 candy bars for $ 1.00 b. 4 candy bars for $ 1.50 c. 5 candy bars for $ 2.00 d. 6 candy bars for $ 2.50 • Unit rates Example: Tell which unit rate is greater: Fred rollerblades 4 miles in 32 minutes. Eden rollerblades 2 miles in 18 minutes.

Indicator 4: Describe and use properties and behaviors of relations, functions, and inverses.

<table>
<tr><th>Bloom's Taxonomy Level</th><th>Standard, Supporting Skills, and Examples</th></tr>
<tr><td>(Application)</td><td>
7.A.4.1. Students are able to recognize one-step patterns using tables, graphs, and models and create one-step algebraic expressions representing the pattern.

Example:
1) Complete the table and write an algebraic expression for the given table.
<table>
<tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Y</td><td>7</td><td>14</td><td>21</td><td>?</td></tr>
</table>
Example:
2) Complete the table and write an algebraic expression for the given table.
<table>
<tr><td>X</td><td>Y</td></tr>
<tr><td>1</td><td>5</td></tr>
<tr><td>2</td><td>6</td></tr>
<tr><td>3</td><td>7</td></tr>
<tr><td>4</td><td>?</td></tr>
</table>

Identify arithmetic and geometric sequences.
Extend arithmetic and geometric sequences.
Example: Is this an arithmetic or geometric sequence or neither? Write the next three terms in the sequence.
3, 7, 11, 15, __ , __ , __ .

</td></tr>
</table>

Seventh Grade Algebra
Performance Descriptors

Advanced	**Seventh grade students performing at the advanced level:** • simulate situations using 1st degree algebraic statements using the set of whole numbers, in order to justify solution(s); • model and solve multi-step problems involving rates and justify the reasoning; • write the inequality statement.
Proficient	**Seventh grade students performing at the proficient level:** • write, simplify, and solve 1st degree algebraic statements using the set of whole numbers; • model and solve multi-step problems involving rates; • identify and graph ordered pairs on a coordinate plane and inequalities on a number line.
Basic	**Seventh grade students performing at the basic level:** • simplify and solve one-step 1st degree algebraic statements using the set of whole numbers; • find unit rates; • graph ordered pairs in Quadrant I on a coordinate plane.

Grade 7 Unpacked Math Standards – Algebra

7.A.1.1. Students are able to **write** and **evaluate** algebraic expressions using the set of whole numbers.

Webb level: 2
Bloom: Knowledge

Verbs Defined:
Write: write
Evaluate: find the value of

Key Terms Defined:
Algebraic expressions: combination of numbers, variables and operations
Set of whole numbers: counting numbers and 0 (0, 1, 2, 3…)

Teacher Speak:
Students are able to write and to evaluate (find the value of) algebraic expressions using the order of operations (excluding nested parentheses) on the set of whole numbers.

Student Speak:
I can:
*write algebraic expressions from words.
*find the value of (evaluate) an algebraic expression using a given value.

7.A.1.2. Students are able to **identify** associative, commutative, distributive, and identity properties involving algebraic expressions.

Webb Level: 1
Bloom: Knowledge

Verbs Defined:
Identify: recognize

Key Terms Defined:
Associative property: $3 + (n + 5) = (3 + n) + 5$ or $(3a)b = 3(ab)$
Commutative property: $5x + 9 = 9 + 5x$ or $xy = yx$
Distributive property: $2(x + 7) = 2x + 2(7)$
Identity property: $x + 0 = x$ or $1x = x$

Teacher Speak :
Students are able to identify (recognize) associative, commutative, distributive, and identity properties involving algebraic expressions.

Student Speak:
I can recognize (identify) the following properties involving algebraic expressions:
* $3 + (n + 5) = (3 + n) + 5$ or $(3a)b = 3(ab)$ (Associative property
* $5x + 9 = 9 + 5x$ or $xy = yx$ (Commutative property)
* $2(x + 7) = 2x + 2(7)$ (Distributive property)
* $x + 0 = x$ or $1 x = x$ (Identity property)

7.A.2.1. Students are able to **write** and **solve** one-step 1st degree equations, with one variable, using the set of integers and inequalities, with one variable, using the set of whole numbers.

Webb level:
Bloom: Application

Verbs Defined:
Write: translate words into mathematical symbols
Solve: find the solution

Key Terms Defined:
Integers: whole numbers and their opposites
Inequality: A comparison between two quantities involving one of the following relationships: <, >, .
1st degree: an expression with a variable(s) to the 1st power (linear).
One-step equations: equations involving one operation
One-step inequalities: inequalities involving one operation
Variable: a letter or symbol used to represent a number
Whole numbers: counting numbers and 0 (0, 1, 2, …)

Teacher Speak:
Students are able to write (translate words into mathematical symbols) and solve (find the solution) one-step 1st degree equations, with one variable, using the set of integers and inequalities, with one variable, using the set of whole numbers.

Student Speak:
I can

* translate (write) words into equations
* translate (write) words into inequalities.
*find the solution (solve) using inverse operations for one-step equations involving integers (…,-2, -1, 0, 1, 2, ….).
*find the solution (solve) using inverse operations for one-step inequalities (<, >,) involving whole numbers (0, 1, 2, 3,…).

7.A.3.1. Students are able to **identify** and **graph** ordered pairs on a coordinate plane and inequalities on a number line.

Webb level: 1
Bloom: Application

Verbs Defined:
Identify: name the coordinates of a given point
Graph: locate a point

Key Terms Defined:
Coordinate plane: plane formed by 2 perpendicular number lines that intersect at their 0 points
Ordered pair: a pair of numbers that gives the location of a point in a coordinate plane (x, y)
Inequality: a comparison between two quantities involving one of the following relationships: <, >, .

Teacher Speak:
Students are able to identify (name the coordinates of a given point) and graph (locate) ordered pairs in Quadrants I-IV on a coordinate plane and locate the solution of an inequality on a number line.

Student Speak:
I can name the coordinates of a given point in all the quarters of the coordinate plane (quadrants).
I can name the coordinates of a given point in any of the quadrants.
Given an ordered pair, I can locate the point (graph) in all the quarters of the coordinate plane (quadrants)
Given an ordered pair, I can graph in any quadrant.
I can graph an inequality on a number line.

7.A.3.2. Students are able to model and solve *multi-step problems* involving *rates*.

Webb Level:
Bloom: Application

Verbs Defined:
Solve: find a solution
Model: write

Key terms defined:
Multi-step problems: problems that use more than one operation
Rates: a ratio of two quantities measured in different units

Teacher Speak:
Students are able to write and find a solution for multi-step problems involving rates.
Students are able to model and solve multi-step problems involving rates.

Student Speak:
I can
write a ratio that compares two quantities measured in different units (rates) to represent problems.
find a solution for a problem involving more than one step (multi-step problem) involving rates.
compare rates with denominators of one (unit rates) and draw conclusions.

7.A.4.1. Students are able to **recognize** one-step patterns using tables, graphs, and models and **create** one-step algebraic expressions representing the pattern.

Webb level: 3
Bloom: Application

Verbs Defined:
Recognize: identify
Create: write

Key Terms Defined:
One-step: one operation
Tables: charts
Graphs: scatterplots
Models: expressions
Algebraic expressions: combination of numbers, variables and operations

Teacher Speak:
Students are able to recognize (identify) one-step patterns using tables, graphs and models, and create (write) one-step algebraic expressions representing the pattern.

Student Speak:

I can look at a chart (table), scatterplot (graph), or expression (model) and:
* identify (recognize) a one-operation (one-step) pattern
* write (create) a combination (algebraic expression) of numbers, letters (variables) and +, - , , (operations)
* write (create) an algebraic expression

Eighth Grade Algebra
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use procedures to transform algebraic expressions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.A.1.1. Students are able to use properties to expand, combine, and simplify 1st degree algebraic expressions with the set of integers.** • Properties include associative, commutative, distributive, and identity properties. • Use order of operations with exponents and nested parentheses. Examples: Simplify the following expressions: 1) $3(-2z+x)$ 2) $3+2(5x-(-2x))$ 3) $\frac{8x}{2}$ • Determine if two 1st degree algebraic expressions are equivalent. Example: Is $3(x+2)$ equivalent to $\frac{9x}{3}+6$?

Indicator 2: Use a variety of algebraic concepts and methods to solve equations and inequalities.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.A.2.1. Students are able to write and solve two-step 1st degree equations, with one variable, and one-step inequalities, with one variable, using the set of integers.** **Examples:** Solve 1) $\frac{x}{2}-(-2)=-5$ 2) $x-(-5)\leq 7$

	Examples: Write and solve 1) Five less than four times a number is thirteen. 2) A number divided by negative seven is less than or equal to fourteen. • Inverse operations • Addition property of equality. • Multiplication property of equality.

Indicator 3: Interpret and develop mathematical models.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**8.A.3.1. Students are able to describe and determine linear relationships.** • Determine slope from a line or ordered pairs on a graph. • Identify x and y intercepts from a graph.

Indicator 4: Describe and use properties and behaviors of relations, functions, and inverses.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Synthesis)	**8.A.4.1. Students are able to create rules to explain the relationship between numbers when a change in the first variable affects the second variable.** **Example:** 1) $x+y=10$. As x increases what happens to y? 2) In the equation y = 6x, what is the effect on the value of y if the value of x is doubled?
(Analysis)	**8.A.4.2. Students are able to describe and represent relations using tables, graphs, and rules.** • Represent situations with patterns and relations to find exact or approximate solutions to problems. • Make predictions relating two variables using a rule or a graph.

Eighth Grade Algebra
Performance Descriptors

Advanced	**Eighth grade students performing at the advanced level:** • represent using 1st degree algebraic statements using integers, tables, and graphs, in order to justify solution(s).
Proficient	**Eighth grade students performing at the proficient level:** • simulate situations using 1st degree algebraic statements using integers, tables, and graphs in order to determine solution(s).
Basic	**Eighth grade students performing at the basic level:** • simplify, solve, and graph 1st degree algebraic statements using whole numbers.

Grade 8 Unpacked Math Standards - Algebra

8.A.1.1. Students are able to **use** properties to **expand, combine,** and **simplify** 1st degree algebraic expressions with the set of integers.

Webb Level: 1
Bloom:Application

Verbs Defined:
Use: apply
Expand: distribute
Combine: join like terms
Simplify: replace with an equivalent expression that has as few terms as possible

Key Terms Defined:
Properties: A set of mathematical rules or laws that result in an equivalent expression
1st degree algebraic expressions: an expression with a variable(s) to the 1st power (linear).
Set of integers: whole numbers and their opposites (…, -2, -1, 0, 1, 2, …)

Teacher Speak:
Students are able to use (apply) properties to expand (distribute), to combine (join like terms), and to simplify (replace with an equivalent expression using as few terms as possible) 1st degree algebraic expressions with the set of integers.

Student Speak:
Using the set of integers (...,-2, -1, 0, 1, 2,…), I can replace algebraic expressions with equivalent expressions that have as few terms as possible (simplify) by using:
**the distributive property*
*the associative property
*the commutative property
*the identity property
*the order of operations including exponents and nested parentheses
*the combination of like terms

8.A.2.1. Students are able to **write** and **solve** two-step 1st degree equations, with one variable, and one-step inequalities, with one variable, using the set of integers.

Webb level: 2
Bloom: Application

Verbs Defined:
Write: translate words into mathematical symbols
Solve: find the solution

Key Terms Defined:
Integers: whole numbers and their opposites
Inequality: A comparison between two quantities involving one of the following relationships: <, >, .
1st degree: an expression with a variable(s) to the 1st power (linear).
One-step inequalities: inequalities involving one operation
Two-step equations: equations involving two operations
Variable: a letter or symbol used to represent a number

Teacher Speak:
Students are able to write (translate words into mathematical symbols) and solve (find the solution) for two-step 1st degree equations and one-step inequalities, with one variable, using the set of integers.

Student Speak:
I can
*translate (write) words into mathematical symbols.
*find the solution (solve) using operations that undo each other (inverse operations) for two-operation (two-step) equations involving whole numbers and their opposites (integers …-2, -1, 0, 1, 2…).
*find the solution (solve) using operations that undo each other (inverse operations) for one-operation (one-step) inequalities (<, >,) involving whole numbers and their opposites (integers …-2, -1, 0, 1, 2,…).
*translate (write) words into equations.
*translate (write) words into inequalities.
*find the solution (solve) using inverse operations for two-operation (two-step) equations involving integers (…-2, -1, 0, 1, 2…).
*find the solution (solve) using inverse operations for one-operation (one-step) inequalities (<, >,) involving integers (…-2, -1, 0, 1, 2,…).

8.A.3.1. Students are able to **describe** and **determine** linear relationships.

Webb level: 2

Bloom: Comprehension

Verbs Defined:
Describe: identify positive/negative slope
Determine: find the slope and intercepts

Key terms defined:

Linear relationship: an equation with the variable raised to the 1^{st} power (1^{st} degree)

Teacher Speak:
Students are able to describe linear relationships (identify positive/negative slope).
Students are able to determine (find the slope and x and y intercepts) from a graph.

Student Speak:
I know that the slope of a line is change in y (rise)/change in x (run).
I know that the x intercept is where the graph of the line crosses the x axis.
I know that the y intercept is where the graph of the line crosses the y axis.
I can identify (describe) if a line (linear relationship) has a positive or negative slope.
I can find (determine) the change in y/change in x (slope) of a line on a coordinate plane.
I can find (determine) the where the graph of the line crosses the x axis (x intercepts) on a coordinate plane.
I can find (determine) the where the graph of the line crosses the y axis (y intercepts) on a coordinate plane.
I can identify (describe) if a line (linear relationship) has a positive or negative slope.
I can find (determine) the slope of a line on a coordinate plane.
I can find (determine) x intercept of a line on a coordinate plane.
I can find (determine) y intercepts of a line on a coordinate plane.

8.A.4.1. Students are able to **create** rules to **explain** the relationship between numbers when a change in the first variable **affects** the second variable.

Webb level: 3
Bloom: Synthesis

Verbs Defined:
Create: write
Explain: describe
Affect: change

Key terms defined:
Rules: description

Relationship: correlation
Change: increase or decrease
Variable: letter or symbol used to represent one or more numbers

Teacher Speak:
Students are able to create (write) rules to explain (describe) the relationship between numbers when a change in the first variable changes the second variable.

Student Speak:
I can write (create) a description (rule) of what happens to the second letter (variable) when the first letter (variable) changes.
I can write (create) a rule of what happens to the second variable when the first variable changes.
8.A.4.2. Students are able to **describe** and **represent** relations using tables, graphs, and rules.

Webb level: 2
Bloom: Analysis

Verbs Defined:
Describe: explain/predict
Represent: write or create

Key terms defined:
Relations: equations that express the relationship between two variables
Tables: charts
Graphs: scatterplot (two sets of data plotted as ordered pairs in the coordinate plane)
line graph (graph that connects data points)
Rules: equations

Teacher Speak:
Students are able to describe (explain/predict) and represent (write or create) relations using tables, graphs, and rules.

Student Speak:
I can
*write or create (represent) a chart (table), scatterplot or line graph (graph) or equation (rule)
* use a chart (table), scatterplot or line graph (graph) or equation (rule) to explain/predict a relationship

Core High School Algebra
Grade Standards, Supporting Skills, and Examples

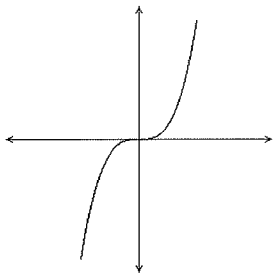
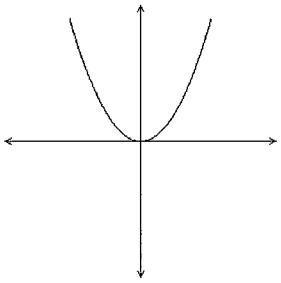
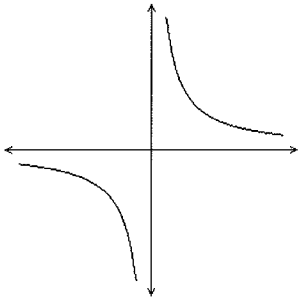
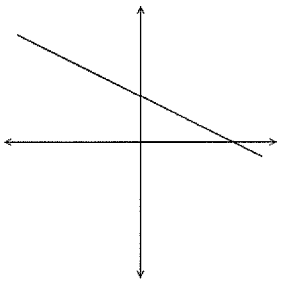
Indicator 1: Use procedures to transform algebraic expressions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.A.1.1. Students are able to write equivalent forms of algebraic expressions using properties of the set of real numbers.** **Example:** Simplify $3(x+5)-2(7-2x)$ **Example:** Express as the product of two binomials. 1) x^2+4x+3 2) x^2-9 • Evaluate algebraic expressions. Example: Evaluate $\frac{5x-y^2}{2z}$ when $x=2$, $y=3$, $z=4$. • Use laws of exponents. Example: Simplify $\frac{[(2x^2)^3 y^3 z^3]}{(4x^2y^2z)}$. • Use conventional order of operations, including grouping and exponents. Example: Simplify $3x(x-2)^2 + 5x^2$.

Indicator 2: Use a variety of algebraic concepts and methods to solve equations and inequalities.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.A.2.1. Students are able to use algebraic properties to transform multi-step, single-variable, first-degree equations.** **Example:** Solve $-3(2x+1) = 2(x-1)+3$
(Application)	**9-12.A.2.2. Students are able to use algebraic properties to transform multi-step, single-variable, first-degree inequalities and represent solutions using a number line.** **Example**: Solve and graph the solution $6-2(3+2x)<4$.

Indicator 3: Interpret and develop mathematical models.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.A.3.1. Students are able to create linear models to represent problem situations.** **Example:** What equation would model total distance traveled over a period of time at a rate of 60 mph? • Calculate and interpret slope. Example: A telephone bill is \$10 per month plus \$0.30 per minute for long distance calls. Write an equation in slope-intercept form $(y = mx + b)$ that expresses the total amount of the phone bill.
(Comprehension)	**9-12.A.3.2. Students are able to distinguish between linear and nonlinear models.** **Example:** Distinguish between $d = 60t$ and $d = \frac{1}{2}gt^2$. **Example:** Which model represents a linear relationship? a)  b)  c)  d) 

Indicator 4: Describe and use properties and behaviors of relations, functions, and inverses.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.A.4.1. Students are able to use graphs, tables, and equations to represent linear functions.** **Examples:** 1) Create a table from the graph or equation of a line. 2) Graph a linear equation in the form $y = mx + b$. 3) Write an equation of a line that passes through the points (3, 2) and (-1, 5).

Core High School Algebra
Performance Descriptors

Advanced	**High school students performing at the advanced level:** • transform algebraic expressions; • solve quadratic equations; • solve a system of linear equations.
Proficient	**High school students performing at the proficient level:** • transform polynomial expressions using real number properties; • solve single variable linear equations with integral coefficients; • graph linear equations; • interpret tables, graphs, and charts to solve problems; • create a linear model from a problem context.
Basic	**High school students performing at the basic level:** • transform linear expressions with integral coefficients using real number properties; • solve linear equations of the form $ax + b = c$, where a, b, and c are integers; • recognize the graph of a linear equation; • graph a line from a table of values.

Grade 9-12 Unpacked Core Math Standards - Algebra

9-12.A.1.1 Students are able to **write** equivalent forms of algebraic expressions **using** properties of the set of real numbers.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Write: determine
Using: applying

Key terms defined:
Equivalent forms: Having the same value when evaluated.
Algebraic expressions: A mathematical combination of numbers, variables, and operations. It is **not** an equation.
Properties of real numbers: A set of mathematical rules or laws that results in an equivalent expression.
Real Number: Any number that can be graphed on the number line. This includes integers and rational numbers.

Teacher Speak:
Students are able to write (determine) equivalent forms of algebraic expressions using (applying) properties of the set of real numbers.

Student Speak:

- I can apply (use) the laws of exponents to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
- Given the values of variables, I can evaluate algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.)
- I can apply (use) the order of operations to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
- I can combine like terms.
- I can multiply polynomials.
- I can apply (use) the distributive property to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
- I can factor out a common term.
- I can determine (write) algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.) from verbal statements.

9-12.A.2.1. Students are able to **use** algebraic properties to **transform** multi-step, single-variable, first-degree equations.

Webb Level: 2
Bloom: Comprehension

Verbs Defined:
Use: Apply
Transform: solve

Key terms defined:
Algebraic properties: A set of mathematical rules or laws that results in an equivalent equation.
Multi-step: Equations that require more than 2 steps to solve.
First degree: Variables are to the first power when the equation is written in simplified form.
Single variable: An equation limited to one variable.
Equation: A mathematical sentence in which the two expressions are equivalent.

Teacher Speak:
Students are able to use (apply) algebraic properties to transform (solve) multi-step, single-variable, first-degree equations.

Student Speak:
I can solve equations (A mathematical sentence in which the two expressions are equivalent) that:

- Have all the variables on one side.
- Have variables on both sides.
- Require the distributive property to simplify one or both sides.
- Require more than two steps to solve.

9-12.A.3.1. Students are able to **create** linear models to **represent** problem situations.

Webb Level: 2
Bloom: Application

Verbs Defined:
Create: Write
Represent: model, portray

Key terms defined:
Linear model: A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.
Problem Situation: A setting in which to find an unknown.

Teacher Speak:
Students are able to create (write) linear equations that represent (portray) problem situations.

Student Speak:
Given a problem situation (setting in which to find an unknown):

- I can write (create) an equation.
- I can find the rate of change (slope).
- I can find the y-intercept.
- I can explain the meaning of the x- and/or y-intercept.
- I can make predictions using the linear equation (model: A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.) that I wrote.

9-12.A.4.1 Students are able to **use** graphs, tables and equations to **represent** linear functions.

Webb Level: 2
Bloom: Application

Verbs Defined:
Use: Create.
Represent: model

Key terms defined:
Graphs: Pictorial representation of data or an equation.
Table: A way of expressing domain & range in a row and column in a horizontal, vertical or T table format.
Equation: Mathematical statement that 2 expressions are equivalent.
Linear function: A function of the form $f(x) = mx + b$ where m and b are some fixed numbers, representing slope and y-intercept. Functions of this kind are called "linear" because their graphs are lines. This can also be written in point-slope () and standard form ().

Teacher Speak:

Students are able to use (create) graphs, tables and equations to represent (model) linear functions.

Student Speak:

- I can develop a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear graph (Pictorial representation of data or an equation).
- I can create a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear equation in any form including standard (), point-slope ()and slope-intercept ($y = mx + b$) .
- I can graph a linear equation in any form including general (), point-slope () and slope-intercept ($y = mx + b$).
- I can make a linear graph from a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format).
- I can write the equation of a line in the form $f(x) = mx + b$ that passes through two points.
- Given any form of a linear equation, I can write it in the form $f(x) = mx + b$.

Advanced High School Algebra
Grade Standards, Supporting Skills, and Examples

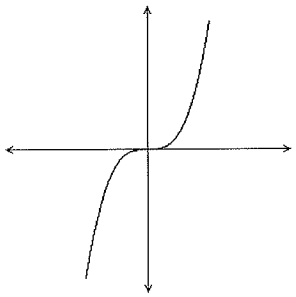
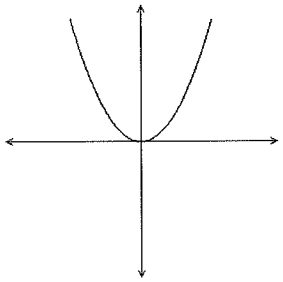
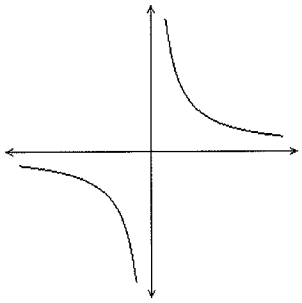
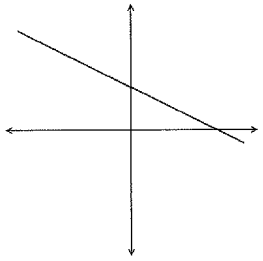
Indicator 1: Use procedures to transform algebraic expressions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.A.1.1A. Students are able to write equivalent forms of rational algebraic expressions using properties of real numbers.** **Example:** Perform the indicated operation. 1) $\frac{x-2}{x^2-4}$ 2) $\frac{x^2+5x+6}{2-x}$ 3) $\frac{2+\frac{1}{x}}{\frac{1}{x+3}-1}$
(Application)	**9-12.A.1.2A. Students are able to extend the use of real number properties to expressions involving complex numbers.** **Example**: Find the sum, difference, product, and quotient of $2+3i$ and $2-3i$.

Indicator 2: Use a variety of algebraic concepts and methods to solve equations and inequalities.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.A.2.1A. Students are able to determine solutions of quadratic equations.** • Use the quadratic formula. Example: Solve $x^2 + 3x + 5 = 0$ • Use the discriminant, $b^2 - 4ac$, to describe the nature of the roots. Example: 1) Describe the nature of the roots a quadratic equation with a discrimint of -4. 2) Describe the nature of the roots of the equation $9x^2 - 13x + 5 = 0$
(Application)	**9-12.A.2.2A. Students are able to determine the solution of systems of equations and systems of inequalities.** **Examples:** Solve each system. 1) $2x + 5y = 9$ and $3x - 4y = 3$ 2) $x^2 + y^2 = 25$ and $3x^2 + 4y^2 = 84$ 3) $y < 2x + 3$ and $y > -4x - 7$
(Application)	**9-12.A.2.3A. Students are able to determine solutions to absolute value statements.** **Example:** Solve $\|3x + 4\| > 5$

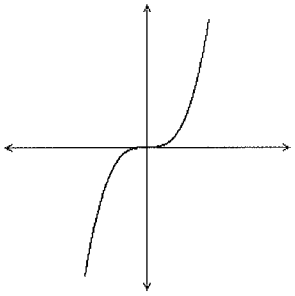
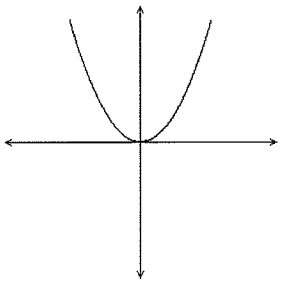
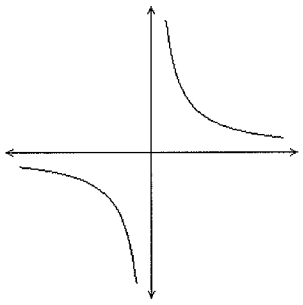
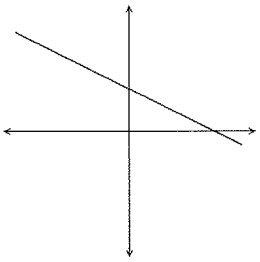
Indicator 3: Interpret and develop mathematical models.

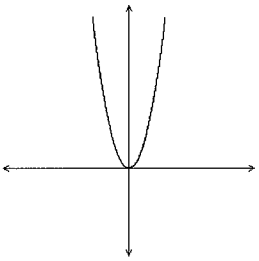
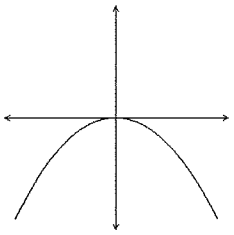
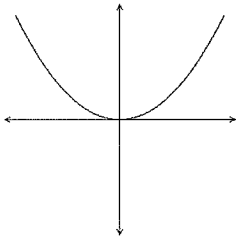
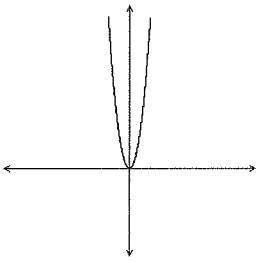
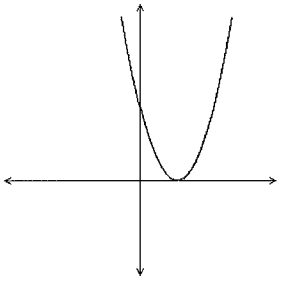
Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.A.3.1A. Students are able to distinguish between linear, quadratic, inverse variation, and exponential models.** **Examples:** 1) Describe the difference between $y = 2x$, $y = x^2$, $y = \frac{2}{x}$ and $y = x^2$ 2) Which of the following graphs represents inverse variation? a) b) Illustrations for Example 9-12.A.3.2 a)  b)  c)  d) 

(Synthesis)	**9-12.A.3.2A. Students are able to create formulas to model relationships that are algebraic, geometric, trigonometric, and exponential.** **Examples:** 1) Algebraic: $P(x) = I(x) - C(x)$ 2) Geometric: $A = s^2$ 3) Trigonometric: $y = A\sin B(x - C) + D$ 4) Exponential: $A(t) = A_0(1 + \frac{r}{n})^{nt}$
(Analysis)	**9-12.A.3.3A. Students are able to use sequences and series to model relationships.** **Example:** A ball is dropped from a height of six feet. Each rebound is half the height of the previous bounce. What is the total vertical distance the ball has traveled on the tenth bounce?

Indicator 4: Describe and use properties and behaviors of relations, functions, and inverses.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.A.4.1A. Students are able to determine the domain, range, and intercepts of a function.** **Example:** Given the function $f(x) = \frac{(x-2)}{x}$, determine each of the following: 1) domain of f 2) range of f 3) x - intercept 4) y -intercept 5) vertical and horizontal asymptotes

(Analysis)	**9-12.A.4.2A. Students are able to describe the behavior of a polynomial, given the leading coefficient, roots, and degree.** **Example:** Given a third degree polynomial with a double root at $x = -2$, a root at $x = 3$, and a positive coefficient on the term of highest degree, describe and sketch the graph. **Example:** Which of the following depicts the graph of $y = x^3$? a)  b)  c)  d) 

(Analysis)	**9-12.A.4.3A. Students are able to apply transformations to graphs and describe the results.** • Change coefficients and/or constants. 1) Compare the graphs of $f(x) = x^2$ and $g(x) = 2(x+1)^2 + 3$ 2) The graph of $y = f(x)$ is shown below.  "Which of the graph below is the graph of $y = 3[f(x)]$? a)  b)  c)  d)  • Graph the inverse of a function. Examples: 1) Show the reflection of the graph of $y = 2x + 3$ across the line $y = x$. 2) Graph the inverse of the function $y = x^2$.

(Application)	**9-12.A.4.4A. Students are able to apply properties and definitions of trigonometric, exponential, and logarithmic expressions.** **Examples:** 1) Simplify $\frac{1-\cos^2 x}{\tan^2 x}$ 2) Evaluate $\log_4(\frac{1}{8})$ 3) Evaluate $e^{\ln(e)}$ 4) Prove the identity: $(\sin x - \cos x)^2 = 1 - \sin(2x)$ 5) Solve for x: $\log_2(5x-1)+4 = \log_2 x$
(Analysis)	**9-12.A.4.5A. Students are able to describe characteristics of nonlinear functions and relations.** • Conic sections Example: Find the vertices, foci, length of major and minor axes and eccentricity of the graph of the ellipse having the equation $\frac{x^2}{9}+\frac{y^2}{25}=1$. • Trigonometric functions Example: Find the period, amplitude, vertical and horizontal shift of $y = 3\sin 2(x+\frac{\pi}{3})-2$. • Exponential and logarithmic functions Examples: 1) Write $y = 3^{2x}$ in logarithmic form. 2) Determine the domain and range of $y = 3^{2x}$ and $y = \ln(5x+1)$.
(Application)	**9-12.A.4.6A. Students are able to graph solutions to linear inequalities.** **Example:** Graph the solution of $y < 2x - 4$

Grade 9-12 Unpacked Advanced Math Standards – Algebra

9-12.A.1.1.A. Students are able to write equivalent forms of rational algebraic expressions using properties of real numbers.

Webb Level: 1
Bloom: Application

Verbs Defined:
Write: determine
Using: applying

Key terms defined:
Equivalent forms: Having the same value when evaluated.
Rational algebraic expressions: A ratio of two or more algebraic expressions. It is not an equation.
Properties of real numbers: A set of mathematical rules or laws that results in an equivalent expression.

Teacher Speak:
Students are able to write (determine) equivalent forms of rational algebraic expressions by using (applying) properties of real numbers.

Student Speak:
- I can apply (use) the laws of exponents to simplify algebraic expressions.
- I can apply (use) the order of operations to simplify algebraic expressions.
- I can add, subtract, multiply and divide rational expressions (A ratio of two or more algebraic expressions. It is not an equation).
- I can determine which polynomials are factorable over the set of integers.

9-12.A.1.2.A. Students are able to **extend** the use of real number properties to expressions involving complex numbers.

Webb Level: 2
Bloom: Application

Verbs Defined:
Extend: expand

Key terms defined:
Real number properties: A set of mathematical rules or laws that results in an equivalent expression.

Expression: A mathematical combination of numbers, variables, and operations. It is **not** an equation.
Complex numbers: A number of the form $a+bi$ where a and b are real numbers and .

Teacher Speak:
Students are able to extend (expand) the use of real number properties to expressions involving complex numbers.

Student Speak
I can add, subtract, multiply and divide complex numbers (A number of the form $a+bi$ where a and b are real numbers and).

9-12.A.2.1.A. Students are able to **determine** solutions of quadratic equations.

Webb Level: 1
Bloom: Analysis

Verbs Defined:
Determine: derive

Key terms defined:
Quadratic equation: an equation containing , a polynomial of degree 2 such that it can be transformed into .

Teacher Speak:
Students are able to determine (derive) solutions of quadratic equations and equations in quadratic form.

Student Speak:
- I can solve quadratic equations (an equation containing , a polynomial of degree 2 such that it can be transformed into) by:
  - ♣ Factoring
  - ♣ Completing the square
  - ♣ Using the quadratic formula
  - ♣ Graphing (using appropriate technology)
- I can determine the nature of the roots.
- I can solve equations that are in quadratic form. (the form , where u is any expression in x, and a, b, and c are real numbers).

9-12.A.2.2.A. Students are able to **determine** the solution of systems of equations and systems of inequalities.

Webb Level: ½
Bloom: Application

Verbs Defined:
Determine: find

Key terms defined:
Solutions: value or values of the variable(s) that make the statement true
Systems of equations: two or more equations
Systems of inequalities: two or more inequalities

Teacher Speak:
Students are able to determine (find) the solution of systems of equations and systems of inequalities.

Student Speak:

- I can solve a system of linear equations (two or more equations) using
  - ♣ Substitution
  - ♣ Graphing
  - ♣ Elimination (linear combination)
  - ♣ Matrices
- I can solve a system (two or more equations) that contains both linear and non-linear equations.
- I can solve a system of inequalities (two or more inequalities) by graphing.

9-12.A.2.3.A. Students are able to **determine** solutions to absolute value statements.

Webb Level: 1
Bloom: Application

Verbs Defined:
Determine: find

Key terms defined:
Solutions: value or values of the variable(s) that make the statement true
Absolute value statement: an equation or inequality in which the absolute value contains the variable

Teacher Speak:
Students are able to determine (find) solutions to absolute value statements.

Student Speak:

- I can solve equations and inequalities containing an absolute value statement (an equation or inequality in which the absolute value contains the variable).
- I can graph the solutions (value or values of the variable(s) that make the statement true) to absolute value inequalities (an inequality in which the absolute value contains the variable).

9-12.A.3.1.A. Students are able to **distinguish** between linear, quadratic, inverse variation, and exponential models.

Webb Level: 1/2
Bloom: Analysis

Verbs Defined:
Distinguish: recognize, classify

Key terms defined:
Linear model: A representation of a problem that can be expressed as an equation in the form $y = mx + b$ where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.
Quadratic model: A representation of a problem that can be expressed as an equation containing , a polynomial of degree 2 such that it can be transformed into .
Inverse variation model: A representation of a problem that can be expressed as , where n is any natural number .
Exponential model: A representation of a problem that can be expressed as . This also includes logarithmic models, .
Model: A representation of a problem that uses tables, graphs, or equations.

Teacher Speak:
Students are able to distinguish (recognize, classify) between linear, quadratic, inverse variation, and exponential models.

Student Speak:

- I can classify models (tables, graphs, or equations) as:

- ♣ Linear (A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.)
- ♣ Quadratic (A representation of a problem that can be expressed as an equation containing , a polynomial of degree 2 such that it can be transformed into .)
- ♣ Inverse variation (A representation of a problem that can be expressed as , where n is any natural number .)
- ♣ Exponential (A representation of a problem that can be expressed as . This also includes logarithmic models, .)

- I can describe the similarities and differences between:
  - ♣ linear models (A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.)
  - ♣ quadratic models (A representation of a problem that can be expressed as an equation containing , a polynomial of degree 2 such that it can be transformed into .)
  - ♣ inverse variation models (A representation of a problem that can be expressed as , where n is any natural number) and
  - ♣ exponential models (A representation of a problem that can be expressed as . This also includes logarithmic models, .)

9-12.A.3.2.A. Students are able to **create** formulas to **model** relationships that are algebraic, geometric, trigonometric, and exponential.

Webb Level: 1/2
Bloom: Synthesis

Verbs Defined:
Create: write.
Model: Represent

Key terms defined:
Formulas: Equations that can be applied to set of problems that have common parameter.
Algebraic: A relation that can be classified as linear, quadratic, cubic, quartic, absolute value, square root, rational or piecewise.
Trigonometric: A function that can be modeled with the six trigonometric functions.
Exponential: A representation of a problem that can be expressed as . This also includes logarithmic models, .
Geometric: All of the conic sections: circles, parabolas, hyperbolas and ellipses.

Teacher Speak:
Students are able to create (write) equations to model (represent) relationships that are algebraic, geometric, trigonometric, and exponential.

Student Speak:

- I can classify information portrayed in graphs and/or tables as:
  - ♣ algebraic (A relation that can be classified as linear, quadratic, cubic, quartic, absolute value, piecewise, square root, or rational.)
  - ♣ geometric (All of the conic sections: circles, parabolas, hyperbolas and ellipses.)
  - ♣ trigonometric (A function that can be modeled with the six trigonometric functions.)
  - ♣ exponential (A representation of a problem that can be expressed as . This also includes logarithmic models, .)
- once I determine (or am given) the type of relationship, I can write the equation.

9-12.A.3.3.A. Students are able to **use** sequences and series to **model** relationships.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Use: apply
Model: show or write

Key terms defined:
Sequences: A function whose domain is the set of consecutive natural numbers and whose range is an ordered list of numbers.
Series: Sum of the terms in a finite or infinite sequence.

Teacher Speak:
Students are able to use (apply) sequences and series to model (show or write) relationships.

Student Speak:

- I can use sequence (a function whose domain is the set of consecutive natural numbers and whose range is an ordered list of numbers) notation to write the terms of a sequence.

- I can use summation notation to write and find sums.
- I can find the sum of finite and infinite sequences (function whose domain is the set of consecutive natural numbers and whose range is an ordered list of numbers.)
- I can find the nth term of an arithmetic or geometric sequence (A function whose domain is the set of consecutive natural numbers and whose range is an ordered list of numbers).
- I can write the recursive and explicit formula of an arithmetic or geometric sequence (A function whose domain is the set of consecutive natural numbers and whose range is an ordered list of numbers).

9-12.A.4.1.A. Students are able to **determine** the domain, range, and intercepts of a function.

Webb Level: 1
Bloom: Analysis

Verbs Defined:
Determine: find

Key terms defined:
Domain: The set of inputs. The set of possible values for x or the independent variable.
Range: The set of outputs. The set of possible values for y or f(x) or the dependent variable.
Intercepts: The value(s) where the graph of a function crosses the axes.
Function: A mathematical relation that associates each object in a set with exactly one value.

Teacher Speak:
Students are able to determine (find) the domain, range, and intercepts of a function.

Student Speak:
Given a function in any form (numerical, graphical, or algebraic), I can find:
- Domain (The set of inputs. The set of possible values for x or the independent variable.)
- Range (The set of outputs. The set of possible values for y or f(x) or the dependent variable.)
- Intercepts (The value(s) where the graph of a function crosses the axes.)
- Horizontal asymptotes
- Vertical asymptotes

9-12.A.4.2.A. Students are able to **describe** the behavior of a polynomial, given the leading coefficient, roots, and degree.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Describe: Identify.

Key terms defined:
Polynomial: Sum of two or more monomials (i.e.). In this standard all polynomials are single variable.
Leading coefficient: The coefficient of the highest degree monomial in a polynomial.
Roots: The zeros of the polynomial. It is also the x-intercept if the roots are real.
Degree: The exponent of a single variable polynomial.

Teacher Speak:
Students are able to describe (identify) the behavior of a polynomial, given the leading coefficient, roots, and degree.

Student Speak:
- Given a single variable polynomial (Sum of two or more monomials (i.e.)) with the leading coefficient (The coefficient of the highest degree monomial in a polynomial.), roots (The zeros of the polynomial. It is also the x-intercept if the roots are real.) and degree (The exponent of a single variable polynomial), I can sketch the general shape of the polynomial.
- Given the graph of a polynomial (Sum of two or more monomials (i.e.)), I can find the roots (The exponent of a single variable polynomial).
- Given a polynomial function:
  - ♣ I can state the maximum number of roots (The exponent of a single variable polynomial) including multiplicities.
  - ♣ I can state the maximum number of turning points (relative max and min).

9-12.A.4.3.A. Students are able to **apply** transformations to graphs and **describe** the results.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Apply: Use
Describe: Identify

Key terms defined:
Transformation: A rule that sets up a one to one correspondence between sets of points.

Teacher Speak:
Students are able to apply (use) transformations to graphs and describe (identify) the results.

Student Speak:

- Given a relation, I can describe the transformations that are applied to the parent relation.
- Given the description of transformations to relations, I can the write the relation.
- Given the graph of a relation, I can write the equation of the relation.
- I can describe a horizontal translation to a graph (f(x-a)).
- I can describe a vertical translation to a graph. (f(x) + a).
- I can describe the reflection over the x-axis to a graph. (f(-x)).
- I can describe the reflection over the y-axis to a graph (-f(x)).
- I can describe a stretch or shrink (dilation to a graph). (f(ax).

9-12.A.4.4.A. Students are able to apply properties and definitions of trigonometric, exponential, and logarithmic expressions.

Webb Level: 2/3
Bloom: Application

Verbs Defined:
Apply: Use

Key terms defined:
Trigonometric Expression: An expression that uses one of three trigonometric functions (sine, cosine, or tangent) or their reciprocals (cosecant, secant, cotangent).
Exponential Expression: Any expression of the form
Logarithmic Expression: An expression of the form

Teacher Speak:
Students are able to apply (use) properties and definitions of trigonometric, exponential, and logarithmic expressions.

Student Speak:

- I can convert from exponential form to logarithmic form and vice-verse.
- I can use the product rule, quotient rule and power rule to simplify logarithmic

expressions.
- I can solve logarithmic, exponential and trigonometric equations.
- I can simplify trigonometric and exponential expressions.
- I can verify trigonometric identities.

9-12.A.4.5.A. Students are able to **describe** characteristics of nonlinear functions and relations.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Describe: Explain

Key terms defined:
Characteristics: Key features of a function. This includes but is not limited to vertex, end behavior, shape, intercepts (both and x and y), symmetry (both rotational and lines), domain and range, centers and radii, directrix, foci, major axis, minor axis, amplitude, and phase shift, continuous or discontinuous, and concavity
Non-linear: A representation of a problem that can be expressed as an equation that has a degree other than 1 or is piecewise.

Teacher Speak:
Students are able to describe (explain) characteristics of nonlinear functions and relations.

Student Speak:
I can describe the key characteristics of:
- ♣ Any trigonometric function.
- ♣ Any conic section (circle, parabola, hyperbola, ellipse).
- ♣ Any non-linear algebraic function (rational expressions, absolute value, square root, cubic, quartic and other higher-degree polynomials.)

9-12.A.4.6.A. Students are able to graph solutions to linear inequalities.

Webb Level: 1
Bloom: Application

Verbs Defined:

Graph: Represent

Key terms defined:
Linear inequality: A comparison of two first degree expressions. The comparisons can be .

Teacher Speak:
Students are able to graph (represent) solutions to linear inequalities (A comparison of two first degree expressions. The comparisons can be .).

Student Speak:

- I can solve a linear inequality algebraically.
- I can match the graph of an inequality with its algebraic representation.
- I can determine the type boundary created by the inequality (solid or dashed).
- I can shade the correct side (half-plane).

Seventh Grade Geometry
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use deductive and inductive reasoning to recognize and apply properties of geometric figures.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.G.1.1. Students are able to identify, describe, and classify polygons having up to 10 sides.** • Relationships among triangles. Example: Can an equilateral triangle contain an obtuse angle? Why/why not? • Relationships among quadrilaterals. Example: Is a square a type of rectangle? • Sketch two-dimensional figures.
(Knowledge)	**7.G.1.2. Students are able to identify and describe elements of geometric figures.** • Altitude • Midpoint • Bisector • Radius • Diameter • Chord

Indicator 2: Use properties of geometric figures to solve problems from a variety of perspectives.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.G.2.1. Students are able to demonstrate ways that shapes can be transformed.** • Translation • Rotation • Reflection √ *Tessellation* √ *Write and solve proportions that express the relationships between corresponding parts of similar quadrilaterals and triangles.*

Seventh Grade Geometry
Performance Descriptors

Advanced	**Seventh grade students performing at the advanced level:** • analyze two-dimensional shapes using their properties and relationships; • predict the results of two-dimensional transformations.
Proficient	**Seventh grade students performing at the proficient level:** • describe and classify two-dimensional shapes using their properties and relationships; • transform two-dimensional geometric figures.
Basic	**Seventh grade students performing at the basic level:** • identify properties and elements of basic two-dimensional shapes.

Grade 7 Unpacked Math Standards - Geometry

7.G.1.1. Students are able to **identify, describe, and classify** polygons having up to 10 sides.

Webb level: 1/2
Bloom: Application

Verbs Defined:

Identify: name
Describe: explain
Classify: classify

Key Terms Defined:
Polygons up to 10 sides:

triangle: 3 sided polygon
quadrilateral: 4 sided polygon
pentagon: 5 sided polygon
hexagon: 6 sided polygon
heptagon: 7 sided polygon
octagon: 8 sided polygon
nonagon: 9 sided polygon
decagon: 10 sided polygon

Teacher Speak:
Students are able to identify (name) and classify polygons having up to 10 sides.
Students are able to describe (explain) relationships among triangles and quadrilaterals.

Student Speak:
I can
* name (identify/classify) a polygon with up to 10 sides
* explain (describe) the relationships among quadrilaterals
* explain (describe) the relationships among the different types of triangles

7.G.1.2. Students are able to **identify and describe** elements of geometric figures.

Webb level: 1
Bloom: Knowledge

Verbs Defined:

Identify: name/classify
Describe: explain

Key Terms Defined:
Elements of geometric figures:
altitude
midpoint
bisector
radius
diameter
chord

Teacher Speak:
Students are able to identify (name/classify) and describe (explain) the elements of geometric figures.

Student Speak:
I can name and classify (identify) and explain (describe) the definition of:
* an altitude of a polygon
* a midpoint of a line segment
* a bisector of an angle or a line segment
* a radius of a circle
* a diameter of a circle
* a chord of a circle

7.G.2.1. Students are able to **demonstrate** ways that shapes can be transformed.

Webb level: 2/3
Bloom: Application

Verbs Defined:
Demonstrate: determine

Key Terms Defined:
Types of Transformations: translation, reflection, and rotation

Teacher Speak:
Students are able to demonstrate (determine) ways that shapes can be transformed.

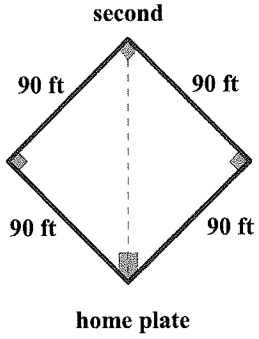
Student Speak:
I can determine (demonstrate) if a shape/picture has been:
* translated (transformation)

* reflected (transformation)
* rotated (transformation)

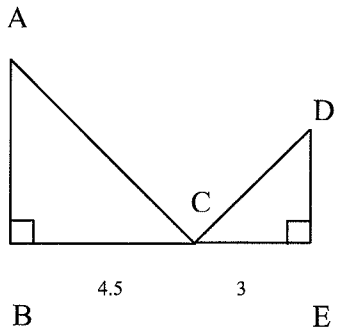
Eighth Grade Geometry

Grade Standards, Supporting Skills, and Examples

Indicator 1: Use deductive and inductive reasoning to recognize and apply properties of geometric figures.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.G.1.1. Students are able to describe and classify prisms, pyramids, cylinders, and cone.** **Example:** Classify the solid. How many edges does it have? How many vertices? How many faces does it have?  • Faces, edges, and vertices. √ *Nets.*
(Application)	**8.G.1.2. Students, when given any two sides of an illustrated right triangle, are able to use the Pythagorean Theorem to find the third side.** **Example:** A baseball diamond is a square. How far does the catcher have to throw when he throws the ball to second?  • Given the formula. • Using whole numbers for the known values.

Indicator 2: Use properties of geometric figures to solve problems from a variety of perspectives.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.G.2.1. Students are able to write and solve proportions that express the relationships between corresponding parts of similar quadrilaterals and triangles.** **Examples:** 1) A rectangle has a width of 5 cm and a length of 7 cm. A similar rectangle is 12 cm in width. What is the length of the rectangle? 2) Given $\triangle ABC \sim \triangle DEC$, find the length of side AB.  3) A frame of a movie film is 35 mm wide and 26.25 mm high. The film projects an image 8 m wide on a movie screen. How high is the image?

Eighth Grade Geometry
Performance Descriptors

Advanced	**Eighth grade students performing at the advanced level:** • sketch, and analyze characteristics of three-dimensional shapes applying properties and relationships; • sketch and analyze characteristics of two-dimensional shapes applying properties and proportional relationships.
Proficient	**Eighth grade students performing at the proficient level:** • compare characteristics of three-dimensional shapes using given formulas, properties, and relationships; • compare two-dimensional shapes using given formulas, properties, and proportional relationships.
Basic	**Eighth grade students performing at the basic level:** • identify and compare characteristics of basic two- and three-dimensional shapes given specific formulas, properties, and proportional relationships.

Grade 8 Unpacked Math Standards – Geometry

8.G.1.1. Students are able to **describe and classify** prisms, pyramids, cylinders, and cone.

Webb level: 1/2
Bloom: Comprehension

Verbs Defined:
Describe: explain/identify
Classify: name/classify

Key Terms Defined:
Prism: right prisms with polygon bases having up to 10 sides
Pyramid: right pyramids with a polygon base having up to 10 sides
Cylinder: right cylinders
Cone: right cones

Teacher Speak:
Students are able to explain, name, and classify prisms, pyramids, cylinders, and cones.

Student Speak:
I can name a 3-dimensional shape as a:
* prism
* pyramid
* cylinder
* cone

I can classify a pyramid and prism by the shape of its base (having up to 10 sides).
For a pyramid and prism, I can identify the number of
* faces
* vertices
* edges

8.G.1.2. Students, when given any two sides of an illustrated right triangle, are able to **use** the Pythagorean Theorem to **find** the third side.

Webb level: 2
Bloom: Application

Verbs Defined:
Use: apply
Find: calculate the length

Key Terms Defined:
Pythagorean Theorem: the sum of the squares of the legs of a right triangle equals the square of the hypotenuse ($a^2 + b^2 = c^2$)

Teacher Speak:
Students, when given any two sides with whole number values of an illustrated right triangle, are able to apply the Pythagorean Theorem to calculate the length of the third side.

Student Speak:
Given the Pythagorean Theorem and a picture of a right triangle with two given sides, I can calculate the missing length.

8.G.2.1. Students are able to **write** and **solve** proportions that express the relationships between corresponding parts of similar quadrilaterals and triangles.

Webb level: 2
Bloom: Application

Verbs Defined:
Write: write
Solve: calculate the solution

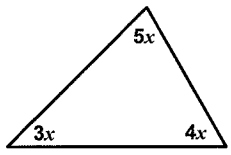
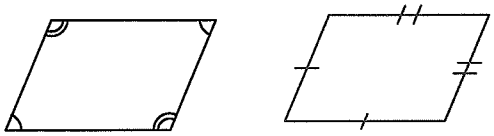
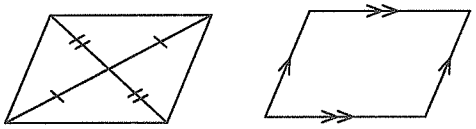
Key Terms Defined:
Proportions: an equation that states that two ratios are equivalent
Similar: corresponding angles are congruent and the corresponding sides are proportional

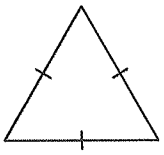
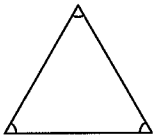
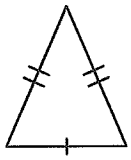
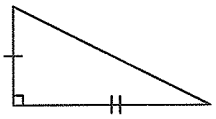
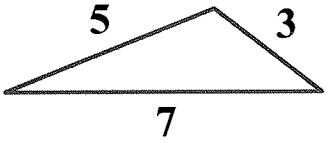
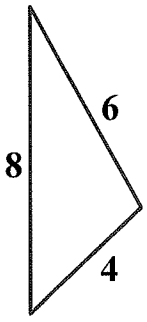
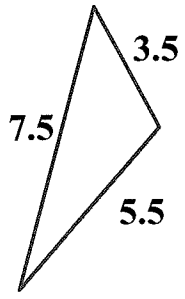
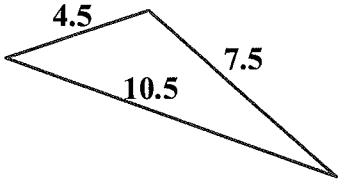
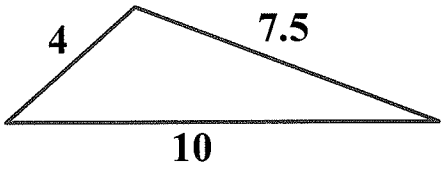
Teacher Speak:
Students are able to write and calculate the solution for a proportion that expresses the relationships between corresponding parts of similar quadrilaterals and triangles.

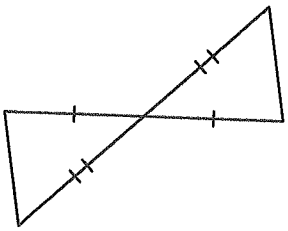
Student Speak:
Given similar triangles or quadrilaterals I can:
* write a proportion to find the missing side length.
*solve a proportion to find the missing side length.
Given a word problem involving similar quadrilaterals or triangles I can:
* write a proportion to find the missing side length.
* solve a proportion to find the missing side length.

Core High School Geometry
Grade Standards, Supporting Skills, and Examples

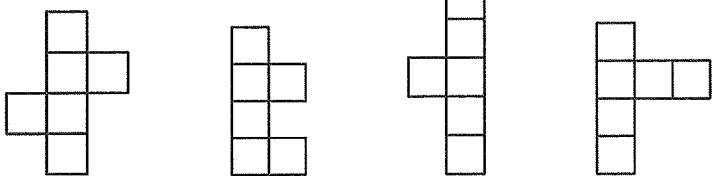
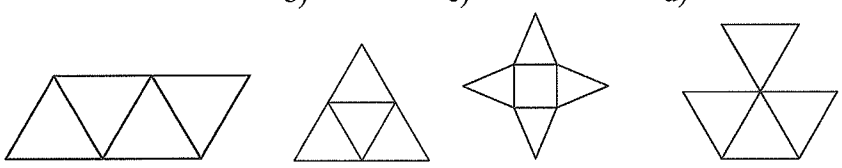
Indicator 1: Use deductive and inductive reasoning to recognize and apply properties of geometric figures.

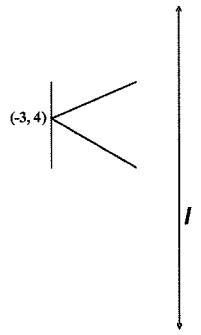
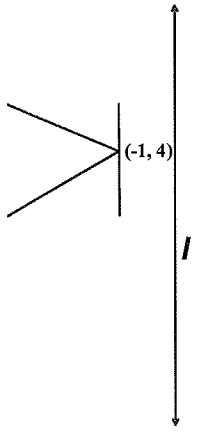
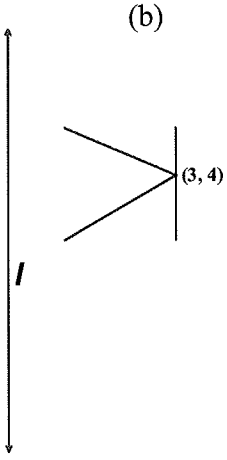
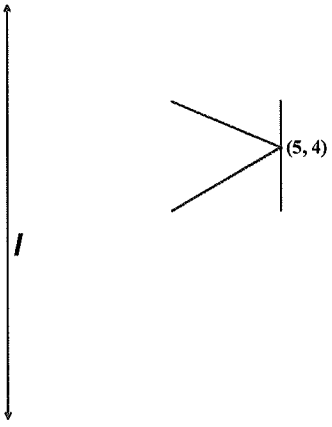
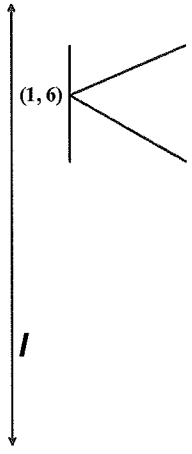
Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.G.1.1. Students are able to apply the properties of triangles and quadrilaterals to find unknown parts.** **Example:** If the length of the hypotenuse of a 30°-60°-90° triangle is 10, what is the length of the shorter leg? **Example:** Consider the triangle with degree measures shown:  1) Find the value of x. 2) Find the measure of each angle. **Example:** Which of the following is not a parallelogram? a) b)  c) d) 

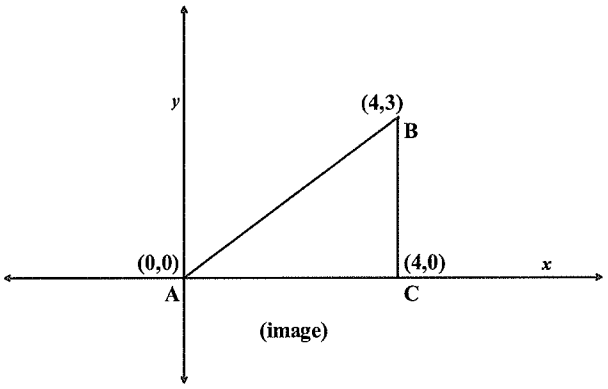
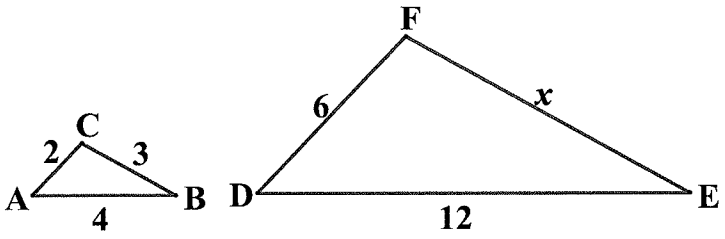
(Application)	**9-12.G.1.2. Students are able to identify and apply relationships among triangles.** **Example:** If the ratio of the sides of two similar triangles is 3 to 5, what is the ratio of their areas? • Definitions and postulates Example: Which of the following is not an isosceles triangle? a)  b)  c)  d)  • Similarity theorems Example: Which triangle is similar to the one with sides 3, 5 and 7?  a)  b)  c)  d) 

	• Congruence theorems Example: In the following figure, which triangle congruence theorem can be used to prove the two triangles congruent?  a) SSS b) SAS c) AAS d) ASA e) None of these

Indicator 2: Use properties of geometric figures to solve problems from a variety of perspectives.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.G.2.1. Students are able to recognize the relationship between a three-dimensional figure and its two-dimensional representation.** **Example:** Which of the following will fold into a cube? a) b) c) d)  **Example:** Which of the following will not fold into a pyramid? (Note: All triangles in each net are congruent.) a) b) c) d)  • Interpret floor plans • Follow instructions for assembly of a product, e.g., "some assembly required."

(Application)	**9-12.G.2.2. Students are able to reflect across vertical or horizontal lines, and translate two-dimensional figures.** **Example:** Which of the following is the image if the letter K shown in the diagram below is reflected across line **l**, then translated two units to the right? Original figure:  (a)  (b)  (c)  (d) 

	• Identify lines of symmetry. Example: How many lines of symmetry does this rectangle have?  a) 1 b) 2 c) 3 d) 4 • Use the coordinate plane. Example: Triangle ABC is shown below. What transformation was performed if the pre-image of triangle ABC has coordinates of (0,0), (4,-3), and (4, 0)?  a) rotation about the origin b) reflection across the x-axis c) dilation by a factor of -1 d) reflection across the y-axis
(Application)	**9-12.G.2.3. Students are able to use proportions to solve problems.** **Example:** Using the height and shadow length of a student and the length of a shadow of a building, find the building's height. **Example:** Given triangle ABC is similar to triangle DEF, what is the value of x?  a) 4 b) 9 c)16 d)12

Core High School Geometry
Performance Descriptors

Advanced	**High school students performing at the advanced level:** • translate and reflect a figure using the coordinate plane; • supply a missing reason and/or statement in a deductive proof.
Proficient	**High school students performing at the proficient level:** • use deductive reasoning and known properties of a geometric figure to find other properties; • use proportions to solve problems; • translate or reflect a simple figure using the coordinate plane; • match a two-dimensional drawing to its three-dimensional counterpart.
Basic	**High school students performing at the basic level:** • identify a translation or reflection; • solve a proportion.

Grade 9-12 Unpacked Core Math Standards – Geometry

9-12.G.1.1. Students are able to **apply** the properties of triangles and quadrilaterals to **find** unknown parts.

Webb Level: 2
Bloom: Application

Verbs Defined:
Apply: use, apply
Find: identify the value

Key terms defined:
Properties: The definitions, axioms, postulates, theorems, and corollaries unique to a triangle and/or a quadrilateral.
Unknown parts: Missing lengths of sides and/or missing measures of angles.

Teacher Speak:
Students are able to apply (use) the properties of triangles and quadrilaterals to find (identify the value of) unknown parts.

Student Speak:

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given two lines in the coordinate plane, I can determine if the lines are parallel, perpendicular or neither.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can identify special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can identify the relationships between two lines: parallel, intersecting and skew.
- I can identify the special angle pairs formed when two parallel lines are cut by a transversal: corresponding, alternate interior, same-side interior.
- Given the measure of one angle when two parallel lines are cut by a transversal, I can calculate the measures of all of the other angles.
- I can use the symbols for perpendicular and parallel ().
- I can use medians, angle bisectors and altitudes in a triangle to solve problems.
- I can classify special quadrilaterals based on their angle measures, side characteristics, and diagonal characteristics. (quadrilateral, rectangle, rhombus,

square, parallelogram, trapezoid, and isosceles trapezoid.)

- Given a special quadrilateral, I can identify the value of (find) its missing parts.
- I can identify the value of (find) the missing side of any right triangle in decimal form.
- Given the length of one side of a 45°-45°-90° or a 30°-60°-90° triangle, I can calculate the length of the other two sides.
- Given the measures of 3 line segments, I can determine if the line segments will form a triangle.
- Given the lengths of the three sides of a triangle, I can determine if the triangle is a right triangle.
- I can classify triangles by both the number of congruent sides and the measures of the angles.

9-12.G.2.1.Students are able to **recognize** the relationship between a three-dimensional figure and its two-dimensional representation.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Recognize: Identify

Key terms defined:
Relationship: The spatial correlation.
Three dimensional figure: A shape that is solid. It has a length, width and height.
Two-dimensional representation: A pattern that can be folded to form a three-dimensional figure, the net.

Teacher Speak:
Students are able to recognize (identify) the relationship between a three-dimensional figure and its two-dimensional representation.

Student Speak:

- Given the two dimensional representation (A pattern that can be folded to form a three-dimensional figure, the net) of a 3-dimensional shape (A shape that is solid. It has a length, width and height), I can identify the solid (polyhedron).
- Given a 3-dimensional shape (solid), I can draw its net (A pattern that can be folded to form a three-dimensional figure).

9-12.G.2.2. Students are able to **reflect** across vertical or horizontal lines, and **translate** two-dimensional figures.

Webb Level: 2/3
Bloom: Application

Verbs Defined:
Reflect: Flip (Create a mirror image)
Translate: Slide

Key terms defined:
Vertical line: Any line that is at right angles to the horizon. Any line that is perpendicular to the x-axis in the coordinate plane.
Horizontal line: Any line that is parallel to the horizon. Any line that is parallel to the x-axis in the coordinate plane.
Two-dimensional figure: A plane figure. It has a length and width.

Teacher Speak:
Students are able to reflect (flip) across vertical or horizontal lines, and translate (slide) two-dimensional figures.

Student Speak:

- I can flip (reflect) figures over a vertical line (Any line that is at right angles to the horizon. Any line that is perpendicular to the x-axis in the coordinate plane) or a horizontal line (Any line that is parallel to the horizon. Any line that is parallel to the x-axis in the coordinate plane.)
- I can draw the line(s) of symmetry on a plane figure.
- I can slide (translate) figures and identify the components.
- Given the coordinates of the pre-image, I can state the coordinates of the image after a:
  - ♣ reflection over a vertical line (Any line that is at right angles to the horizon. Any line that is perpendicular to the x-axis in the coordinate plane) or a horizontal line (Any line that is parallel to the horizon. Any line that is parallel to the x-axis in the coordinate plane.)
  - ♣ Slide (translation).
  - ♣ Composite transformation of flips (reflections) and slides (translations).

9-12.G.2.3. Students are able to **use** proportions to **solve** problems.

Webb Level: 2

Bloom: Application

Verbs Defined:
Use: Apply
Solve: solve

Key terms defined:
Proportion: An equation that states that two ratios are equivalent.

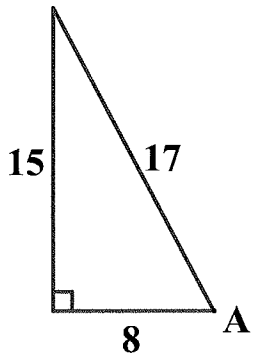
Teacher Speak:
Students are able to use (apply) proportions to solve problems. This is more than finding the missing side of two similar triangles or quadrilaterals.

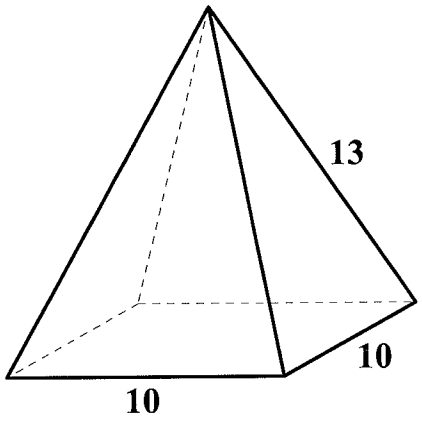
Student Speak:

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.
- I can find the missing length of a side and/or perimeter of similar polygons.

Advanced High School Geometry
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use deductive and inductive reasoning to recognize and apply properties of geometric figures.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Evaluation)	**9-12.G.1.1A. Students are able to justify properties of geometric figures.** **Example:** • Write a direct proof. • Make conjectures.
(Application)	**9-12.G.1.2A. Students are able to determine the values of the sine, cosine, and tangent ratios of right triangles.** **Example:** Determine the sine, cosine, and tangent of angle A. 
(Application)	**9-12.G.1.3A. Students are able to apply properties associated with circles.** **Example:** Find measures of angles, arcs, chords, tangents, segments and secant segments.

(Analysis)	**9-12.G.1.4A. Students are able to use formulas for surface area and volume to solve problems involving three-dimensional figures.** **Example:** Find the total surface area and volume of the regular square pyramid shown. 

Indicator 2: Use properties of geometric figures to solve problems from a variety of perspectives.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Synthesis)	**9-12.G.2.1A. Students are able to use Cartesian coordinates to verify geometric properties.** **Example:** Prove that $\triangle ABC$ is a right triangle, given A(0,0), B(–2,6), and C(3,1).

Grade 9-12 Unpacked Advanced Math Standards – Geometry

9-12.G.1.1.A. Students are able to **justify** properties of geometric figures.

Webb Level: 3
Bloom: Evaluation

Verbs Defined:
Justify: Explaining

Key terms defined:
Properties: set of mathematical rules, definitions, postulates and theorems
Geometric Figures: any two or three dimensional shape

Teacher Speak:
Students are able to justify (explain) properties of geometric figures.

Student Speak:

- Given a property of a geometric figure:
  - ♣ I can explain why a statement is true.
  - ♣ If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and indirect proofs for geometric shapes.

9-12.G.1.2A. Students are able to **determine** the values of the sine, cosine, and tangent ratios of right triangles.

Webb Level: 1
Bloom: Application

Verbs Defined:
Determine: find

Key terms defined:
Sine: In a right triangle, it is the ratio of the opposite leg to the hypotenuse.
Cosine: In a right triangle, it is the ratio of the adjacent leg to the hypotenuse.
Tangent: In a right triangle, it is the ratio of the opposite leg to the adjacent leg.
Ratio: A quotient of two numbers or like quantities.

Teacher Speak:
Students are able to determine (find) the values of the sine, cosine, and tangent ratios of right triangles.

Student Speak:

- Given any two sides of a right triangle, I can find the ratios for sine, cosine and tangent.
- Given any two parts of a right triangle, I can find all of the missing parts.
- I can use sine, cosine and tangent ratios to solve application problems that involve right triangles.

9-12.G.1.3A. Students are able to **apply** properties associated with circles.

Webb Level: 2
Bloom: Application

Verbs Defined:
Apply: Use

Teacher Speak:
Students are able to apply properties associated with circles.

Student Speak:

- I can state the similarities and differences between a chord and a diameter.
- Given the arc measures, I can find the measures of a central angle, an inscribed angle, the angle inside a circle formed by two chords, and the angle outside the circle formed by a combination of secants and/or tangents.
- I can find the measure of the angle formed by the tangent and radius.
- From given values, I can find the missing parts of chords, secants, and tangents.

9-12.G.1.4A. Students are able to **use** formulas for surface area and volume to **solve** problems involving three-dimensional figures.

Webb Level: 1
Bloom: Analysis

Verbs Defined:
Use: apply

Solve: solve

Key terms defined:
Surface area: the area of the exterior of any solid object
Volume: the number cubes that are contained within any solid object
Three-Dimensional Figures: prisms, pyramids, cones, spheres and cylinders

Teacher Speak:
Students are able to use (apply) formulas for surface area and volume to solve problems involving three-dimensional figures.

Student Speak:
- Given the appropriate formulas, I can find the surface area or volume of any solid object or a combination of solid objects.
- Given the surface area or volume of any solid object, I can find the key missing parts.

9-12.G.2.1A. Students are able to **use** Cartesian coordinates to **verify** geometric properties.

Webb Level: 2
Bloom: Synthesis

Verbs Defined:
Use: Apply
Verify: Show

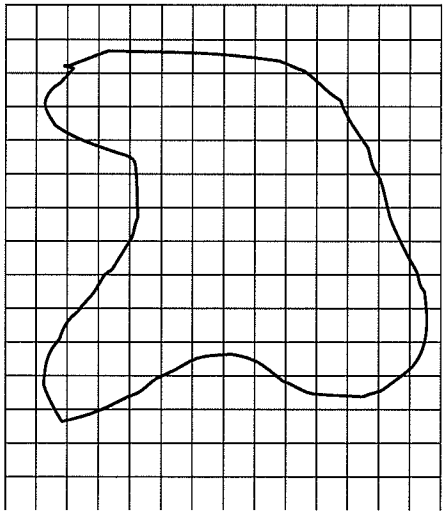
Key terms defined:
Cartesian coordinates: x-y plane.
Geometric properties: Set of mathematical rules, definitions, postulates and theorems.

Teacher Speak:
Students are able to use (apply) Cartesian coordinates to verify (show)geometric properties.

Student Speak:
I can use apply Cartesian Coordinate System to show the geometric properties including:
- ♣ Midpoint
- ♣ Two shapes congruent and similar.
- ♣ Special segments in a triangle (median, altitude, angle bisector, cicumcenter, incenter, orthocenter, centroid).
- ♣ The relationships of all quadrilaterals.

Seventh Grade Measurement
Grade Standards, Supporting Skills, and Examples

Indicator 1: Apply measurement concepts in practical applications.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**7.M.1.1. Students are able to select, use, and convert appropriate units of measurement for a situation including capacity and angle measurement.** • Measure angles $\leq 180^{\circ}$ to the nearest degree. • Measure length, capacity, and mass. • Convert within the Metric system (kilo- thru milli-). • Convert within the U.S. Customary system (weight, length, capacity).
(Comprehension)	**7.M.1.2. Students, when given the formulas, are able to find circumference, perimeter, and area of circles, parallelograms, triangles, and trapezoids (whole number measurements).** • Use appropriate unit of measure. • Estimate the area of irregular shapes. Example: Use a grid to find the approximate area of the lake. 

Seventh Grade Measurement
Performance Descriptors

Advanced	**Seventh students performing at the advanced level:** • use perimeter, circumference, and area formulas to solve problems; • select, use, and convert appropriate units of measure to solve problems; • draw and use grids to estimate the area of a shape.
Proficient	**Seventh grade students performing at the proficient level:** • select and use the appropriate formula to find the perimeter, circumference, and area of a shape; • select and use appropriate units of measure; • convert units of measure.
Basic	**Seventh grade students performing at the basic level:** • given the formula find the perimeter and area of a shape; • select appropriate units of measure.

Grade 7 Unpacked Math Standards - Measurement

7.M1.1.Students are able to **select, use, and convert** appropriate units of measurement for a situation including capacity and angle measurement.

Webb level: 1/2
Bloom: Comprehension

Verbs Defined:
Select: choose
Use: use/measure
Convert: convert

Key Terms Defined:

Teacher Speak:
Students are able to select (choose), use (use/measure), and convert appropriate units of measurement for a situation including capacity and angle measurement.

Student Speak:
I can:
* measure (use) length (to nearest millimeter), capacity, and mass in the metric system
* measure (use) length (to nearest $^{1}/_{8}$ inch), capacity, and weight in the U.S. customary system
* measure (use) angles $\leq 180°$ to the nearest degree
* convert within the metric system for kilo- thru milli-
* convert within the U.S. customary system for capacity, weight and length
* choose (select) the correct unit to label length, capacity, and mass in the metric system and U.S. customary system

7.M.1.2. Students, when given the formulas, are able to **find** circumference, perimeter, and area of circles, parallelograms, triangles, and trapezoids (whole number measurements).

Webb level: 1
Bloom: Comprehension

Verbs Defined:
Find: calculate/find

Key Terms Defined:
Circumference: distance around a circle

Teacher Speak:
Students, when given the formulas, are able to find/calculate circumference, perimeter, and area of circles, parallelograms, triangles, and trapezoids (whole number measurements).

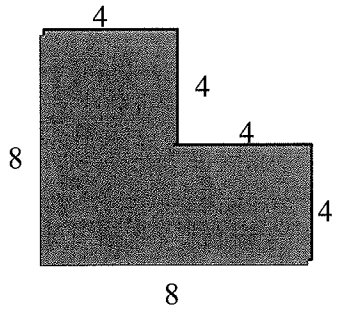
Student Speak:
I can find (calculate) the perimeter for:
* parallelograms
* triangles
* trapezoids

When given the formula, I can find (calculate) the area for:
* circles
* parallelograms
* triangles
* trapezoids

When given the formula, I can find (calculate) the circumference.
I can estimate the area of an irregular shape by using what I know about area and perimeter.
I can use the correct unit to label perimeter, circumference and area.

Eighth Grade Measurement
Grade Standards, Supporting Skills, and Examples

Indicator 1: Apply measurement concepts in practical applications.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.M.1.1. Students are able to apply proportional reasoning to solve measurement problems with rational number measurements.** • Conversion within measurement systems. • Use scale drawings to represent situations. • Indirect measurement. Examples: 1) One of the models of King Kong was 18 inches tall. How tall was King Kong in the movie if the scale is 3 in. = 4 ft.? 2) A lake front building that is 26 ft. high casts a shadow on the water. How long is the shadow if a 10 ft. high truck parked nearby casts a 7 ft. shadow?
(Comprehension)	**8.M.1.2. Students are able to find area, volume, and surface area with whole number measurements.** • Use appropriate unit of measure • Apply strategies and/or formulas. • Volume of rectangular prisms, rectangular pyramids, cylinders, and cones. • Surface area of rectangular prisms and cylinders. • Area of composite shapes. Example: Find the area of the figure. 

Eighth Grade Measurement
Performance Descriptors

Advanced	**Eighth students performing at the advanced level:** • solve measurement problems without pictorial representation; • apply formulas for volume and surface area to solve problems; • write appropriate formulas to find the area of composite shapes.
Proficient	**Eighth grade students performing at the proficient level:** • solve measurement problems given pictorial representation; • select and use formulas to find volume and surface area; • find area of composite shapes.
Basic	**Eighth grade students performing at the basic level:** • convert units within a measurement system; • find area and volume given the formula.

Grade 8 Unpacked Math Standards – Measurement

8.M.1.1. Students are able to **apply** proportional reasoning to **solve** measurement problems with rational number measurements.

Webb level: 2
Bloom: Application

Verbs Defined:
Apply: use/write
Solve: calculate the solution for

Key Terms Defined:
Proportional reasoning: using proportions to solve a problem
Rational number: a number that can be written as a ratio of two integers

Teacher Speak:
Students are able to apply (use) proportional reasoning to solve (calculate the solution for) measurement problems with rational number measurements.

Student Speak:
Using rational numbers,
I can:
* calculate the solution for (solve) a proportion.
* write and solve a proportion for a given scale or a scale drawing (proportional reasoning).
* write and solve a proportion for a word problem to find a distance that could not be measured easily (indirect measurement).

8.M.1.2. Students are able to **find** area, volume, and surface area with whole number measurements.

Webb level: 1/2
Bloom: Comprehension

Verbs Defined:
Find: calculate

Key Terms Defined:
Volume: the number of cubic units needed to fill the space inside the figure (rectangular prisms, rectangular pyramids, cylinders, and cones)
Surface area: the number of square units needed to cover the outside of the figure

(rectangular prisms and cylinders)

Teacher Speak:
Students are able to find (calculate) area, volume, and surface area with whole number measurements.

Student Speak:
When given the formulas, I can calculate (find) the volume of:
*rectangular prisms
*rectangular pyramids
*cylinders
*cones
When given the formulas, I can calculate (find) surface area of:
*rectangular prisms
*cylinders
I can find the area of a figure that is made up of two or more squares, rectangles, or triangles (composite shape).
I can use the correct unit to label volume, surface area and area.

Core High School Measurement
Grade Standards, Supporting Skills, and Examples

Indicator 1: Apply measurement concepts in practical applications.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.M.1.1. Students are able to choose appropriate unit label, scale, and precision.** **Examples:** 1) Which would be the best unit of measure for the volume of a pitcher - cubic centimeters, cubic yards, or pounds? 2) The radius of a circle is 1.30 cm. Which is the most reasonable approximation for its circumference? a) 8.2 cm b) 8 cm c) 8.16814 cm d) 8.1610899 cm 3) In determining the area of a flower garden, an unreasonable answer is: a) 25.8 square feet b) 26 square feet c) 26.5 square feet d) 26.5278394 square feet • Determine appropriate scales for histograms, scatterplots, and other graphs.
(Comprehension)	**9-12.M.1.2. Students are able to use suitable units when describing rate of change.** **Examples:** 1) Find the average change in temperature in degrees per hour. 2) In 1903, there were 20,000 people in South Dakota. The population of South Dakota today is about 700,000. What units would describe the average rate of change in the population?
(Application)	**9-12.M.1.3. Students are able to use formulas to find perimeter, circumference, and area to solve problems involving common geometric figures.** **Examples:** 1) Find the radius of a circle that has an area of 100 π square units. 2) Given points (3,1), (6,1), and (4,6), sketch the triangle and find its area. • Use algebraic expressions with geometric formulas.

	Examples: 1) Given the measures of a diagonal and one side of a rectangle, find the area of the rectangle. 2) Given the circumference of a circle, find the area. 3) The length of a rectangle is five units more than its width. The perimeter is 170 units. Find the dimensions.

Core High School Measurement
Performance Descriptors

Advanced	**High school students performing at the advanced level:** • use dimensional analysis to solve problems; • apply indirect measurement methods; • represent and solve problems involving volume and surface area.
Proficient	**High school students performing at the proficient level:** • select a suitable unit of measure for problem situations, including rate of change; • choose an appropriate scale for a graph; • represent and solve problems involving perimeter, circumference, and area.
Basic	**High school students performing at the basic level:** • recognize a unit of measure that describes a rate of change problem; • find circumference and area of circles; • find perimeter and area of rectangles and triangles.

Grade 9-12 Unpacked Core Math Standards – Measurement

9-12.M.1.1.Students are able to **choose** appropriate unit label, scale, and precision.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Choose: Determine

Key terms defined:
Unit label: The most appropriate measurement quantity for the situation.
Scale: The horizontal and vertical divisions that fit the data.
Precision: The accepted tolerance level.

Teacher Speak:
Students are able to choose (determine) appropriate unit label, scale, and precision.

Student Speak:

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

9-12.M.1.2. Students are able to **use** suitable units when **describing** rate of change.

Webb Level: 2
Bloom: Comprehension

Verbs Defined:
Use: use
Describing: expressing

Key terms defined:
Suitable units: Commonly accepted divisions of measure.
Rate of change: Slope

Teacher Speak:

Students are able to use suitable units when describing (expressing) rate of change.

Student Speak:

- I can determine the rate of change (slope) using the most commonly accepted units.
- Given the equation of a line of best fit, I can interpret the meaning of the slope of the situation including the correct units.
- Given the graph, I can interpret the meaning of the slope of the situation including the correct units.

9-12.M.1.3. Students are able to **use** formulas to **find** perimeter, circumference, and area to **solve** problems involving common geometric figures.

Webb Level: 1/2
Bloom: Application

Verbs Defined:
Use: recall and apply
Find: compute/calculate
Solve: solve

Key terms defined:
Formula: A general mathematical statement or rule.
Perimeter: The distance around a closed planar geometric figure.
Circumference: The distance around a circle.
Area: The amount of space contained inside a planar figure.
Common geometric figures: Circle, square, rectangle, triangle.

Teacher Speak:
Students are able to use (recall and apply) formulas to find (compute/calculate) perimeter, circumference, and area to solve problems involving common geometric figures.

Student Speak:

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.
- I can solve measurement problems without pictorial information.
- Given the area (the amount of space contained inside a planar figure) or perimeter

(the distance around a closed planar geometric figure), I can solve for missing parts.

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures (circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.

Advanced High School Measurement
Grade Standards, Supporting Skills, and Examples

Indicator 1: Apply measurement concepts in practical applications.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.M.1.1A. Students are able to use dimensional analysis to check answers and determine units of a problem solution.** **Example:** An interplanetary probe travels 30,400 miles/hour. Express this as meters/second.
(Analysis)	**9-12.M.1.2A. Students are able to use indirect measurement in problem situations that defy direct measurement.** **Example:** An electronic measuring device on the ground 320 feet from the base of the dam at Lake Pactola determines the distance to the top to be 400 feet. How high is the dam?

* unpack standards not available

Seventh Grade Number Sense
Grade Standards, Supporting Skills, and Examples

Indicator 1: Analyze the structural characteristics of the real number system and its various subsystems. Analyze the concept of value, magnitude, and relative magnitude of real numbers.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**7.N.1.1. Students are able to represent numbers in a variety of forms by describing, ordering, and comparing integers, decimals, percents, and fractions.** **Examples**: 1) Arrange in order from least to greatest 2, $\frac{1}{2}$, 1.5, 75%. 2) Choose the number that is closest to $\frac{1}{4}$: a) 0.4 b) 1.4 c) 0.14 d) 0.3 e) 2.5 3) Suppose a recipe calls for ¾ c. sugar. Juanita has the following measuring cups: 1 cup, $\frac{1}{2}$ cup, $\frac{1}{3}$ cup, $\frac{1}{4}$ cup, $\frac{1}{8}$ cup, and a tablespoon ($\frac{1}{16}$cup). Record different ways to measure $\frac{3}{4}$cup. • Describe and compare numbers using ratios including appropriate notation, e.g., a:b, $\frac{a}{b}$, a to b. √ *Scientific notation, calculator notation.* √ *Include percents less than one and greater than 100.* √ *Identify, represent, compare, and order rational numbers and represent them on a number line.*
(Application)	**7.N.1.2. Students are able to find and use common multiples and factors of whole numbers.** **Examples**: 1) List the 1st five multiples of each of these numbers: 5, 8 and 2. • Least Common Multiple Example: 1) Find the Least Common Multiple of 2, 3 and 5. • Greatest Common Factor Example: Find the Greatest Common Factor of 6 and 42.

	• Divisibility rules (2, 3, 4, 6, 9, 10). Example: 1) Write a digit in the blank so that the entire number is divisible by 3. 5 _, 203 2) Will any other digits work? Explain your thinking.

Indicator 2: Apply number operations with real numbers and other number systems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.N.2.1. Students are able to add, subtract, multiply, and divide integers and positive fractions.** **Examples:** 1) Sue received \$100 from her mom for shopping. On a recent shopping trip to the mall she spent \$55 at the clothing store and \$28 at the jewelry store. What was her financial status at the end of the afternoon? Was it positive or negative? Use integers to solve. 2) Suppose Cody jogged $\frac{3}{4}$ mile yesterday and $1\frac{1}{8}$ miles today. How much did he jog all together? How much farther did he jog today than yesterday? 3) Emerick bought a $3\frac{1}{2}$ pound package of hamburger. How many $\frac{1}{2}$ pound burgers can you make? Explain the strategy used.

Indicator 3: Develop conjectures, predictions, or estimations to solve problems and verify or justify the results.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**7.N.3.1. Students are able to use various strategies to solve one- and two-step problems involving positive fractions and integers.** **Example:** Bill received \$200 for his birthday. He spent $\frac{1}{4}$ of it on new CDs. Does he have enough to buy a \$178.99 T.V. set? Explain. • Formulate rules to solve practical problems involving integers (problem solving). • Use estimation strategies to make predictions and test the reasonableness of the answer. • Explain strategies and justify answers.

Seventh Grade Number Sense
Performance Descriptors

Advanced	**Seventh grade students performing at the advanced level:** • justify problem-solving strategies used in multi-step situations with integers and positive fractions.
Proficient	**Seventh grade students performing at the proficient level:** • read, represent, estimate, and calculate with integers and positive fractions; • find and use least common multiples and greatest common factors; • apply problem-solving strategies in one- and two-step situations with integers and positive fractions.
Basic	**Seventh grade students performing at the basic level:** • read, represent, estimate, and calculate decimals; • find common factors and multiples; • apply problem solving strategies in one- and two-step situations with decimals.

Grade 7 Unpacked Math Standards – Number Sense

7.N.1.1. Students are able to **represent** numbers in a variety of forms by **describing**, **ordering**, and **comparing** integers, decimals, percents, and fractions.

Webb level: 2
Bloom: Comprehension

Verbs Defined:
Represent: write
Describe: represent a situation in the correct number form
Order: order
Compare: determine if a number is greater than, less than, or equal to another number

Key Terms Defined:
Integers: whole numbers and their opposites, (…-2, -1, 0, 1, 2…)

Teacher Speak:
Students are able to represent (write) numbers in a variety of forms by describing (representing a situation in the correct number form), ordering, and comparing (determining if a number is greater than, less than, or equal to another number) integers, decimals, percents and fractions.

Student Speak:
I can:
*write (represent) numbers as integers, decimals, percents and fractions.
*write fractions as ratios (3:4, 3 to 4, ¾)
*arrange integers, decimals, percents and fractions in order.
*determine if an integer, decimal, percent, or fraction is greater than, less than, or equal to another number (compare).

7.N.1.2. Students are able to **find** and **use** common multiples and factors of whole numbers.

Webb level: 1/2
Bloom: Application

Verbs Defined:
Find: determine
Use: use

Key Terms Defined:
Factor: a whole number that divides another whole number without a remainder
- **Greatest common factor**: the largest factor of two or more numbers

Multiple: a product of two whole numbers
- **Common multiple**: a multiple that is the same for two or more numbers
- **Least common multiple**: the smallest common multiple for two or more numbers

Whole numbers: counting numbers and zero (0, 1, 2, …)

Teacher Speak:
Students are able to find (determine) and use (apply) common multiples and factors of whole numbers.

Student Speak:
I can determine (find)
*common factors and greatest common factor of two numbers
*common multiples and least common multiple of two or three numbers
I can use
*common factors and greatest common factor of two numbers to solve problems
*common multiples and least common multiple of two or three numbers to solve problems
I can use divisibility rules for 2, 3, 4, 5, 6, 9, and 10.

7.N.2.1. Students are able to **add, subtract, multiply,** and **divide** integers and positive fractions.

Webb level: 1
Bloom: Application

Verbs Defined:

Key terms defined:
Integers: whole numbers and their opposites
Positive fractions: fractions greater than zero

Teacher Speak:
Students are able to add, subtract, multiply and divide integers and positive fractions.

Student Speak:
I can:

*add/subtract integers (...-2, -1, 0, 1, 2,...).
*multiply/divide integers (...-2, -1, 0, 1, 2,...).
*add/subtract positive fractions.
*multiply/divide positive fractions.

7.N.3.1. Students are able to **use** various strategies to **solve** one- and two-step problems involving positive fractions and integers.

Webb level: 2
Bloom: Application

Verbs defined:
Use: apply
Solve: find the solution to

Key terms defined:
Strategies: methods

- estimation,
- guess and check,
- make a table or organized list,
- work a simpler problem,
- look for a pattern,

One-step problems: one-operation problems
Two-step problems: two-operation problems
Positive fractions: fractions greater than zero
Integers: whole numbers and their opposites

Teacher Speak:
Students are able to use (apply) various strategies to solve (find the solution to) one- and two-step problems involving positive fractions and integers.

Student Speak:
I can:
*apply (use) estimation, guess and check, make a table or organized list, work a simpler problem, look for a pattern, (strategies) to find the solution (solve) for one-step problems involving positive fractions and integers.
*apply (use) estimation, guess and check, make a table or organized list, work a simpler problem, look for a pattern, (strategies) to find the solution for two-step problems involving positive fractions and integers.

Eighth Grade Number Sense

Grade Standards, Supporting Skills, and Examples

Indicator 1: Analyze the structural characteristics of the real number system and its various subsystems. Analyze the concept of value, magnitude, and relative magnitude of real numbers.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**8.N.1.1. Students are able to represent numbers in a variety of forms and identify the subsets of rational numbers.** • Exponents • Scientific notation • Absolute value • Radicals (perfect squares) • Graph on a number line Example: Choose four numbers between two and three and place them on a number line. √ *Explain the effects of operations on the magnitude of rational numbers.* *Example:* *Use an area model to show that multiplying 5 by a number >1 results in an answer >5, but multiplying 5 by a number <1 results in an answer <5.* √ *Multiplication and division of an inequality by a negative number.*

Indicator 2: Apply number operations with real numbers and other number systems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.N.2.1. Students are able to read, write, and compute within any subset of rational numbers.** • Solve problems involving discount, markup, commission, profit, and simple interest. Example: The school store buys notebooks for \$.30. They sell them for \$.50. What is the percent of markup on each notebook? If they sell 170 notebooks, what is their profit?

Indicator 3: Develop conjectures, predictions, or estimations to solve problems and verify or justify the results.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**8.N.3.1. Students are able to use various strategies to solve multi-step problems involving rational numbers.** **Examples:** 1) A soccer team won 48 of its first 80 games. How many of its next 50 games must the team win in order to maintain the ratio of wins to losses? 2) A certain rectangle has whole number dimensions in inches and the ratio of its length to width is 4 to 3. Its area is 300 square inches. What is the length and width of the rectangle? • Explain strategies and justify answers. • Formulate rules to solve practical problems involving rational numbers. • Use estimation strategies to make predictions and test the reasonableness of the answer. Example: Estimate $\sqrt{20}$ √ *Formulate counter-examples to disclaim given assertions.*

Eighth Grade Number Sense
Performance Descriptors

Advanced	**Eighth grade students performing at the advanced level:** • justify problem-solving strategies used in multi-step situations within the set of rational numbers.
Proficient	**Eighth grade students performing at the proficient level:** • read, represent, estimate, and calculate using the set of rational numbers; • apply problem-solving strategies in multi-step situations using the set of rational numbers.
Basic	**Eighth grade students performing at the basic level:** • read, represent, estimate, and calculate integers and positive fractions; • apply problem-solving strategies in one- and two-step situations with integers and positive fractions.

Grade 8 Unpacked Math Standards – Number Sense

8.N.1.1. Students are able to **represent** numbers in a variety of forms and **identify** the subsets of rational numbers.

Webb level: 1
Bloom: Comprehension

Verbs Defined:
Represent: write/graph
Identify: recognize

Key Terms Defined:
Variety of forms: exponents, scientific notation, absolute value, radicals involving perfect squares, graph of a number
Subsets of rational numbers: set of natural numbers, set of whole numbers, set of integers

Teacher Speak
Students are able to represent (write) numbers in a variety of forms and identify (recognize) the subsets of rational numbers.

Student Speak
I can:
*write (represent) numbers in different forms:
exponential
scientific notation
absolute value
radicals involving perfect squares
*graph (represent) numbers on a number line
*recognize (identify) the numbers within the sets of natural numbers, whole numbers, and integers (subsets of rational numbers)

8.N.2.1. Students are able to read, write, and **compute** within any subset of rational numbers.

Webb level: 1/2
Bloom: Application

Verbs Defined:
Compute: calculate

Key Terms Defined:
rational numbers: natural numbers, whole numbers, integers, fractions, decimals, percents (any number written as a fraction,)

Teacher Speak:
Students are able to read, write and compute (calculate) within any subset of rational numbers.

Student Speak:
I can:
*read natural numbers, whole numbers, integers, fractions, decimals and percents
*write natural numbers, whole numbers, integers, fractions, decimals, and percents
*compare within the subsets of rational numbers
*calculate (compute) problems involving rational numbers
- negative and positive fractions
- negative and positive decimals
- integers

* solve problems involving
- discount
- commission
- percent of profit
- mark-up
- simple interest
- percent increase
- percent decrease

8.N.3.1. Students are able to **use** various strategies to **solve** multi-step problems involving rational numbers.

Webb level: 2
Bloom: Application

Verbs Defined:
Use: apply
Solve: find the solution to

Key Terms Defined:
Strategies: methods
- estimation,
- guess and check,

- make a table or organized list,
- work a simpler problem,
- look for a pattern,

Multi-step problems: problems involving at least two steps
Rational numbers: any number that can be expressed as ratio of two integers; the denominator cannot be zero

Teacher Speak:
Students are able to use (apply) various strategies to solve (find the solution to) multi-step problems involving rational numbers.

Student Speak:
I can:
*apply (use) estimation, guess and check, make a table or organized list, work a simpler problem, look for a pattern, (strategies) to find the solution for problems that involve at least two steps (multi-step problems) involving rational numbers.

Core High School Number Sense
Grade Standards, Supporting Skills, and Examples

Indicator 1: Analyze the structural characteristics of the real number system and its various subsystems. Analyze the concept of value, magnitude, and relative magnitude of real numbers.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.N.1.1. Students are able to identify multiple representations of a real number.** **Example:** Which of the following does not represent the same number? a) $\frac{4}{4}$ c) 3^0 b) $6-5$ d) $\frac{0}{0}$ • Given a real number identify the subset(s) of real numbers to which it belongs. Example: Which of the following is an integer? a) $\frac{4}{7}$ b) $\frac{4}{10}$ c) $\frac{4}{2}$ d) $-\frac{4}{3}$ Example: Which of the following is a rational number? a) $2\sqrt{2}$ b) π c) $\sqrt{4}$ d) 5.121221222 … • Represent rational and irrational numbers in different forms. Example: Write the decimal 0.757575… as a fraction in lowest terms.

(Comprehension)	**9-12.N.1.2. Students are able to apply the concept of place value, magnitude, and relative magnitude of real numbers.** **Example:** Put the following in order from largest to smallest: $-3,\ 0.0032,\ \frac{2}{3},\ \sqrt{10},\ -5$ • Scientific notation Example: Which is larger: 2.3×10^{6} or 3.2×10^{5}? • Infinitely many solutions Examples: 1) $x>4$ has infinitely many real solutions 2) $x+2=y$ has infinitely many ordered pair solutions • Completeness of the real numbers (density, i.e. between any two real numbers is another real number) Example: Find two real numbers between $\frac{1}{3}$ and $\frac{1}{4}$.

Indicator 2: Apply number operations with real numbers and other number systems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.N.2.1. Students are able to add, subtract, multiply, and divide real numbers including integral exponents.** **Examples:** Expand each of the following as a rational number in lowest terms. 1) $\left(\frac{2^{-1}+2}{4}\right)$ 2) $\left(\frac{2}{3}\right)^{2}+3$

Indicator 3: Develop conjectures, predictions, or estimations to solve problems and verify or justify the results.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.N.3.1. Students are able to use estimation strategies in problem situations to predict results and to check the reasonableness of results.** **Examples:** 1) When traveling at 72 miles per hour, is it possible to travel 350 miles in 2 hours? 2) At a salary of $210 per month, is the annual income about $24,000? • Use rounding as an estimation strategy. Examples: 1) Given the diameter of a circle is 9.8 inches, estimate its circumference. 2) The cost of shelving is 7 cents per inch. Estimate the cost of 48 inches of shelving. 3) The length of a rectangle is 4.25 cm and the width is 2.95 cm. Approximately what is the perimeter? • Use non-routine estimation strategies. Examples: 1) Approximately how many cubic centimeters are in a gallon of milk? (Students might solve this by guessing how many cubic centimeter cubes would fill the jug or by estimating the cubic centimeters in a quart.) 2) Approximate the area of an irregular shape drawn on a grid by counting the squares. 3) Explain how to find the surface area of your hand.

(Comprehension)	**9-12.N.3.2. Students are able to select alternative computational strategies and explain the chosen strategy.** **Example:** Using mental math, which two numbers should be added first? $250 + 613 + 750$ • Use properties of numbers that allow operational shortcuts for computational procedures. Examples: 1) $103(17) = 100(17) + 3(17)$ 2) Rearrange and group to add the following: $-7 + 4 + 8 + (-2) + (-12) + 5 + 2$

Core High School Number Sense
Performance Descriptors

Advanced	**High school students performing at the advanced level:** • classify a number as real, pure imaginary, or complex; • evaluate numerical expressions using rational exponents; • explain a reasonable solution to a problem.
Proficient	**High school students performing at the proficient level:** • identify the subsets of the set of real numbers to which a given number belongs; • evaluate numerical expressions using integral exponents; • check reasonableness of a solution to a problem.
Basic	**High school students performing at the basic level:** • give an example of each of the following: a whole number, an integer, and a rational number; • evaluate numerical expressions using whole number exponents.

Grade 9-12 Unpacked Core Math Standards – Number Sense

9-12.N.1.1.Students are able to **identify** multiple representations of a real number.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Identify: write, classify

Key terms defined:
Multiple representations: equivalent expressions
Real Number: Any number that can be graphed on the number line. This includes rational and irrational numbers.

Teacher Speak:
Students are able to identify (classify) and write multiple representations of a real number.

Student Speak:

- Given a real number (Any number that can be graphed on the number line. This includes rational and irrational numbers), I can write and/or classify (identify) the subset(s) of the real numbers to which it belongs (rational, irrational, integers, whole numbers, natural numbers).
- I can write (identify) any rational number as a fraction and decimal.

9-12.N.1.2. Students are able to **apply** the concept of place value, magnitude, and relative magnitude of real numbers.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Apply: apply

Key terms defined:
Place Value: The value of a digit based on its position in a number in standard form.
Magnitude: distance from the origin on the number line.
Relative magnitude: comparison of size of subsets of real numbers.
Real Number: Any number that can be graphed on the number line. This includes rational

and irrational numbers.

Teacher Speak:
Students are able to apply the concept of place value, magnitude, and relative magnitude of real numbers.

Student Speak:

- Given any two real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.), I can find another real number between them.
- I can arrange real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.) in order by criteria.
- I can compare real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers) written in a variety of forms.
  - ♣ Square roots
  - ♣ Decimals
  - ♣ Scientific notation
  - ♣ Fractions

9-12.N.2.1. Students are able to **add**, **subtract**, **multiply**, and **divide** real numbers including integral exponents.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:

Key terms defined:
Real Number: Any number that can be graphed on the number line. This includes rational and irrational numbers.
Integral exponents: Powers that are integers.

Teacher Speak:
Students are able to add, subtract, multiply, and divide real numbers including integral exponents.

.

Student Speak:

- I can add, subtract, multiply and divide:
  - ♣ Numerical expressions containing rational numbers.
  - ♣ Numerical expressions containing integral exponents (powers that are

integers).
- I can evaluate complex fractions.

9-12.N.3.1. Students are able to **use** estimation strategies in problem situations to **predict** results and to **check** the reasonableness of results.

Webb Level: 2
Bloom: Analysis

Verbs Defined:
Use: apply
Predict: conjecture
Check: determine the appropriateness of the result

Key terms defined:
Estimation strategies: methods of approximation
Problem Situation: a setting in which to find an unknown
Reasonableness: appropriateness

Teacher Speak:
Students are able to use (apply) methods of approximation in problem situations to predict (conjecture) results and to check (determine the appropriateness of) results.

Student Speak:
- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.
- I can find the area and volume of irregular shapes applying (using) estimation strategies (methods of approximation).

9-12.N.3.2. Students are able to **select** alternative computational strategies and **explain** the chosen strategy.

Webb Level: 3
Bloom: Comprehension

Verbs Defined:
Select: choose and apply

Explain: justify

Key terms defined:
Alternative computational strategies: properties of numbers that allow operational shortcuts for computational procedures.

Teacher Speak
Students are able to select (choose and apply) alternative computational strategies and explain (justify) the chosen strategy.

Student Speak
- I can mentally rearrange and group a list of numbers to find the sum.
- I can use the distributive property to compute the product of two numbers.
- I can justify (explain) the operational shortcuts I use for computational procedures.

Advanced High School Number Sense
Grade Standards, Supporting Skills, and Examples

Indicator 1: Analyze the structural characteristics of the real number system and its various subsystems. Analyze the concept of value, magnitude, and relative magnitude of real numbers.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**9-12.N.1.1A. Students are able to describe the relationship of the real number system to the complex number system.** **Example:** 1) Identify the imaginary part of $5+4i$. 2) What is the magnitude of $2+3i$?
(Application)	**9-12.N.1.2A. Students are able to apply properties and axioms of the real number system to various subsets, e.g., axioms of order, closure.** **Examples:** 1) Is the set $\{1, 2, 3\}$ closed under addition? 2) Which of these operations are commutative? a) addition b) subtraction c) multiplication d) division

Indicator 2: Apply number operations with real numbers and other number systems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Application)	**9-12.N.2.1A. Students are able to add, subtract, multiply, and divide real numbers including rational exponents.** **Examples:** Express as a rational number in lowest terms: 1) $\left(8^{\frac{2}{3}} - 8^{\frac{1}{3}}\right)^3$ 2) $\dfrac{\left(2^{-3}+2^{2}\right)^{-1}}{2^{-1}}$ • Simplify numeric expressions with radicals. Example: 1) Perform the indicated operation: $\sqrt{\frac{27}{5}} - \sqrt{\frac{3}{5}}$ 2) Is $\dfrac{4}{1+\sqrt{5}}$ equivalent to $-1+\sqrt{5}$?

Indicator 3: Develop conjectures, predictions, or estimations to solve problems and verify or justify the results.

Note: Skills for this indicator have been subsumed within applications to advanced skills by the time students reach advanced high school mathematics.

Grade 9-12 Unpacked Advanced Math Standards – Number Sense

9-12.N.1.1A. Students are able to **describe** the relationship of the real number system to the complex number system.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Describe: Compare and contrast

Key terms defined:
Real Number System: The set of numbers consisting of the union of rational and irrational numbers.
Complex Number System: The set of numbers consisting of the union of imaginary and real numbers.

Teacher Speak:
Students are able to describe (compare and contrast) the relationship of the real number system to the complex number system.

Student Speak:
I can state the similarities between the real numbers and the complex numbers.
I can state the differences between the real numbers and the complex numbers.
I can find the absolute value (magnitude) of a complex number.
I can identify the parts (imaginary or real) of a complex number.
I can graph points in the complex plane.
Given a point in a complex plane, I can state its coordinate.

9-12.N.1.2A. Students are able to **apply** properties and axioms of the real number system to various subsets, e.g., axioms of order, closure.

Webb Level: 1
Bloom: Application

Verbs Defined:
Apply: Identify

Key terms defined:
Properties: A set of mathematical rules or laws that results in an equivalent expression.
Axiom: A basic assumption about a mathematical system from which theorems can be

deduced.
Subset: A set that is contained within another set.

Teacher Speak:
Students are able to apply (use) properties and axioms of the real number system to various subsets, e.g., axioms of order, closure.

Student Speak:
I can identify the following properties of a subset:

- Closure under multiplication.
- Closure under addition.
- Associative property of addition.
- Associative property of multiplication.
- Commutative property of addition.
- Commutative property of multiplication.
- Distributive property of multiplication over addition/subtraction.
- Additive inverse property (Property of opposites).
- Multiplicative inverse property.
- Multiplicative property of zero (Zero product property).
- Identity property of addition.
- Identity property of multiplication.

9-12.N.2.1A. Students are able to **add, subtract, multiply**, and **divide** real numbers including rational exponents.

Webb Level: 2
Bloom: Application

Key terms defined:
Real Number: Any number that can be graphed on the number line. This includes rational and irrational numbers.
Rational Exponent: A power that can be expressed as a rational number.

Teacher Speak:
Students are able to add, subtract, multiply, and divide real numbers including rational exponents.

Student Speak:

- I can add, subtract, multiply and divide:
  - ♣ Numerical expressions containing real numbers.
  - ♣ Expressions in radical form.

- ♣ Numerical expressions containing rational exponents (powers that are rational numbers).

- I can simplify expressions that contain radicals.
- I can write an expression with a rational exponent in radical form and vice-verse.
- I can rationalize the denominator.
- I can simplify a complex fraction that contains expressions with rational exponents.

Seventh Grade Statistics & Probability
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use statistical models to gather, analyze, and display data to draw conclusions.

<table>
<tr><th>Bloom's Taxonomy Level</th><th>Standard, Supporting Skills, and Examples</th></tr>
<tr><td>(Comprehension)</td><td>7.S.1.1. Students are able to find the mean, median, mode, and range of a set of data.
Example:
Find the mean, median, mode, and range of the following set of data.
<table><tr><th colspan="7">Daily High Temperatures</th></tr><tr><th>S</th><th>M</th><th>T</th><th>W</th><th>T</th><th>F</th><th>S</th></tr><tr><td>62</td><td>58</td><td>55</td><td>65</td><td>62</td><td>67</td><td>72</td></tr></table></td></tr>
<tr><td>(Application)</td><td>7.S.1.2. Students are able to display data, using frequency tables, line plots, stem-and-leaf plots, and make predictions from data displayed in a graph.
Example:
If Tanja had a typical game, how many points could she expect to score? Explain your reasoning.
Tanja's Points Scored Per Basketball Game
<table><tr><td>0</td><td>7</td></tr><tr><td>1</td><td>0 8</td></tr><tr><td>2</td><td>1 1 2 5 5 5 8</td></tr><tr><td>3</td><td>2 3</td></tr><tr><td>4</td><td>0</td></tr></table></td></tr>
</table>

Indicator 2: Apply the concepts of probability to predict events/outcomes and solve problems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**7.S.2.1. Students are able, given a sample space, to find the probability of a specific outcome.** • Simple probability. Example: In a bag with 5 blue, 7 red, and 3 green marbles, what is the probability of not getting a blue marble? • Express probability as a ratio, decimal, or percent.

Seventh Grade Statistics & Probability
Performance Descriptors

Advanced	**Seventh grade students performing at the advanced level:** • organize and represent data in various forms and use results to make predictions; • find measures of central tendency; • make predictions using theoretical probability of an independent event.
Proficient	**Seventh grade students performing at the proficient level:** • organize and represent data in various forms and make predictions from given graphs; • find measures of central tendency given a set of data; • find the probability of a simple event.
Basic	**Seventh grade students performing at the basic level:** • represent data in various forms; • find mean, mode, and range of a given set of data; • find the probability of a simple event given pictorial representation.

Grade 7 Unpacked Math Standards – Statistics & Probablity

7.S.1.1. Students are able to **find** the mean, median, mode, and range of a set of data.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Find: find/calculate

Key Terms Defined:

Teacher Speak:
Students are able to find (find/calculate) the mean, median, mode and range of a set of data.

Student Speak:
From a list of numbers, I can:
*calculate (find) the mean.
*find/calculate the median.
*find the mode.
*calculate (find) the range.

7.S.1.2. Students are able to **display** data, using frequency tables, line plots, stem-and-leaf plots, and **make predictions** from data displayed in a graph.

Webb level: 3
Bloom: Application

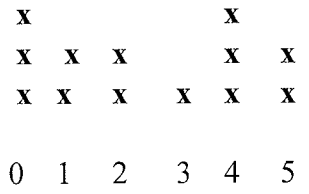
Verbs Defined:
Display: represent
Make predictions: make predictions

Key Terms Defined:
Frequency tables: a table that displays the number of times each item or category occurs in a data set
Stem and Leaf Plot: an ordered display of data, where the leaf is the last digit to the right and the stem is the remaining digits

0 0 2 4 5
1 0 1 8 9
2

3 1 4 5 5

Line Plot: displays data with x marks above a number line



Teacher Speak:
Students are able to display (represent) data, using frequency tables, line plots, stem-and-leaf plots, and make predictions from data displayed in a graph.

Student Speak:
I can represent (display) data using:
* a table that displays the number of times each item or category occurs in a data set (frequency tables).
* x marks above a number line (line plots).
* an ordered display of data, where the leaf is the last digit to the right and the stem is the remaining digits (stem-and-leaf plots).
I can make predictions using:
* frequency tables.
* line plots.
* stem-and-leaf plots.

7.S.2.1. Students are able, given a sample space, to **find** the probability of a specific outcome.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Find: write

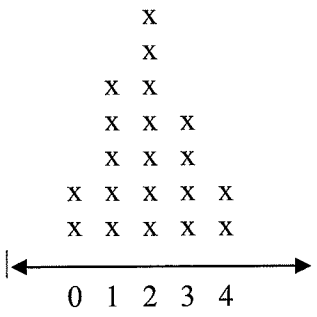
Key Terms Defined:
Sample space: all the possible outcomes
Specific outcome: one of the possible events

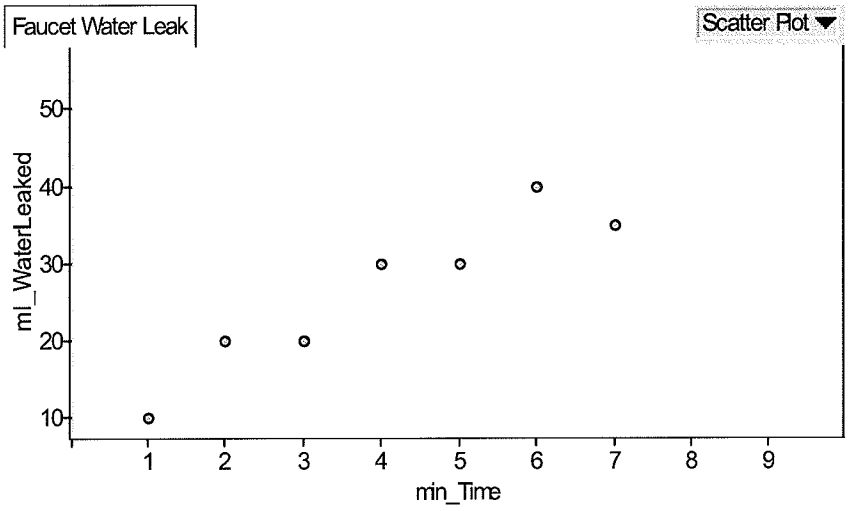
Teacher Speak:
Students are able, given a sample space, to find (write) the probability of a specific outcome.

Student Speak:
Given the possible outcomes of an event (sample space), I can write (find) the probability as a decimal, fraction and percent.

Eighth Grade Statistics & Probability
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use statistical models to gather, analyze, and display data to draw conclusions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**8.S.1.1. Students are able to find the mean, median, mode, and range of a data set from a stem-and-leaf plot and a line plot.** **Example:** Find the mean, median, mode, and range of the given data. 1) Average Speed: 5 | 8 9 9 9 6 | 0 0 0 2 2 5 6 7 8 8 9 7 | 0 0 0 1 1 1 1 2 2 3 5 Key: 5 | 8 means 58 mph 2) Hours Spent on Homework 

(Application)	**8.S.1.2. Students are able to use a variety of visual representations to display data to make comparisons and predictions.** • Double bar graph • Double line graph • Scatterplot Example: At 10 minutes, predict the amount of water that had been leaked. 

Indicator 2: Apply the concepts of probability to predict events/outcomes and solve problems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Comprehension)	**8.S.2.1. Students are able to find the sample space and compute probability for two simultaneous independent events.** **Examples:** 1) What is the probability of getting a head and a three when flipping a coin and rolling a number cube? 2) Jamie has three different colored shirts and two different colored pairs of pants. Using a tree diagram, table or organized list, find how many different outfits she can make. • Express probability as a ratio, decimal, or percent.

Eighth Grade Statistics & Probability
Performance Descriptors

Advanced	**Eighth grade students performing at the advanced level:** • choose the measure of central tendency that best represents the data; • make predictions using probability for two independent events.
Proficient	**Eighth grade students performing at the proficient level:** • represent data in various forms and use results to make predictions and comparisons; • find measures of central tendency; • compute the probability for two independent events.
Basic	**Eighth grade students performing at the basic level:** • represent data in various forms; • find the mean and mode of a given set of data; • find the probability of a simple event.

Grade 8 Unpacked Math Standards – Statistics & Probability

8.S.1.1. Students are able to **find** the mean, median, mode, and range of a data set from a stem-and-leaf plot and a line plot.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Find: find/calculate

Key Terms Defined:

Teacher Speak:
Students are able to find (find/calculate) the mean, median, mode and range of a set of data from a stem-and-leaf plot and line plot.

Student Speak:
From a stem-and-leaf plot and a line plot, I can:
*calculate (find) the mean
*find/calculate the median
*find the mode
*calculate (find) the range

8.S.1.2. Students are able to use a variety of visual representations to **display** data to **make** comparisons and predictions.

Webb level: 3
Bloom: Application

Verbs Defined:
Display: represent
Make: write

Key Terms Defined:
Visual representations: double bar, double line, scatter plot

Teacher Speak:
Students are able to use a variety of visual representations to display (represent) data to make (write) comparisons and predictions.

Student Speak:
I can write (make) predictions and comparisons using a:
*double bar graph.
*double line graph.
*scatter plot.

I can represent (display) data using a:
*double bar graph.
*double line graph.
*scatter plot.

8.S.1.2. Students are able to use a variety of visual representations to **display** data to **make** comparisons and predictions.

Webb level: 3
Bloom: Application

Verbs Defined:
Display: represent
Make: write

Key Terms Defined:
Visual representations: double bar, double line, scatter plot

Teacher Speak:
Students are able to use a variety of visual representations to display (represent) data to make (write) comparisons and predictions.

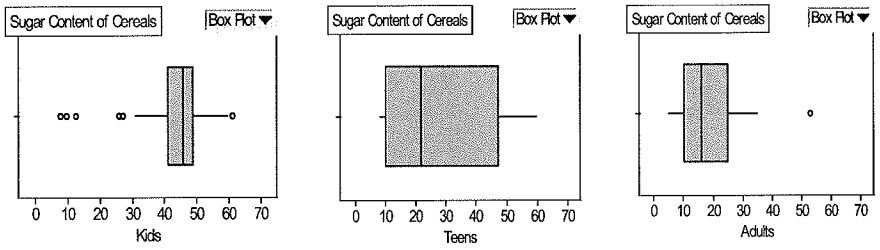
Student Speak:
I can write (make) predictions and comparisons using a:
*double bar graph.
*double line graph.
*scatter plot.

I can represent (display) data using a:
*double bar graph.
*double line graph.
*scatter plot.

Core High School Statistics & Probability
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use statistical models to gather, analyze, and display data to draw conclusions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Analysis)	**9-12.S.1.1. Students are able to draw conclusions from a set of data.** **Example:** Stacy scored 0, 0, 3, 6, 12, 8, 17, 19, 17, 20, and 36 points in eleven games during the basketball season. a) Is there an outlier in the data set? b) Give the five number summary. c) Is it possible to determine Stacy's shooting percentage? d) Can you determine that Stacy's performance improved? e) Predict how many points Stacy will score in the next game. • Determine and use appropriate statistical values. • Determine which questions can or cannot be answered from a given data set.
(Comprehension)	**9-12.S.1.2. Students are able to compare multiple one-variable data sets, using range, interquartile range, mean, mode, and median.** **Example:** Kim scored 1, 0, 3, 6, 12, 8, 17, 17, 17, 17, and 35 points in eleven games during the basketball season. Pat scored 9, 11, 10, 13, 12, 11, 14, 12, 13, and 15 points in ten games during the basketball season. Who is the more consistent scorer? Why?
(Analysis)	**9-12.S.1.3. Represent a set of data in a variety of graphical forms and draw conclusions.** **Example**: In order to determine the median of a set of data, would you prefer to see a box-and-whisker plot or a histogram? Why? • Make a scatterplot to draw a regression line and make predictions. Example: As a group activity, students will plot their wrist measurement and shoe size as ordered pairs. After drawing the line of best fit, students will predict another person's wrist size based on a given shoe size.

	• Make a box-and-whisker plot to model a set of one-variable data. Example: These box plots show the amount of sugar in cereals preferred by "kids" (ages 12 or younger), "teens" (ages 13 – 19) and "adults" (ages over 19).  1) In general, which group prefers cereal with less sugar? Use the graphs and summary numbers to explain. 2) For which group do more of those surveyed prefer cereals with similar sugar content? How did you decide this? • Make a histogram from a frequency distribution.

Indicator 2: Apply the concepts of probability to predict events/outcomes and solve problems.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Knowledge)	**9-12.S.2.1. Students are able to distinguish between experimental and theoretical probability.** **Example:** Determine which of the two activities represents experimental probability: a) roll two dice many times, record the sums, and write the probabilities of different sums, or b) create a sample space of all possible outcomes and write the probabilities of different sums.
(Comprehension)	**9-12.S.2.2. Students are able to predict outcomes of simple events using given theoretical probabilities.** **Example:** Given a spinner with unequal regions (50% red, 20% blue, 30% yellow), predict how many of the next 10 spins will be blue. • Determine the sample space of an experiment.

Core High School Statistics & Probability
Performance Descriptors

Advanced	**High school students performing at the advanced level:** • calculate probability of compound events; • determine correlation coefficient in a data set.
Proficient	**High school students performing at the proficient level:** • calculate probability of a simple event and make predictions; • answer questions about measures of central tendency and five-number summary based on a given data set; • draw a regression line for a scatterplot.
Basic	**High school students performing at the basic level:** • calculate the probability of a simple event; • calculate mean, median, and mode for a data set.

Grade 9-12 Unpacked Core Math Standards – Statistics & Probability

9-12.S.1.1. Students are able to **draw** conclusions from a set of data.

Webb Level: 3
Bloom: Analysis

Verbs Defined:
Draw: arrive at, generate

Key terms defined:
Conclusions: conjectures
Set of data: collection of numbers or information

Teacher Speak:
Students are able to draw (arrive at, generate) conclusions from a set of data.

Student Speak

- I can identify an outlier in a data set (collection of numbers or information).
- I can give the five number summary (minimum, first quartile, median, third quartile, and maximum) of a data set (collection of numbers or information).
- I can determine which statistical value (mean, median, mode) is appropriate for a specific situation.
- I can use the statistical values to make appropriate predictions.
- I can determine which questions can or cannot be answered from a given data set (collection of numbers or information).

9-12.S.1.2. Students are able to **compare** multiple one-variable data sets, **using** range, interquartile range, mean, mode, and median.

Webb Level: 2
Bloom: Comprehension

Verbs Defined:
Compare: Identify the similarities and differences
Using: applying

Key terms defined:
One-variable data set: A collection of numbers or information representing one variable.
Range: The difference between the greatest and least values in a data set.
Interquartile range: The difference between the values of the third (upper) and first (lower)

quartiles in a data set.
Mean: The arithmetic average which is the sum of two or more quantities divided by the number of quantities.
Mode: The value that occurs most frequently in a data set.
Median: The quantity designated the central value in a set of numbers. The center number (or the average of the two central numbers) of a list of data when the numbers are arranged in order from least to greatest.

Teacher Speak:
Students are able to compare (identify the similarities and differences of) multiple one-variable data sets, using (applying) range, interquartile range, mean, mode, and median.

Student Speak:

- I can apply (use) the appropriate statistical values to identify the similarities and differences of (compare) two or more one-variable data sets (collection of numbers or information representing one variable.)
- In a one-variable data set (collection of numbers or information representing one variable), I can find the:
  - ♣ range (The difference between the greatest and least values in a data set.)
  - ♣ interquartile range (The difference between the values of the third (upper) and first (lower) quartiles in a data set.)
  - ♣ mean (The arithmetic average which is the sum of two or more quantities divided by the number of quantities.)
  - ♣ mode (The value that occurs most frequently in a data set.)
  - ♣ median (The quantity designated the central value in a set of numbers. The center number (or the average of the two central numbers) of a list of data when the numbers are arranged in order from least to greatest.)

9-12.S.1.3. Students are able to **represent** a set of data in a variety of graphical forms and **draw** conclusions.

Webb Level: 3
Bloom: Analysis

Verbs Defined:
Represent: display
Draw: arrive at, generate

Key terms defined:
Set of data: collection of numbers or information
Conclusions: conjectures
Graphical forms: pictorial representations

Teacher Speak:
Represent (display) a set of data in a variety of graphical forms and draw (generate) conclusions.

Student Speak:
- I can draw a line of best fit on a scatterplot and use it make appropriate predictions.
- I can determine the most appropriate graphical form (pictorial representations) to display (represent) a data set (of numbers or information).
- Given a set of data I can make a:
  - ♣ Box-and-whisker plot
  - ♣ Histogram
  - ♣ Stem-and-leaf plot
  - ♣ Scatterplot
  - ♣ Frequency table

9-12.S.2.1. Students are able to **distinguish** between experimental and theoretical probability.

Webb Level: 1
Bloom: Knowledge

Verbs Defined:
Distinguish: differentiate

Key terms defined:
Experimental probability: the ratio of successes to total trials
Theoretical probability: the ratio of favorable outcomes to possible outcomes

Teacher Speak:
Students are able to distinguish (differentiate) between experimental and theoretical probability.

Student Speak:
Given a probability situation, I can determine if the given probability is experimental (the

ratio of successes to total trials) or theoretical (the ratio of favorable outcomes to possible outcomes).

9-12.S.2.2. Students are able to **predict** outcomes of simple events **using** given theoretical probabilities.

Webb Level: 1
Bloom: Comprehension

Verbs Defined:
Predict: conjecture
Using: applying

Key terms defined:
Outcome: one of the possible events in a probability situation
Simple events: the result of a single probability situation
Theoretical probability: the ratio of favorable outcomes to possible outcomes

Teacher Speak:
Students are able to predict (conjecture) outcomes of simple events using (applying) given theoretical probabilities.

Student Speak:
- I can conjecture (make predictions) based on given probabilities.
- I can find the geometric probability in a problem situation.

Advanced High School Statistics & Probability
Grade Standards, Supporting Skills, and Examples

Indicator 1: Use statistical models to gather, analyze, and display data to draw conclusions.

Bloom's Taxonomy Level	Standard, Supporting Skills, and Examples
(Evaluation)	**9-12.S.1.1A. Students are able to analyze and evaluate the design of surveys and experiments.** **Examples:** 1) Create and administer a survey and identify sources of bias. 2) What type(s) of bias might affect the results of a telephone survey? 3) In an experiment, why is it very important to **randomly** assign subjects to groups?
(Evaluation)	**9-12.S.1.2A. Students are able to analyze and evaluate graphical displays of data.** **Example:** Find graphical displays of data in a newspaper or magazine and discuss the following: a) What is the type of data display? b) Is the display a good model for the data? c) What other type of data display(s) could have been used? d) Does the display exhibit any distortions which could be misleading?
(Analysis)	**9-12.S.1.3A. Students are able to compare multiple one-variable data sets, using standard deviation and variance.** **Example:** In her math class, Jane scored 87 on a math test with mean score 80 and standard deviation 5. In another class, Alice scored 85 on a test with mean score 83 and standard deviation 3. Which student has the better score in her class? • Calculate the standard deviation and variance of a data set.
(Application)	**9-12.S.1.4A. Students are able to describe the normal curve and use it to make predictions.** **Example:** A set of normally distributed data representing the heights of a population of 18-year-old females has mean 65 inches, with standard deviation 2 inches. In a group of one hundred 18-year-old females from this population, approximate the number who are taller than 67 inches.

* unpack standards
Not available

(Application)	**9-12.S.1.5A. Students are able to use scatterplots, best-fit lines, and correlation coefficients to model data and support conclusions.** **Example:** For a given set of two-variable data: 1) Create a scatterplot and find the least-squares regression line. 2) Interpret the value of the correlation coefficient.

Indicator 2: Apply the concepts of probability to predict events/outcomes and solve problems.

<table>
<tr><th>Bloom's Taxonomy Level</th><th>Standard, Supporting Skills, and Examples</th></tr>
<tr><td>(Application)</td><td>9-12.S.2.1A. Students are able to use probabilities to solve problems.
• Compute combinations, permutations.
• Interpret tables.
Example: Use the data given in the table:
Voters in District 5
<table><tr><th></th><th>Males</th><th>Females</th></tr><tr><td>Democrat</td><td>30</td><td>50</td></tr><tr><td>Republican</td><td>70</td><td>50</td></tr></table>1) Find the probability that a voter in District 5 is a male Democrat.
2) Given that a voter is a Democrat, find the probability that the voter is female.
• Create and use tree diagrams.</td></tr>
<tr><td>(Application)</td><td>9-12.S.2.2A. Students are able to determine probability of compound, complementary, independent, and mutually exclusive events.
Examples: Solve the following:
1) Using a standard deck of cards of 52 cards, find the probability of drawing a king followed by another king, without replacing the first king back into the deck.
2) Using a standard deck of cards of 52 cards, find the probability of drawing a king followed by another king, with replacing the first king back into the deck.
3) Which of these problem situations represents independent events?</td></tr>
</table>

	Examples: Solve the following: 1) Find the probability of drawing an ace in a single draw from a standard deck of 52 cards. 2) Find the probability of drawing a heart in a single draw from a standard deck of 52 cards. 3) Find the probability of drawing the ace of hearts in a single draw from a standard deck of 52 cards. 4) Find the probability of drawing an ace or a heart in a single draw from a standard deck of 52 cards. 5) Explain whether the events "drawing an ace" and "drawing a heart" are mutually exclusive (disjoint)? 6) Describe the complementary event of "drawing a heart."
(Analysis)	**9-12.S.2.3A. Students are able to generate data and use the data to determine empirical (experimental) probabilities.** **Example:** Toss 20 identical thumbtacks once and record the number that land with the point up. Do this 50 times, recording each result. Use the data to approximate the probability of this type of thumbtack landing point up.

7th Grade Math

Course Description: In seventh grade math, students will learn that math is not several isolated topics, but a useful way of thinking and making connections related to real life situations. Students will develop thinking skills through the use of decimals, algebra, statistics, integers, fractions, proportional reasoning, geometry, and measurement.

Unit:
Decimal Patterns and Algebra
Integers
Measurement
Statistics
Probability
Linear Equations and Inequalities
Fractions
Ratios and Proportions
Percent
Geometry
Two Dimensional Shapes
Three Dimensional Shapes

7^{th} Grade Math

Course Description: In seventh grade math, students will learn that math is not several isolated topics, but a useful way of thinking and making connections related to real life situations. Students will develop thinking skills through the use of decimals, algebra, statistics, integers, fractions, proportional reasoning, geometry, and measurement.

Unit: Decimal Patterns and Algebra

Timeline: 15 days

Essential Questions:
What are the properties of addition and multiplication and how can they be applied?
How do you tell the difference between arithmetic and geometric sequences?
How can order of operations be applied to simplify numeric algebraic expressions?
What are the requirements for writing a number in scientific notation?

Standards:
7.A.1.1
7.A.1.2
7.A.4.1
7.N.1.1
7.N.3.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Integers

Timeline: 11 days

Essential Questions:
How do you graph an ordered pair on a coordinate plane?
What are the rules for operations involving integers?
How can order of operations be applied to simplify numeric algebraic expressions?

Standards:
7.N.1.1
7.N.2.1
7.N.3.1
7.A.3.1

Content/Activities/Assessment:

7th Grade Math

Unit: Measurement

Timeline: 10 days

Essential Questions:
How do you convert measurements using the metric system?
How do you use the conversion facts to change units in a customary system?
How do you select the appropriate unit of measurement for any situation?

Standards:
7.M.1.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Statistics

Timeline: 10 days

Essential Questions:
How do you find the mean, median, mode and range for a set of data?
How would you use a stem and leaf plot and line plot to sort data?
What are the differences between a bar graph and a histogram and why would you use double line or double bar graphs?
How can use a graph to make a prediction?
How do you determine the line of best fit on a scatter plot?

Standards:
7.S.1.1
7.S.1.2
7.A.3.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Probability

Timeline: 9 days

Essential Questions:
What are the similarities and differences between theoretical and experimental probability?
How is the fundamental counting principle used to determine the total number of outcomes in the sample space?
How do you use a tree diagram to show all outcomes in the sample space?

Standards:
7.S.2.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Linear Equations and Inequalities

Timeline: 12 days

Essential Questions:
What are the key words that you use to translate English phrases to algebraic expressions?
How do you use inverse operations to solve one and two step linear equations?
How do you use inverse operations to solve one step inequalities?
How do you graph an inequality on a line graph?

Standards:
7.A.1.1
7.A.2.1
7.A.3.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Fractions

Timeline: 24 days

Essential Questions:
How do you convert among fractions, decimals and percents?
How do you find greatest common factor and least common multiple?
What do you have to do to compare fractions, decimals and percents?
How do you demonstrate the steps for computation addition, subtraction, multiplication, and division of fractions and mixed numbers?
How do you use the five steps problem solving to solve story problems involving fractions?

Standards:
7.N.1.1
7.N.1.2
7.N.2.1
7.N.3.1

Content/Activities/Assessment:

7th Grade Math

Unit: Ratios and Proportions

Timeline: 11 days

Essential Questions:
What is the difference between a ratio and a rate?
How is unit rate used to find the best buy?
How do you use cross products to solve proportion problems?

Standards:
7.A.2.1
7.A.3.2
7.G.2.1
7.N.1.1
7.N.3.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Percent

Timeline: 13 days

Essential Questions:
How do you use equations to solve problems involving percents?
What is the difference between discount and sale price?
How do you find percent of change?
How do you use the interest formula?

Standards:
7.N.3.1

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Geometry

Timeline: 15 days

Essential Questions:
How are angles measured and classified?
How do you transform shapes?
What are the characteristics needed to classify polygons?
How do you identify the different types of angles created by parallel lines and a transversal?
What are the essential steps for creating and labeling a circle graph?

Standards:
7.G.1.1
7.G.1.2
7.G.2.1
7.M.1.1
7.S.1.2

Content/Activities/Assessment:

7^{th} Grade Math

Unit: Two Dimensional Shapes

Timeline: 11 days

Essential Questions:
What are the differences of the parts of a circle (radius, diameter, and chord)?
How do you use formulas to finding perimeters, areas, and circumferences of polygons and circles?
How do you use squares and square roots to find missing sides of a right triangle?
What is the proper labeling for perimeter, area, and circumference?
How do you use formulas and grids to find areas of irregular shapes?

Standards:
7.M 1.2
7.G.1.2
7.N.1.1
8.G.1.2

Content/Activities/Assessment:

7th Grade Math

Unit: Three Dimensional Shapes

Timeline: 10 days

Essential Questions:
How do you compare and contrast three dimensional shapes by using their parts.
How do you find the surface area and volume of 3-D shapes using formulas?
What is the proper labeling for surface areas and volumes?

Standards:
8.M.1.2
8.G.1.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Course Description: Students will learn how to perform computations with whole numbers, decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit:
Tools of Algebra
Integers
Equations and Inequalities
Factors and Exponents
Rational Numbers
Ratio, Proportions, and Percents
Functions and Graphing
Indirect Measurement
9. Two Dimensional Figures
10. Three Dimensional Figures
11. Statistics and Probability
12. Polynomials
13. Algebra Readiness

7th Grade Pre-Algebra

Course Description:

Students will learn how to perform computations with whole numbers, decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit: Tools of Algebra

Timeline: 8 days

Essential Questions:

What are the 5 steps to problem solving?
What are the properties of addition and multiplication and how are they applied?
Why must the order of operations be followed in problem solving?
What are similarities and differences of numerical and algebraic expressions?
What are the key words that are used to translate English to algebraic expressions and equations?

Standards:

7.A.1.1
7.A.1.2
7.A.2.1
8.A.1.1
8.A.2.1

7th Grade Pre-Algebra

Unit: Integers

Timeline: 9 days

Essential Questions:
How do you graph an ordered pair on a coordinate plane?
What are the rules for operations involving integers?
How can order of operations be applied to simplify numeric algebraic expressions with integers?

Standards:
7.N.1.1
7.N.2.1
7.N.3.1
7.A.3.1
8.N.2.1
8.A.1.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Equations and Inequalities

Timeline: 19 days

Essential Questions:
How do you use the distributive property to simplify expressions?
How do you use inverse operations to solve multi-step equations and inequalities?
How do you graph an inequality on a line graph?
What are the key words that you use to translate English to algebraic equations and inequalities?

Standards:
7.A.1.1
7.A.2.1
7.A.3.1
8.A.1.1
8.N.1.1

Content/Activities/Assessment:

7^{th} Grade Pre-Algebra

Unit: Factors and Exponents

Timeline: 11 days

Essential Questions:
What are the parts of scientific notation and what do they mean?
How do the properties of integers apply to exponents when multiplying and dividing?
What are some of the different ways of finding GCF and how is GCF used for simplifying fractions?
What are the divisibility rules?

Standards:
7.N.1.1
7.N.1.2
7.N.2.1
8.N.1.1
8.N.2.1

Content/Activities/Assessment:

7^{th} Grade Pre-Algebra

Unit: Rational Numbers

Timeline: 12 days

Essential Questions:
What are the similarities and differences between GCF and LCM?
What are the rules for adding, subtracting, multiplying and dividing rational expressions?
How do you use inverse operations to solve one-step equations with rational numbers?
How and why do you convert between fractions and decimals?

Standards:
7.N.1.1
7.N.1.2
7.N.2.1
7.N.3.1
8.A.1.1
8.N.1.1
8.N.2.1
8.N.3.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Ratios, Proportions, and Percents

Timeline: 15 days

Essential Questions:
How do you convert among ratios, decimals and percents?
What are the two methods used to solve percent case problems?
How do you use cross products to solve proportion problems?
How do you convert measurements using both the metric and customary systems?
How do you use equations to solve problems involving percents?

Standards:
7.N.1.1
7.N.3.1
7.A.2.1
7.A.3.2
7.G.2.1
8.M.1.1
8.N.2.1
8.N.3.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Functions and Graphing

Timeline: 7 days

Essential Questions:
What are the methods for finding slope of a line and how does this apply to rate of change?
How do you graph a linear equation using intercepts and tables?
How do you determine the line of best fit on a scatter plot?

Standards:
7.A.3.1
8.A.3.1
8.A.4.1
8.A.4.2

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Indirect Measurement

Timeline: 6 days

Essential Questions:
How do you apply the Pythagorean Theorem to find the missing side of a right triangle?
How do you find the square and square roots of numbers?
How do you use proportions to find missing sides of similar shapes?

Standards:
7.N.1.1
7.N.3.1
7.G.2.1
7.A.2.1
8.M.1.1
8.G.1.2
8.G.2.1
8.N.1.1
8.N.3.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Two Dimensional Figures

Timeline: 12 days

Essential Questions:
How do you use formulas to find perimeters, areas, and circumferences of polygons, circles, and irregular shapes and label answers properly?
How are angles measured and classified?
How do you transform shapes?
What are the characteristics needed to classify polygons?

Standards:
7.G.1.1
7.G.1.2
7.G.2.1
7.M.1.1
7.M.1.2
7.S.1.2
8.M.1.2

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Three Dimensional Figures

Timeline: 10 days

Essential Questions:
How do you compare and contrast three dimensional shapes by using their parts?
How do you find the surface area and volume of 3-D shapes using formulas?
What is the proper labeling for surface areas and volumes?

Standards:
8.M.1.2
8.G.1.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Statistics and Probability

Timeline:

Essential Questions:
How do you find the mean, median, mode or range using stem and leaf plot, line plot, or set of data?
What are the essential steps for creating and labeling a circle graph?
What are the various ways to display data, how are they different and how are they used to make predictions?
What are the similarities and differences between theoretical and experimental probability?
How do you find the probability of compound events using the sample space?

Standards:
7.S.1.1
7.S.1.2
7.S.2.1
8.S.1.1
8.S.1.2
8.S.2.1

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Polynomials

Timeline: 9 days

Essential Questions:
What are similar terms and how should the terms be arranged?
How can you model addition, subtraction, and multiplication of polynomials with algebra tiles?
How do you classify polynomials by degree and number of terms?
What is the purpose of FOIL and how do you use it with polynomials?

Standards:
9-12.A.1.1
9-12.A.3.2

Content/Activities/Assessment:

7th Grade Pre-Algebra

Unit: Algebra Readiness

Timeline: 12 days

Essential Questions:
How do you use the slope intercept form to graph equations?
What are you trying to find when solving a system of equation by graphing?
How do you graph a linear inequality?

Standards:
9-12.A.4.1
9-12.A.2.2A

Content/Activities/Assessment:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit

Tools of Algebra
Integers
Equations and Inequalities
Factors/Exponents
Rational Numbers
Ratio/Proportions/Percents
Functions/Graphing
Similarity/Indirect measurement
9. Two dimensional Figures
10. Three dimensional Figures
11. Stats/Probability
12. Polynomials
13. Algebra Readiness

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 1

Tools of Algebra

Timeline:

8 days

Essential Questions:

What are the 5 steps to problem solving?
What are the properties of addition and multiplication and how are they applied?
Why must the order of operations be followed in problem solving?
What are similarities and differences of numerical and algebraic expressions?
What are the key words that you use to translate English to algebraic expressions and equations?

Standards:

8.A.1.1
8.A.2.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 2

Integers

Timeline:

9 days

Essential Questions:

How do you graph an ordered pair in a coordinate plane?
What are the rules for operations involving integers?
How can order of operations be applied to simplify numeric algebraic expressions with integers?

Standards:

8.A.1.1
8.N.2.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 3

Equations and Inequalities

Timeline:

19 days

Essential Questions:

How do you use distributive property to simplify expressions?
How do you use inverse operations to solve multi-step equations and inequalities?
How do you graph an inequality on a line graph?
What are the key words that you use to translate English to algebraic equations and inequalities?

Standards:

8.A.1.1
8.N.1.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 4

Factors/Exponents

Timeline:

11 days

Essential Questions:

What are the parts of scientific notation and what do they mean?
How do the properties of integers apply to exponents when multiplying and dividing?
What are some of the different ways of finding GCF and how is GCF used to simplify fractions?

Standards:

8.N.1.1
8.N.2.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 5

Rational Numbers

Timeline:

12 days

Essential Questions:

What are the similarities and differences between GCF and LCM?
What are the rules for adding, subtracting, multiplying and dividing rational expressions?
How do you use inverse operations to solve one-step equations with rational numbers?
How and why do you convert between fractions and decimals?

Standards:

8.A.1.1
8.N.1.1
8.N.2.1
8.N.3.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 6:

Ratios/Proportions/Percents

Timeline:

15 days

Essential Questions:

How do you convert among ratios, decimals, and percents?
How do you set up and solve a percent equation?
How do you use cross products to solve proportion problems?
How do you convert measurements using the metric system?
How do you use the conversion facts to change units in a customary system?

Standards:

8.M.1.1
8.N.2.1
8.N.3.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 7

Functions/Graphing

Timeline:

7 days

Essential Questions:

What are the methods for finding slope of a line and how does this apply to the rate of change?
How do you graph a linear equation using intercepts and tables?
How do you identify the dependent variable in a two variable equation?

Standards:

8.A.3.1
8.A.4.1
8.A.4.2

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 8

Indirect Measurement

Timeline:

6 days

Essential Questions:

How do you apply the Pythagorean Theorem?
How do you find the square and square roots of numbers?
How do you use proportions to find missing sides of similar shapes?

Standards:

8.G.1.2
8.G.2.1
8.M.1.1
8.N.1.1
8.N.3.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 9

Two Dimensional Figures

Timeline:

12 days

Essential Questions:

How do you use formulas to find perimeters, areas and circumferences of polygons and circles?
What are the proper units of measure for perimeter, area and circumference?
How do you find the area of composite shapes?

Standards:

8.M.1.2

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 10

Three Dimensional Figures

Timeline:

8 days

Essential Questions:

How do you compare and contrast three dimensional shapes by using their parts?
How do you find the surface area and volume of 3-D shapes using formulas?
What is the proper labeling for surface areas and volumes?

Standards:

8.G.1.1
8.M.1.2

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 11

Stats/Probability

Timeline:

12 days

Essential Questions:

How do you find the mean, median, mode, and range from a stem and leaf plot or line plot?
What are the essential steps for creating and labeling a circle graph?
What are the various ways to display data, how are they different and how are they used to make predictions?
How do you find probability of compound events?
What are the different ways of determining a sample space?

Standards:

8.S.1.1
8.S.1.2
8.S.2.1

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 12

Polynomials

Timeline:

9 days

Essential Questions:

What are similar terms and how should the terms be arranged?
How can you model addition, subtraction and multiplication of polynomials with algebra tiles?
How do you classify polynomials by degree and number of terms?
What is the purpose of FOIL and how do you use it with polynomials?

Standards:

9-12.A.1.1
9-12.A.3.2

Content/Activities/Assessments:

8th Grade Pre-Algebra

Course Description

Students will learn how to perform computations with whole numbers decimals, fractions, and integers and how to solve equations, linear equations, inequalities, square roots, percentage problems, and story problems. They will also have experience with problems involving statistics and probability. Areas of geometry, perimeters, areas and volumes, are included in the curriculum.

Unit # 13

Algebra Readiness

Timeline:

12 days

Essential Questions:

How do you use the slope intercept form to graph equations?
What are you trying to find when solving a system of equation by graphing?
How do you graph a linear inequality?

Standards:

9-12.A.4.1
9-12.A.2.2A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #1:

Basics of Algebra (Review of Pre-Algebra)

Timeline:

3 days

Essential Questions:

What are the 5 steps to problem solving?
What are the properties of addition and multiplication?
Why must the order of operations be followed in problem solving?
How do you translate verbal phrases into expressions and equations?

Standards:

9-12.A.1.1
9-12.A.3.1
9-12.N.2.1
9-12.N.3.2

Contents/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #2:

Real Numbers

Timeline:

7 days

Essential Questions:

What is the purpose of subtraction of real numbers?
What are similar terms?
How does the distributive property help to simplify an expression?

Standards:

9-12.A.1.1
9-12.N.1.1
9-12.N.1.2
9-12.N.2.1

Contents/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #3:

Linear Equations

Timeline:

12 days

Essential Questions:

How does PEMDAS help us to solve equations?
How are solving decimal equations different from solving other types of equations?
What is the function form of a two variable equation?
How do you identify the dependent variable in a two variable equation?

Standards:

9-12.A.2.1
9-12.A.3.1
9-12.A.4.1

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #4:

Graphing Linear Equations

Timeline:

11 days

Essential Questions:

What is the coordinate system and how do you plot locations on the coordinate system?
How do you graph a linear equation and two variables?
What are the different ways of finding slope given different situations?
How do you graph a linear equation using the graphing calculator?
What is meant by solving the linear equation?

Standards:

9-12.A.3.1
9-12.A.4.1
9-12.M.1.2

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #5:

Writing Linear Equations

Timeline:

8 days

Essential Questions:

How do you transform from one form of a linear equation to another form of a linear equation?
How do you write a linear equation from the given slope and y-intercept, two points, or the graph?
How do you know the relationship between lines without graphing it as in parallel, perpendicular or intersecting?
What is the purpose of the y-intercept?

Standards:

9-12.A.4.1

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #6:

Linear Inequalities

Timeline:

9 days

Essential Questions:

What is the difference between equality and inequality?
What are the special rules for solving and graphing simple and compound inequalities?
Why are there two possible solutions to absolute values of equations and inequalities?
Under what circumstances would an absolute value not exist?

Standards:

9-12.A.2.1
9-12.A.2.2
9-12.A.2.3A
9-12.A.4.6A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #7:

Systems of Equations

Timeline:

9 days

Essential Questions:

What are the different methods for solving a system of linear equations and inequalities?
How can you identify if a linear system has one solution, no solution or infinite solutions?
How do you decide which method you should use for each given system?
How can you use systems to model a real life situation?

Standards:

9-12.A.3.1
9-12.A.2.2A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #8:

Exponents

Timeline:

6 days

Essential Questions:

What is the meaning of an exponent?
What is the difference between positive and negative exponents?
How do you convert numbers from scientific notation to decimal form and vice versa?
What are the parts of scientific notation and what do they mean?
How do you multiply and divide in scientific notation?

Standards:

9-12.A.1.1
9-12.N.1.1
9-12.N.2.1

Content/Activities/Assessments:

8^{th} Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #9:

Quadratics

Timeline:

8 days

Essential Questions:

How are quadratic functions different than linear functions?
How do you simplify radicals?
What is the meaning of a solution to a quadratic equation?
What is the quadratic formula?
How do the coefficients a, b, c, affect the shape of the graph of the quadratic function $y=ax^2 + bx + c$?

Standards:

9-12.A.3.2
9-12.N. 1.1
9-12.A.2.1A
9-12.A.3.1A
9-12.A.4.2A
9-12.A.4.3A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #10:

Polynomials

Timeline:

7 days

Essential Questions:

What are similar terms and how should the terms be arranged?
How can you model addition, subtraction and multiplication of polynomials with algebra tiles?
How do you classify polynomials by degree and number of terms?
What is the purpose of FOIL and how do you use it with polynomials?

Standards:

9-12.A.1.1
9-12.A.3.2

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #11:

Factoring

Timeline:

10 days

Essential Questions:

How do you identify the leading coefficient in a polynomial?
How do you determine the signs of factors?
When and how do you use slide and divide when factoring trinomials?
What are all the steps for factoring a trinomial?

Standards:

9-12.A.2.1A
9-12.A.3.1A
9-12.A.4.2A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #12:

Rational Equations and Functions

Timeline:

13 days

Essential Questions:

When do you need to worry about extraneous solutions?
How do you simplify rational polynomial expressions?
What are the rules for adding, subtracting, multiplying and dividing rational expressions?

Standards:

9-12.A.2.1
9-12.G.2.3
9-12.N.2.1
9-12.A.1.1A
9-12.A.4.1A
9-12.M.1.2A
9-12.N.1.2A
9-12.N.2.1A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #13:

Radical Expressions and Equations

Timeline:

12 days

Essential Questions:

What are radicals and radical equations and are there any restrictions?
How do you solve a radical equation?
How do you apply the Pythagorean Theorem?

Standards:

9-12.G.1.1
9-12.N.1.1
9-12.N.1.2
9-12.N.2.1A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit 14:

Statistics and Probability

Timeline:

8 days

Essential Questions:

What are the different ways to organize data and why is one way better for a particular data set?
What information can you get from a data set?
How do you enter data into a graphing calculator?
What is the difference between theoretical probability and experimental probability?
How do you find the probability of hitting a certain region on a target?

Standards:

9-12.M.1.1
9-12.S.1.1
9-12.S.1.2
9-12.S.1.3
9-12.S.2.1
9-12.S.2.2
9-12.S.1.1A
9-12.S.1.2A
9-12.S.1.5A

Content/Activities/Assessments:

8th Grade Algebra I

Course Description:

Algebra I is concerned with strengthening mathematical operations with numbers. Algebra develops analytical skills and prepares the student for further study in mathematics. Topics include signed numbers, solving equations, factoring, problem solving, the coordinate graph system, linear equations, quadratic equations, rational and irrational numbers, and operations with polynomials.

Unit #15:

Problem Solving

Timeline:

7 days

Essential Questions:

What is the relationship between the whole job and a part per unit of time?
How do use a table to develop an equation for solving story problems?
What do the column and row headings signify in a table?

Standards:

9-12.A.2.1
9-12.A.3.1
9-12.A.4.1
9-12.M.1.3
9-12.N.3.1

Content/Activities/Assessments:

Algebra I
Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Real Number System

Timeline: 2 weeks

Essential questions
How do you use the order of operations to simplify algebraic expressions?
How could tell if a relation is a function?
How do you interpret a graph/table?
What is the structure of the real number system and how are the subsets related?

Standards
A1.1
• I can apply (use) the laws of exponents to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• Given the values of variables, I can evaluate algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.)
• I can apply (use) the order of operations to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• I can apply (use) the distributive property to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• I can determine (write) algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.) from verbal statements.
A4.1
• I can develop a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear graph (Pictorial representation of data or an equation).
• I can create a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear equation in any form including standard ($Ax+By=C$), point-slope ($( ) \circ\circ y-y=m\,x-x$)and slopeintercept (y = mx + b) .
• I can make a linear graph from a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format).
N2.1
• I can add, subtract, multiply and divide:

- Numerical expressions containing rational numbers.
- Numerical expressions containing integral exponents (powers that are integers).

N3.1

- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

N3.2

- I can mentally rearrange and group a list of numbers to find the sum.
- I can use the distributive property to compute the product of two numbers.
- I can justify (explain) the operational shortcuts I use for computational procedures.

Content/Activities/Assessment

Algebra I

Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Solving Linear equations

Timeline: 2 weeks

Essential questions

How do you solve linear equations algebraically?
How do you transform equations?
How you use linear equations to model & solve problems?

Standards

A2.1

I can solve equations (A mathematical sentence in which the two expressions are equivalent) that:

- Have all the variables on one side.
- Have variables on both sides.
- Require the distributive property to simplify one or both sides.
- Require more than two steps to solve.

A3.1

Given a problem situation (setting in which to find an unknown):

- I can write (create) an equation.
- I can find the rate of change (slope).

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.

M1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.

M1.3

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.
- I can solve measurement problems without pictorial information.

• Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
• I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure)

N1.2

• Given any two real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.), I can find another real number between them.
• I can arrange real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.) in order by criteria.
• I can compare real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers) written in a variety of forms.

- ☐ Square roots
- ☐ Decimals
- ☐ Scientific notation
- ☐ Fractions

N3.1

• I can apply rounding as an estimation strategy (methods of approximation).
• I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

Content/Activities/Assessment

Algebra I

Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Graphing Linear equations and functions

Timeline: 2 weeks

Essential questions

How do you graph a linear equation?
How do you find and interpret rate of change?
How do you construct & interpret scatterplots?
How do you use function notation to evaluate functions?
How do graphically determine if a relation is a function?

Standards

A3.1

- I can write (create) an equation.
- I can find the rate of change (slope).
- I can find the y-intercept.
- I can explain the meaning of the x- and/or y-intercept.
- I can make predictions using the linear equation (model: A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.) that I wrote.

A3.2

I can graph and interpret equations in slope-intercept from that model real life situations.

A4.1

- I can develop a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear graph (Pictorial representation of data or an equation).
- I can make a linear graph from a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format).
- I can write the equation of a line in the form f(x) = mx + b that passes through two points.

M1.1

- I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).

N3.1

- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

Content/Activities/Assessment

Algebra I

Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Writing linear equations

Timeline: 2 weeks

Essential questions

How you write linear models to represent problem situations?
How do you use linear models to solve problems?
How do you distinguish between a linear and non-linear model?

Standards

A3.1

- I can write (create) an equation.
- I can make predictions using the linear equation (model: A representation of a problem that can be expressed as an equation in the form y = mx + b where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.) that I wrote.

A3.2

- I can determine when a linear model is appropriate.

A4.1

- I can create a table (A way of expressing domain & range in a row and column in a horizontal, vertical or T table format) from a linear equation in any form including standard ($Ax+By=C$), point-slope ($( ) \circ\circ y-y=m\,x-x$)and slopeintercept (y = mx + b) .
- I can graph a linear equation in any form including general ($Ax+By=C$), pointslope ($( ) \circ\circ y-y=m\,x-x$) and slope-intercept (y = mx + b).
- Given any form of a linear equation, I can write it in the form f(x) = mx + b.

M1.2

- I can determine the rate of change (slope) using the most commonly accepted units.
- Given the equation of a line of best fit, I can interpret the meaning of the slope of the situation including the correct units.
- Given the graph, I can interpret the meaning of the slope of the situation including the correct units.

Content/Activities/Assessment

Algebra I

Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Linear inequalities

Timeline: 2 weeks

Essential questions

How do solve linear inequalities?
How do you represent solutions to inequalities?
How do you solve absolute value statements?
How do you graph an absolute value solutions on number line?

Standards

A2.2

- I can use algebraic properties to transform multi-step, single-variable, first-degree inequalities and represent solutions using a number line.

A3.1

- I can write (create) an inequality.
- I can make predictions using the linear inequality (model: A representation of a problem that can be expressed as an inequality in the form $y \geq mx + b$ or $y \leq mx+b$ where m represents the constant rate of change, or slope, and b represents some fixed value, or the y-intercept.) that I wrote.

A.3.2

I can distinguish between linear and nonlinear models of inequalities

M1.1

- I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).

N3.1

- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

A2.3A

- I can solve equations and inequalities containing an absolute value statement (an equation or inequality in which the absolute value contains the variable).
- I can graph the solutions (value or values of the variable(s) that make the statement true) to absolute value inequalities (an inequality in which the absolute value contains the variable).

A4.6A

- I can solve a linear inequality algebraically.

- I can match the graph of an inequality with its algebraic representation.
- I can determine the type boundary created by the inequality (solid or dashed).
- I can shade the correct side (half-plane).

Content/Activities/Assessment

Algebra I
Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Solving systems of linear equations

Timeline: 1 week

Essential questions
How do you solve a system of linear equations graphically?
How do you solve a system of linear equations using substitution or combinations?
How do you model a situation using a linear system?

Standards
A3.1
- I can create a linear model to represent a problem situation

A3.2
- I can distinguish between linear and nonlinear models in situations

A2.2A
- I can solve a system of linear equations (two or more equations) using
  - Substitution
  - Graphing
  - Linear Combinations

Content/Activities/Assessment

Algebra I
Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Exponents

Timeline: 2 weeks

Essential questions
How do you evaluate expressions with integer exponents?
How do use scientific notation in problem solving?
How do use exponential models to solve problems?

Standards
A1.1
• I can apply (use) the laws of exponents to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).

A3.2
• I can distinguish between linear and exponential models
M1.1
• I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).
N1.1
• Given a real number (Any number that can be graphed on the number line. This includes rational and irrational numbers), I can write and/or classify (identify) the subset(s) of the real numbers to which it belongs (rational, irrational, integers, whole numbers, natural numbers).
• I can write (identify) any rational number as a fraction and decimal.
N1.2
• Given any two real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.), I can find another real number between them.
• I can arrange real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.) in order by criteria.
• I can compare real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers) written in a variety of forms.
    Square roots
    Decimals
    Scientific notation
    Fractions

N2.1

- I can add, subtract, multiply and divide:
  - Numerical expressions containing rational numbers.
  - Numerical expressions containing integral exponents (powers that are integers).
- I can evaluate complex fractions.

N3.1

- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

N3.2

- I can justify (explain) the operational shortcuts I use for computational procedures.

Content/Activities/Assessment

Algebra I
Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Quadratic equations

Timeline: 2 weeks

Essential questions
How do simplify radicals?
How do you graph quadratic expressions?
How do you solve quadratic equations?

Standards
A1.1
• I can apply (use) the laws of exponents to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• Given the values of variables, I can evaluate algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.)
• I can apply (use) the order of operations to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
M1.1
• I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).
N1.1
• Given a real number (Any number that can be graphed on the number line. This includes rational and irrational numbers), I can write and/or classify (identify) the subset(s) of the real numbers to which it belongs (rational, irrational, integers, whole numbers, natural numbers).
• I can write (identify) any rational number as a fraction and decimal.
N1.2
• Given any two real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.), I can find another real number between them.
• I can arrange real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers.) in order by criteria.
• I can compare real numbers (Any number that can be graphed on the number line. This includes rational and irrational numbers) written in a variety of forms.
Square roots

Decimals
Scientific notation
Fractions

N2.1

• I can add, subtract, multiply and divide:
    Numerical expressions containing rational numbers.
    Numerical expressions containing integral exponents (powers that are integers).
• I can evaluate complex fractions.

N3.1

• I can apply rounding as an estimation strategy (methods of approximation).
• I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

N3.2

• I can justify (explain) the operational shortcuts I use for computational procedures.

A2.1A

• I can solve quadratic equations (an equation containing x^2, a polynomial of degree 2 such that it can be transformed into $ax^2 + bx + c = 0$, $a \neq 0$) by:
    Factoring
    Completing the square
    Using the quadratic formula
    Graphing (using appropriate technology)
• I can determine the nature of the roots.
• I can solve equations that are in quadratic form. (the form $y = au^2 + bu + c$, where u is any expression in x, and a, b, and c are real numbers).

Content/Activities/Assessment

Algebra I
Description: Algebra I is concerned with strengthening mathematical operations with literal numbers. Topics include an introduction of basic algebraic skills emphasizing signed numbers, equations, algebraic fractions, and simplifying algebraic expressions. Students will learn to understand mathematical concepts through real-world problem scenarios.

Unit: Polynomials

Timeline: 2 weeks

Essential questions
How do simplify polynomials?
How do you factor polynomials?
How do you solve polynomials equations by factoring?

Standards
A1.1
• I can apply (use) the laws of exponents to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• Given the values of variables, I can evaluate algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.)
• I can apply (use) the order of operations to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• I can combine like terms.
• I can multiply polynomials.
• I can apply (use) the distributive property to simplify algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.).
• I can factor out a common term.
• I can determine (write) algebraic expressions (A mathematical combination of numbers, variables, and operations. It is **not** an equation.) from verbal statements.
A2.1A
• I can solve quadratic equations (an equation containing x^2, a polynomial of degree 2 such that it can be transformed into $ax^2 + bx + c = 0$, $a \neq 0$) by:
    Factoring
    Completing the square
    Using the quadratic formula
    Graphing (using appropriate technology)
• I can determine the nature of the roots.
• I can solve equations that are in quadratic form. (the form y

Geometry Essential Standards

A.4.1 Students are able to use graphs, tables and equations to represent linear functions.

G.1.1. Students are able to apply the properties of triangles and quadrilaterals to find unknown parts.

G.1.2. Students are able to identify and apply relationships among triangles.

G.2.1. Students are able to recognize the relationship between a three-dimensional figure and its two-dimensional representation.

G.2.2. Students are able to reflect across vertical or horizontal lines, and translate two-dimensional figures.

G.2.3. Students are able to use proportions to solve problems.

G.1.2A. Students are able to determine the values of the sine, cosine and tangent ratios of right triangles.

G.1.4A. Students are able to use formulas for surface area and volume to solve problems involving three-dimensional figures.

M.1.2A. Students are able to use indirect measurement in problem situations that defy direct measurement.

Geometry Extended/Reviewed Standards

A.1.1. Students are able to write and evaluate algebraic expressions using the set of whole numbers.

A.2.1. Students are able to use algebraic properties to transform multi-step, single-variable, and first-degree equations.

A.2.2. Students are able to use algebraic properties to transform multi-step, single-variable, first-degree inequalities and represent solutions using a number line.

A.3.1. Students are able to create linear models to represent problem situations.

M.1.1. Students are able to choose appropriate unit label, scale and precision.

M.1.2. Students are able to use suitable units when describing rate of change.

M.1.3. Students are able to use formulas to find perimeter, circumference, and area to solve problems involving common geometric figures.

N.1.1. Students are able to identify multiple representations of a real number.

N.1.2. Students are able to apply the concept of place value, magnitude and relative magnitude of real numbers.

N.3.1. Students are able to use estimation strategies in problem situations to predict results and to check the reasonableness of results.

N.3.2. Students are able to select alternative computational strategies and explain the chosen strategy.

N.1.2A. Students are able to apply properties and axioms of the real number system to various subsets, e.g., axioms of order, closure.

Geometry Introduced Standards

A.4.3A. Students are able to apply transformations to graphs and describe the results.

A.4.5A. Students are able to describe characteristics of nonlinear functions and relations.

G.1.1A. Students are able to justify properties of geometric figures.

G.2.1A. Students are able to use Cartesian coordinates to verify geometric properties.

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 1: Basics of Geometry

Timeline: 7 days (includes unit review and test)

Essential Questions:

1. Why can patterns in numbers and figures help us draw conclusions? (Sec 1.1*)
2. Why are some geometric terms undefined? (Sec 1.2*)
3. How do you apply segment and angle postulates? (Sec 1.3-1.6*)
4. How do you determine the area and perimeter of common plane figures? (Sec 1.7 *)

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.1 (Sec 1.1-1.5)

Essential Standards: G.1.1(Sec 1.6), M.1.3 (Sec 1.7)

Introduced Standards: G1.1A (Sec 1.1)

* Chapter and Section references are for Geometry McDougal Littell 2004.

Content-Activities-Assessment

Student Speak:

- I can find and describe patterns
- I can understand and use basic geometric terms
- I can find the distance and midpoint of a line
- I can use Pythagorean Theorem, segment and angle addition
- I can classify and identify angles and solve problems using vertical, complimentary, supplementary, linear pair and adjacent angles

- I can use formulas to find perimeter, circumference and area of common geometric figures

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 2: Reasoning and Proof

Timeline: 3 days

Essential Questions:

1. Why are some converse statements false? (Sec 2.1)

2. How can you use properties of algebra and geometry to justify statements? (Sec 2.4-2.6*)

   * Chapter and Section references are for Geometry McDougal Littell 2004.

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.2, N.1.2A (Sec 2.4 -2.6)

Essential Standards: G.1.1 (Sec 2.6)

Introduced Standards: G1.1A (Sec 2.4-2.6*)

Content-Activities-Assessment

Student Speak:

- I can understand conditional statements and their converse

- I can identify and use properties from algebra to justify statements

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 3: Perpendicular and Parallel Lines

Timeline: 8 days (Including review and test)

Essential Questions:

1. How are lines different? (Sec 3.1)
2. What are the properties of special angle pairs formed by lines intersected by a transversal? (Sec 3.1)
3. How can we apply properties of parallel lines and angles to determine other relationships? (Sec 3.2-3.5)
4. How can slope determine whether lines are parallel or perpendicular? (Sec 3.6 - 3.7)
5. How do you write the equation of a line in y = mx + b form? (Sec 3.6 - 3.7)

Standards

Reviewed Standards: A.1.1, A.2.1, N1.2, N.3.2, M.1.2 (Sec 3.3-3.7)

Essential Standards: G.1.1 (Sec 3.1 & 3.3*), A.4.1(Sec 3.6 - 3.7*)

Introduced Standards: G1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Student Speak:

- I can identify the relationships between lines: parallel, intersecting and skew and use the symbols for perpendicular and parallel ($\perp$ and $\parallel$).

- I can identify and calculate the special angle pairs formed by two parallel lines and a transversal: corresponding, alternate interior, same-side interior

- I can find the slope of any line and determine if lines are parallel, perpendicular or neither

- I can write the equation of a line in the form of y=mx+b that passes through one point and has a given slope.

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 4: Congruent Triangles (Sec 4.1-4.5... move 4.6 to unit 5)

Timeline: 8 days (Including review and test)

Essential Questions:

1. How do you classify triangles and what are their angle properties? (Sec 4.1)
2. How can we apply special properties of triangles to form other conclusions? (Sec 4.1)
3. What relationship exists between congruent figures? (Sec 4.1)
4. How can we prove two triangles are congruent? (Sec 4.2,-4.4, 4.6 HL)
5. How can we apply congruent triangle properties to make other conclusions? (Sec 4.2)

Standards

Reviewed Standards: A.1.1, A.2.1, N.3.2 (All Sec*)

Essential Standards: G.1.1, G1.2, (All Sec*)

Introduced Standards: G1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 5: Properties of Triangles (Sec 4.6 at beginning of Unit 5)

Timeline: 6 days (Including review and test)

Essential Questions:

1. How can we apply properties of isosceles triangles to make other conclusions? (Sec 4.6)

2. How can we apply properties of bisectors, medians, altitudes and mid-segments of triangles to make other conclusions? (Sec 5.1-5.4)

3. What comparisons can be made of the sides and angles of a triangle? (Sec 5.5)

Standards

Reviewed Standards: A.1.1, A.2.1, N.3.2, A.2.2, N.1.2A (All Sec*)

Essential Standards: G.1.1, G1.2, (All Sec*)

Introduced Standards: G1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 6: Quadrilaterals

Timeline: 7 days (Including review and test)

Essential Questions:

1. How are polygons different? (Sec 6.1)
2. What properties can be applied to find measures of angles of quadrilaterals? (Sec 6.1)
3. How can we apply properties and coordinate geometry of quadrilaterals to determine other relationships? (Sec 6.2-6.3)
4. How do you apply properties of quadrilaterals? (Sec 6.4-6.6)
5. How do you determine the area of polygons? (Sec 6.7)

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.1, M.1.3, N.3.1, N.3.2 (All Sec*)

Essential Standards: G.1.1, M.1.3 (All Sec*)

Introduced Standards: G1.1A, G.2.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 7: Transformations

Timeline: 5 days (Including review and test)

Essential Questions:

1. How are transformations different? (Sec 7.1)

2. How can we apply properties of transformations to determine other relationships? (Sec 7.2-7.4)

3. What transformations have symmetry? (Sec 7.2-7.3)

4. What are the properties of vectors and how do you write the equation of a circle? (Sec 7.4 Vectors, 10.6 Equations of Circles)

Standards

Reviewed Standards: N.3.1, N.3.2 (All Sec*)

Essential Standards: G.2.2, G.2.1A, A.4.5A (All Sec*)

Introduced Standards: A.4.3A, (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 8: Similarity

Timeline: 6 days (Including review and test)

Essential Questions:

1. How are ratios written and simplified? (Sec 8.1)
2. How can we apply properties of proportions to solve problems? (Sec 8.1-8.2)
3. How can we apply properties of similar polygons to form other conclusions? (Sec 8.3)
4. What relationship exists between similar figures? (Sec 8.4-8.5)
5. How can we prove two triangles are similar? (Sec. 8.4-8.5)
6. How can we apply similar triangle properties to make other conclusions? (8.6)

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.1 (All Sec*)

Essential Standards: G.1.1, G.1.2, G.2.3, M.1.2A (All Sec*)

Introduced Standards: G.1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 9: Right Triangles and Trigonometry

Timeline: 8 days (Including review and test)

Essential Questions:

1. How do you simplify, multiply and divide radicals? (Supplement Lesson 9.1 Worksheet)
2. What is the Pythagorean Theorem? (Sec 9.2)
3. How do you classify triangles when applying Converse of Pythagorean Theorem? (Sec 9.3)
4. How can we apply properties of radicals to special right triangles? (Sec 9.4)
5. What trigonometric properties are used to solve a right triangle? (Sec 9.5-9.6)

Standards

Reviewed Standards: A.1.1, A.2.1, N.3.1, N.3.2 (All Sec*)

Essential Standards: G.1.1, G.1.2, G.1.2A (All Sec*)

Introduced Standards: G.1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 11: Area of Polygons and Circles

Timeline: 7 days (Including review and test)

Essential Questions:

1. How do you apply properties of polygons to find interior and exterior angles? (Sec 11.1)
2. How do you determine and compare the area and perimeter of similar figures? (Sec 11.2-11.3)
3. How do you determine the circumference, area of circles and sectors and arc length? (Sec 11.4-11.5)
4. How can we apply properties of geometric probability to solve problems? (Sec 11.6)

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.1, N.3.1, N.3.2 (All Sec*)

Essential Standards: M.1.1, M.1.3 (All Sec*)

Introduced Standards: G.1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Geometry

A study of plane and solid geometry figures including parallelism, congruency, similarity, area, volume, and coordinate geometry . Deductive reasoning and problem solving will be emphasized in the development of properties.

Unit 12: Surface Area and Volume

Timeline: 6-7 days (Including review and test)

Essential Questions:

1. How are polyhedra different? (Sec 12.1)
2. How do you determine the surface area of three-dimensional geometric figures? (Sec 12.2-12.6)
3. How do you determine the volume of three-dimensional geometric figures? (Sec 12.2-12.6)

Standards

Reviewed Standards: A.1.1, A.2.1, M.1.1, M.1.3, N.3.1, N.3.2 (All Sec*)

Essential Standards: G.2.1, G.1.4A (All Sec*)

Introduced Standards: G.1.1A (all sections*)

* Chapter and Section references are for Geometry McDougal Littell 2004

Content-Activities-Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Basics of geometry

Timeline: 1.5 Weeks.

Essential questions

How do you describe a pattern?
How do you measure segments and angles?
How divide segments and angles into parts?
What are relationships between angle pairs?

Standards

G1.1

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can identify special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use the symbols for perpendicular and parallel ($\parallel$ *and* $\perp$)

M1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

M1.3

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.

• I can solve measurement problems without pictorial information.
• Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.

N3.1
• I can apply rounding as an estimation strategy (methods of approximation).
• I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.
• I can find the area and volume of irregular shapes applying (using) estimation strategies (methods of approximation).

G1.1A
Given a property of a geometric figure:
- I can explain why a statement is true.
- If a statement is false, I can provide a counterexample. (An example showing why something is false.)

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including midpoint.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Reasoning and proof

Timeline: 1.5 Weeks.

Essential questions

How do you use deductive reasoning to make a logical argument?
How do represent logic statements symbolically?
How do write algebraic proofs?
How do you write proofs about congruent segments and angles?
How do you prove properties about special pairs of angles?

Standards

G1.1

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can identify special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use the symbols for perpendicular and parallel ($\parallel$ and $\perp$).

G1.1A:

- I can write direct proofs for geometric shapes, specifically angles and segments.
- I can use symbolic notation to represent logical statements.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including proving lines are perpendicular.

Content/Activities/Assessment

Accelerated Geometry

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Unit: Perpendicular and parallel lines

Timeline: 1.5 Weeks.

Essential questions

What are the properties of perpendicular and parallel lines?
How do you prove lines perpendicular/parallel?
How do write equations of perpendicular/parallel lines?

Standards

G1.1

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given two lines in the coordinate plane, I can determine if the lines are parallel, perpendicular or neither.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can identify the relationships between two lines: parallel, intersecting and skew.
- I can identify the special angle pairs formed when two parallel lines are cut by a transversal: corresponding, alternate interior, same-side interior.
- Given the measure of one angle when two parallel lines are cut by a transversal, I can calculate the measures of all of the other angles.
- I can use the symbols for perpendicular and parallel ($\parallel$ and $\perp$).

M1.2

- I can determine the rate of change (slope) using the most commonly accepted units.
- Given the equation of a line of best fit, I can interpret the meaning of the slope of the situation including the correct units.
- Given the graph, I can interpret the meaning of the slope of the situation including the correct units.

G1.1A

- Given a property of a geometric figure:
    - ✱ I can explain why a statement is true.

✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)

- I can write direct and indirect proofs for geometric shapes.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including

- determining if two lines are parallel.
- determining if two lines are perpendicular.
- writing the equations of perpendicular and parallel lines.

Content/Activities/Assessment

Accelerated Geometry

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Unit: Congruent Triangles

Timeline: 1.5 Weeks.

Essential questions

How do you prove triangles are congruent?
How do you use congruent triangles to solve problems?
How do use the properties of special classifications of triangles?

Standards

G1.1

- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can classify triangles by both the number of congruent sides and the measures of the angles.

G1.2

- I can identify congruent figures and corresponding parts.
- I can use congruence postulates in application problems.

G1.1A

- Given a property of a geometric figure:
  - I can explain why a statement is true.
  - If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct proofs for geometric shapes.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including
- placing figures in the coordinate plane.
- writing coordinate proofs.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Properties of triangles

Timeline: 1.5 Weeks.

Essential questions

How do you use the properties of the special lines and segments of related to triangles to solve problems?
How do you compare side lengths and angle measures in one or more triangles?
How do you write an indirect proof?

Standards

G1.1

- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use medians, angle bisectors and altitudes in a triangle to solve problems.

G1.2 (Entire standard)

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.

M1.3

- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can solve measurement problems without pictorial information.
- Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures

(circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.

G1.1A

- Given a property of a geometric figure:
  - ✱ I can explain why a statement is true.
  - ✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and indirect proofs for geometric shapes.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including:

- Midpoint
- Two shapes congruent and similar.
- Special segments in a triangle (median, altitude, angle bisector, circumcenter,
- incenter, orthocenter, centroid).

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Quadrilaterals

Timeline: 1.5 Weeks.

Essential questions

How do you classify special quadrilaterals?
How do you use properties of special quadrilaterals to solve problems?
How write proofs involving special quadrilaterals?
How do find the areas of triangles and quadrilaterals?

Standards

G1.1

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- Given the measure of one angle when two parallel lines are cut by a transversal, I can calculate the measures of all of the other angles.
- I can classify special quadrilaterals based on their angle measures, side characteristics, and diagonal characteristics. (quadrilateral, rectangle, rhombus, square, parallelogram, trapezoid, and isosceles trapezoid.)
- Given a special quadrilateral, I can identify the value of (find) its missing parts.

M.1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the appropriate scale (The horizontal and vertical divisions that fit the data) for any graph (including histograms, scatterplots, and linear function graphs).
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

M1.3

• I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
• I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
• I can solve measurement problems without pictorial information.
• Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
• I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures (circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.

G1.1A

• Given a property of a geometric figure:
    - ✱ I can explain why a statement is true.
    - ✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)
• I can write direct and proofs for geometric shapes, specifically, given properties, proving a quadrilateral is a specific quadrilateral

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including:

- Midpoint
- Two shapes congruent and similar.
- Special segments in a triangle (median, altitude, angle bisector, circumcenter,
- incenter, orthocenter, centroid).
- The relationships of all quadrilaterals.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Quadrilaterals

Timeline: 1.5 Weeks.

Essential questions

How do you classify special quadrilaterals?
How do you use properties of special quadrilaterals to solve problems?
How write proofs involving special quadrilaterals?
How do find the areas of triangles and quadrilaterals?

Standards

G1.1

I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.

- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given two lines in the coordinate plane, I can determine if the lines are parallel, perpendicular or neither.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use the symbols for perpendicular and parallel ($\parallel$ and $\perp$).
- I can use medians, angle bisectors and altitudes in a triangle to solve problems.

G2.2

- I can flip (reflect) figures over a vertical line (Any line that is at right angles to the horizon. Any line that is perpendicular to the x-axis in the coordinate plane) or a horizontal line (Any line that is parallel to the horizon. Any line that is parallel to the x-axis in the coordinate plane.)
- I can draw the line(s) of symmetry on a plane figure.
- I can slide (translate) figures and identify the components.
- Given the coordinates of the pre-image, I can state the coordinates of the image after a:
    - ✱ reflection over a vertical line (Any line that is at right angles to the horizon. Any line that is perpendicular to the x-axis in the coordinate plane) or a horizontal line (Any line that is parallel to the horizon. Any line that is parallel to the x-axis in the coordinate plane.)
    - ✱ Slide (translation).
    - ✱ Composite transformation of flips (reflections) and slides (translations).

M1.3

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can solve measurement problems without pictorial information.

G1.1A

- Given a property of a geometric figure:
  - I can explain why a statement is true.
  - If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and proofs for geometric shapes.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including:

- Midpoint
- Two shapes congruent and similar.
- Special segments in a triangle (median, altitude, angle bisector, circumcenter, incenter, orthocenter, centroid).
- The relationships of all quadrilaterals.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Similarity

Timeline: 1.5 Weeks.

Essential questions

How do prove triangles are similar?
How you use similar polygons to solve problems?
How do use proportions to solve problems in geometry?

Standards

G1.2 (Entire Standard)

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.
- I can find the missing length of a side and/or perimeter of similar polygons.

M1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

M1.3

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.
- I can solve measurement problems without pictorial information.
- Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures

(circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.

G1.1A

- Given a property of a geometric figure:
  - I can explain why a statement is true.
  - If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and proofs for geometric shapes, specifically proving shapes are similar and properties of similar shapes.

M1.2A (Entire standard)

Content/Activities/Assessment

Accelerated Geometry
Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Similarity

Timeline: 1.5 Weeks.

Essential questions
How do prove triangles are similar?
How you use similar polygons to solve problems?
How do use proportions to solve problems in geometry?

Standards
G1.2 (Entire Standard)

G2.3
- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.
- I can find the missing length of a side and/or perimeter of similar polygons.

M1.1
- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

M1.3
- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.
- I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.
- I can solve measurement problems without pictorial information.
- Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures

(circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.

G1.1A

- Given a property of a geometric figure:
  - I can explain why a statement is true.
  - If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and proofs for geometric shapes, specifically proving shapes are similar and properties of similar shapes.

M1.2A (Entire standard)

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Right Triangles

Timeline: 1.5 Weeks.

Essential questions

How do solve a right triangle?
How do you use special right triangles to solve problems?
How do you use the Pythagorean theorem and its converse to solve problems?
How do you find magnitude and direction to find vectors?
How do use the geometric mean theorems to solve problems?

Standards

G1.1

- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given two lines in the coordinate plane, I can determine if the lines are parallel, perpendicular or neither.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use medians, angle bisectors and altitudes in a triangle to solve problems.
- Given the length of one side of a 45°-45°-90° or a 30°-60°-90° triangle, I can calculate the length of the other two sides.
- Given the measures of 3 line segments, I can determine if the line segments will form a triangle.
- Given the lengths of the three sides of a triangle, I can determine if the triangle is a right triangle.

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.
- I can find the missing length of a side and/or perimeter of similar polygons.

G1.1A

- Given a property of a geometric figure:

✱ I can explain why a statement is true.
✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)

• I can write direct and indirect proofs for geometric shapes.

G1.2A

• Given any two sides of a right triangle, I can find the ratios for sine, cosine and tangent.
• Given any two parts of a right triangle, I can find all of the missing parts.
• I can use sine, cosine and tangent ratios to solve application problems that involve right triangles.

G2.1A: I can use apply Cartesian Coordinate System to show the geometric properties including:

- Midpoint
- Two shapes congruent and similar.
- Special segments in a triangle (median, altitude, angle bisector, circumcenter, incenter, orthocenter, centroid).
- The relationships of all quadrilaterals.

M1.2A (entire standard)

Content/Activities/Assessment

Accelerated Geometry

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Unit: Circles

Timeline: 1.5 Weeks.

Essential questions

How do you use arcs, angles and segments to solve problems?
How do you use the graph of the equation of a circle to model problems?

Standards

G1.1

- I can identify the value of (find) the length and midpoint of any (horizontal, vertical or oblique) segment on the coordinate plane.
- I can identify the value of (find) the slope of any line in the coordinate plane.
- Given two lines in the coordinate plane, I can determine if the lines are parallel, perpendicular or neither.
- Given a complex diagram, I can solve for the missing lengths of a segment or missing measures of angles.
- I can solve problems using special angle pairs (vertical, complementary, supplementary, linear pair and adjacent.)
- I can use medians, angle bisectors and altitudes in a triangle to solve problems.
- Given the length of one side of a 45°-45°-90° or a 30°-60°-90° triangle, I can calculate the length of the other two sides.

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.

A3.2A:

- I can write the equation of a circle.
- I can use the equation of a circle and its graph to solve problems.

G1.1A

- Given a property of a geometric figure:
  - ✱ I can explain why a statement is true.

✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)

• I can write direct and indirect proofs for geometric shapes.

G1.3A

• I can state the similarities and differences between a chord and a diameter.

• Given the arc measures, I can find the measures of a central angle, an inscribed angle, the angle inside a circle formed by two chords, and the angle outside the circle formed by a combination of secants and/or tangents.

• I can find the measure of the angle formed by the tangent and radius.

• From given values, I can find the missing parts of chords, secants, and tangents.

G2.1A

I can use apply Cartesian Coordinate System to show the geometric properties including:

- Midpoint
- Two shapes congruent and similar.
- Special segments in a triangle (median, altitude, angle bisector, circumcenter,
- incenter, orthocenter, centroid).
- The relationships of all quadrilaterals.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Area

Timeline: 1.5 Weeks.

Essential questions

How do you find the angles measures of polygons?
How do you find the area of a regular polygons?
How do you compare perimeters and areas of similar shapes?
How do you use arc length and sector area to solve problems?
How do you use geometric probability to solve problems?

Standards

G1.1

- I can use medians, angle bisectors and altitudes in a triangle to solve problems.
- Given a special quadrilateral, I can identify the value of (find) its missing parts.
- I can identify the value of (find) the missing side of any right triangle in decimal form.
- Given the length of one side of a 45°-45°-90° or a 30°-60°-90° triangle, I can calculate the length of the other two sides.

G2.3

- I can write and solve a proportion (An equation that states that two ratios are equivalent.)
- I can apply (use) a proportion (An equation that states that two ratios are equivalent) to solve application problems.
- I can find the missing length of a side and/or perimeter of similar polygons.

M1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

M1.3

- I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) of any polygon.
- I can compute/calculate (find) the area (the amount of space contained inside a planar figure) of any circle, square, rectangle, or triangle without being given the formula.

• I can compute/calculate (find) the circumference (the distance around a circle) without being given the formula.
• I can solve measurement problems without pictorial information.
• Given the area (the amount of space contained inside a planar figure) or perimeter (the distance around a closed planar geometric figure), I can solve for missing parts.
• I can compute/calculate (find) the perimeter (the distance around a closed planar geometric figure) and area (the amount of space contained inside a planar figure) of common figures (circle, square, rectangle, triangle) on the coordinate plane where at least one side is parallel or perpendicular to the x-axis.
• I can calculate and interpret geometric probability.

N3.1
• I can apply rounding as an estimation strategy (methods of approximation).
• I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.

G1.2A
• Given any two sides of a right triangle, I can find the ratios for sine, cosine and tangent.
• Given any two parts of a right triangle, I can find all of the missing parts.
• I can use sine, cosine and tangent ratios to solve application problems that involve right triangles.

G1.3A
• I can state the similarities and differences between a chord and a diameter.
• Given the arc measures, I can find the measures of a central angle, an inscribed angle, the angle inside a circle formed by two chords, and the angle outside the circle formed by a combination of secants and/or tangents.
• I can find the measure of the angle formed by the tangent and radius.
• From given values, I can find the missing parts of chords, secants, and tangents.

Content/Activities/Assessment

Accelerated Geometry

Description: Accelerated Geometry emphasizes deductive reasoning to arrive at properties of geometry in a logical sequence. This is the second course in the Advanced Placement sequence. Formal proofs are used in the development of many properties and problem solving. Areas of study will include properties of plane and solid geometry figures, parallelism, congruency, similarity, area, volume, coordinate geometry, right triangle trigonometry, circles, and transformational geometry.

Unit: Solid

Timeline: 1.5 Weeks.

Essential questions

How do you name and classify geometric solid?
How do represent a geometric solid as a net?
How you find surface and volume of solids?

Standards

G2.1

- Given the two dimensional representation (A pattern that can be folded to form a three-dimensional figure, the net) of a 3-dimensional shape (A shape that is solid. It has a length, width and height), I can identify the solid (polyhedron).
- Given a 3-dimensional shape (solid), I can draw its net (A pattern that can be folded to form a three-dimensional figure).

M1.1

- Given a measurement situation, I can determine (choose) the most commonly accepted unit of measure.
- I can determine (choose) the commonly accepted precision (The accepted tolerance level) of a measurement and/or calculation.

N3.1

- I can apply rounding as an estimation strategy (methods of approximation).
- I can estimate the answer to a problem to check the reasonableness (appropriateness) of my calculated answer.
- I can find the area and volume of irregular shapes applying (using) estimation strategies (methods of approximation).

G1.1A

- Given a property of a geometric figure:
  - ✱ I can explain why a statement is true.
  - ✱ If a statement is false, I can provide a counterexample. (An example showing why something is false.)
- I can write direct and indirect proofs for geometric shapes.

G1.4A

- Given the appropriate formulas, I can find the surface area or volume of any solid object or a combination of solid objects.
- Given the surface area or volume of any solid object, I can find the key missing parts.

G1.2A

- Given any two sides of a right triangle, I can find the ratios for sine, cosine and tangent.
- Given any two parts of a right triangle, I can find all of the missing parts.
- I can use sine, cosine and tangent ratios to solve application problems that involve right triangles.

G1.3A

- I can state the similarities and differences between a chord and a diameter.
- Given the arc measures, I can find the measures of a central angle, an inscribed angle, the angle inside a circle formed by two chords, and the angle outside the circle formed by a combination of secants and/or tangents.
- I can find the measure of the angle formed by the tangent and radius.
- From given values, I can find the missing parts of chords, secants, and tangents.

Content/Activities/Assessment

Course Name: Algebra II

Course Description: Algebra II reviews and extends the concepts and skills introduced in Algebra I. Additional topics will include sequences, series, probability, statistics, and solving quadrate equations.

Unit Name: Linear Equations and Functions

Timeline: 6 days

Essential Questions:
What determines a function?
How do you identify the slope/rate of change?
How do you write a linear equation?
How do you approximate data within your equation?
How do you write a linear equality?

Standards:
A.3.1(Review)(2.3, 2.4, 2.6)
A.4.1(Essential)(2.3, 2.4, 2.5)
A.4.3.A(Essential)(2.6)
A.4.6.A(Essential)(2.6)
M.1.2(Review)(2.2)
M.1.1.A(Review)(2.2)
N.1.2(Review)(2.3, 2.4, 2.6)
N.3.1(Review)(2.4)
S.1.3(Essential)(2.5)
A.3.2.A(2.8)

Content/Activities/Assessment:
All sections reference McDougell Littell Algebra II 2004.

Teacher Speak:
Students are able to use (create) graphs, tables and equations to represent (model) linear functions.
Students are able to apply (use) transformations to graphs and describe (identify) the results.
Students are able to graph (represent) solutions to linear inequalities (A comparison of two first degree expressions. The comparisons can be $<,>,\leq,\geq$.).
Represent (display) a set of data in a variety of graphical forms and draw (generate) conclusions.
Students are able to create (write) equations to model (represent) relationships that are algebraic, geometric, trigonometric, and exponential.
Student Speak:
• I can develop a table/chart from a linear graph (Pictorial representation of data or an equation).
• I can create a table/chart from a linear equation in any form including standard, point-slope, slope- intercept form.
• I can graph a linear equation in any form including standard, point- slope, and slope-intercept.
• I can make a linear graph from a table (A way of expressing domain & range in a row & column in horizontal, vertical or T table).
• I can write the equation of a line in the form f(x) = mx + b that passes through two points.
* Given any form of a linear equation, I can write it in the form f(x) = mx + b.
• Given a relation, I can describe the transformations that are applied to the parent relation.
• Given the description of transformations to relations, I can the write the relation.
• Given the graph of a relation, I can write the equation of the relation.
• I can describe a horizontal translation to a graph (f(x-a)).
• I can describe a vertical translation to a graph. (f(x) + a).
• I can describe the reflection over the x-axis to a graph. (f(-x)).
• I can describe the reflection over the y-axis to a graph (-f(x)).
* I can describe a stretch or shrink (dilation to a graph). (f(ax).
• I can solve a linear inequality algebraically.
• I can match the graph of an inequality with its algebraic representation.
• I can determine the type boundary created by the inequality (solid or dashed).
* I can shade the correct side (half-plane).
• I can draw a line of best fit on a scatterplot and use it make appropriate predictions.
• I can determine the most appropriate graphical form to display a data set (of numbers or information).
• Given a set of data I can make a: Box-and-whisker plot: Histogram; Stem-and-leaf plot; Scatterplot; Frequency table
• I can classify info portrayed in graphs and tables as: algebraic, geometric, trigonometric, exponential.
• Once I determine (or am given) the type of relationship, I can write the equation.

Accelerated Algebra II

The pace and depth of topics in this course will be challenging. A strong math aptitude and work ethic are needed to be successful. Topics covered include polynomial, exponential, rational, trigonometry and inverse functions, sequences, series, conic sections, probability, systems of equations and inequalities, powers and roots.

Unit 1 Equations and inequalities

Timeline 9 days

Essential questions.
1. How do you identify properties and use operations with real numbers?
2. How do you solve linear equations?
3. How do you solve absolute value equations and inequalities?

Standards A.2.1 , A.2.2 , A.2.3

Content/activities/assessment

Unit 2 Linear equations and functions.

Timeline 10 days

Essential questions.
1. How do you identify the domain and range of a function?
2. How do you write a linear equation?
3. How do you approximate the best fitting line for a set of data?

Standards A.4.1 , A.4.6 ,S.1.3

content/activities/assessment

Unit 3 Systems of linear equations and inequalities

Timeline 7 days

Essential questions
1. How do you solve a system of 2 variable equations?
2. How do you solve a system of 2 variable inequalities?
3. How do you solve a system of 3 variable equations?

Standards A.2.2 , a.4.1 , N.1.2

content/activities/assessment

Unit 4 Quadratic Functions

Timeline 10 days

Essential questions
1. How do you solve quadratic equations?
2. How do you perform operations with complex numbers?
3. How do you solve quadratic inequalities?

Standards A.1.2 , A.2.1 N.1.1

content/activities/assessment

Unit 5 Polynomial and polynomial functions

Timeline 9 days

Essential questions
1. How do you use properties of exponents to evaluate and simplify expressions?
2. How do you add, subtract and multiply polynomials?
3. Find the rational zeros of a polynomial function?

Standards N.2.1 , N.2.1 , A.3.2

content/activities/assessment

Unit 6 Powers, roots and radicals

Timeline 9 days

Essential questions
1. How do you use the properties of rational exponents to evaluate and simplify expressions?
2. How do you find the composition of two functions?
3. How do you find the inverse of a linear function?
4. How do you find the measures of central tendency?

Standards N.1.1 , N.1.2 , N.2.1

content/activities/assessment

Unit 7 Exponential and Logarithmic Functions

Timeline 8 days

Essential questions
1. How do you use exponential growth functions to model life situations?
2. How do you use properties of logarithms?
3. How do you solve equations involving logarithms?

Standards A.4.4.A , N.2.1

content/activities/assessment

Unit 8 Rational Equations and Functions

Timeline 8 days

Essential questions
1. How do you graph general rational functions?
2. How do you simplify rational expressions?
3. How do you add and subtract rational expressions?

Standard A.1.1.A , A.3.1.A

content/activities/assessment

Unit 9 Quadratic relations and conic sections

Timeline 8 days

Essential questions
1. How do you find the distance between 2 points?
2. How do you graph circles?
3. How do you write equations of circles?
4. How do you classify a conic using it's equation?

Standards A.4.3

content/activities/assessment

Unit 10 Sequences, series, probability and statistics

Timeline 6 days

Essential questions
1. How do you find the sum of an arithmetic series?
2. How do you find the sum of a geometric series?
3. How do you find the number of permutations or combinations of an event?

Standards A.3.3 , S.2.1 , S.2.2

content/ activities/assessment

Unit 11 Trigonometric ratios and functions

Timeline 2 days

Essential Questions
1. How do you use Trig. relationships to evaluate trig. functions of acute angles?
2. How do you solve triangles?
3. How do you solve problems involving trig. ratios?

Standards G.1.1 , G1.2.A , M.1.2.A

content/activities/assessment

Trigonometry with Algebra III

Trigonometry is the study of a set of periodic functions defined by means of a unit circle. These functions are useful as models for many different kinds of practical situations in physics, calculus, engineering and other math oriented areas. In addition to the trigonometry functions, this course will study several other classes of functions.

Unit 1 Linear relations and functions

Timeline 14 days

Essential questions.
1. How do you find the domain and range of a function?
2. How do you find the composition of two functions?
3. How do you graph a piecewise function?

Standards A.4.1.A , A.4.6.A , S.1.5.A , N.1.2.A

Content/activities/assessment

Unit 2 Systems of linear equations and inequalities

Timeline 7 days

Essential questions.
1. How do you solve a system of two equations in two variables?
2. How do you solve a system of three equations in three variables?
3. How do you add, subtract and multiply matrices?

Standards A.1.1.A , A.2.2.A

content/activities/assessment

Unit 3 The nature of graphs

Timeline 10 days

Essential questions
1. How do you determine if the graph of a relation is symmetrical?
2. How do you identify the transformations of simple graphs?
3. How do you identify the end behavior of a function?

Standards A.3.1.A , A.4.2.A , A.4.3.A , A.4.5.A

content/activities/assessment

Unit 4 Polynomial and rational functions

Timeline 9 days

Essential questions
1. How do you solve quadratic equations?
2. How do solve a polynomial equation using the rational roots theorem?
3. How do you write polynomial functions to model real-world data?

Standards A.2.1.A , A.4.6.A , A.3.1.A , A.4.3.A

content/activities/assessment

Unit 5 The trigonometric functions

Timeline 10 days

Essential questions
1. How do you find the trigonometric ratios for acute angles of right triangles?
2. How do you solve right triangles?
3. How do you solve problems using the law of sines?
4. How do you solve problems using the law of cosines?

Standards M.1.1.A , M.1.2.A , G.1.2.A , G.2.1.A

content/activities/assessment

Unit 6 Graphs of trigonometric functions

Timeline 12 days

Essential questions
1. How do you find the amplitude and period for the sine and cosine functions?
2. How do you find the phase and vertical shifts of sine and cosine functions?
3. How do model real-world data using sinusoidal functions?

Standards M.1.1.A A.4.4.A , A.4.5.A , A.4.3.A , A.3.2.A , A.4.1.A

content/activities/assessment

Unit 8 Polar coordinates and complex numbers

Timeline 6 days

Essential questions
1. How do you graph points in polar coordinates?
2. How do you convert between polar and rectangular coordinates?
3. How do you add, subtract, multiply and divide complex numbers in rectangular form?

Standard A.2.1.A , N.1.1.A

content/activities/assessment

Unit 9 Exponential and logarithmic functions

Timeline 8 days

Essential questions
1. How do you simplify expressions containing expressions containing rational expressions?
2. How do you solve problems involving exponential growth and decay?
3. How do you evaluate expressions involving logarithms?
4. How do you solve equations involving logarithms?

Standards A.3.2.A , A.4.4.A , N.2.1.A

content/activities/assessment

Pre-Calculus

This course is the fourth course in the advanced placement sequence. It will include the study of circular functions and the full treatment of trigonometric functions. Topics will include solution of triangles, vectors with applications, polar coordinates, complex numbers, matrix operations. Students will be required to memorize the unit circle and the basic identities associated with circular and trigonometric functions. Six basic types of functions will be studied and graphed (polynomial, rational algebraic, exponential, logarithmic, and trigonometric.) The conic sections will be studied including translation and rotation of axes.

Unit 1 Linear relations and functions

Timeline 14 days

Essential questions.
1. How do you find the domain and range of a function?
2. How do you find the composition of two functions?
3. How do you graph a piecewise function?

Standards A.4.1.A , A.4.6.A , S.1.5.A , N.1.2.A

Content/activities/assessment

Unit 2 Systems of linear equations and inequalities

Timeline 7 days

Essential questions.
1. How do you solve a system of two equations in two variables?
2. How do you solve a system of three equations in three variables?
3. How do you add, subtract and multiply matrices?

Standards A.1.1.A , A.2.2.A

content/activities/assessment

Unit 3 The nature of graphs

Timeline 10 days

Essential questions
1. How do you determine if the graph of a relation is symmetrical?
2. How do you identify the transformations of simple graphs?
3. How do you identify the end behavior of a function?

Standards A.3.1.A , A.4.2.A , A.4.3.A , A.4.5.A

content/activities/assessment

Unit 4 Polynomial and rational functions

Timeline 9 days

Essential questions
1. How do you solve quadratic equations?
2. How do solve a polynomial equation using the rational roots theorem?
3. How do you write polynomial functions to model real-world data?

Standards A.2.1.A , A.4.6.A , A.3.1.A , A.4.3.A

content/activities/assessment

Unit 5 The trigonometric functions

Timeline 10 days

Essential questions
1. How do you find the trigonometric ratios for acute angles of right triangles?
2. How do you solve right triangles?
3. How do you solve problems using the law of sines?
4. How do you solve problems using the law of cosines?

Standards M.1.1.A , M.1.2.A , G.1.2.A , G.2.1.A

content/activities/assessment

Unit 6 Graphs of trigonometric functions

Timeline 12 days

Essential questions
1. How do you find the amplitude and period for the sine and cosine functions?
2. How do you find the phase and vertical shifts of sine and cosine functions?
3. How do model real-world data using sinusoidal functions?

Standards M.1.1.A A.4.4.A , A.4.5.A , A.4.3.A , A.3.2.A , A.4.1.A

content/activities/assessment

Unit 7 Trigonometric identities and equations

Timeline 7 days

Essential questions
1. How do you use the pythagorean identities?
2. How do you use basic trigonometric identities to verify other trigonometric identities?
3. How do you solve trigonometric equations?

Standards A.4.4.A

content/activities/assessment

Unit 8 Polar coordinates and complex numbers

Timeline 6 days

Essential questions
1. How do you graph points in polar coordinates?
2. How do you convert between polar and rectangular coordinates?
3. How do you add, subtract, multiply and divide complex numbers in rectangular form?

Standard A.2.1.A , N.1.1.A

content/activities/assessment

Unit 9 Exponential and logarithmic functions

Timeline 8 days

Essential questions
1. How do you simplify expressions containing expressions containing rational expressions?
2. How do you solve problems involving exponential growth and decay?
3. How do you evaluate expressions involving logarithms?
4. How do you solve equations involving logarithms?

Standards A.3.2.A , A.4.4.A , N.2.1.A

content/activities/assessment

Calculus Standards

(Rev.Summer 2010)

Algebra

1.0 Use procedures to transform algebraic expressions

A1.1C Apply procedures and theorems for determining limits of various functions.

A1.2 C Apply procedures and theorems for deriving various functions.

A1.3 C Apply procedures and theorems for integrating various functions.

2.0 Use a variety of algebraic concepts and methods to solve equations and inequalities.

These have been subsumed in the previous courses, but are applied throughout this course.

3.0 Interpret and develop mathematical models

A3.1 C Students are able to write the equation of the line tangent to a curve.

A3.2 C Students are able to use the derivative to model problems
- a. instantaneous rate of change, speed, velocity, acceleration, optimization, related rates and differential equations.

A3.3 C Students are able to use the integral to model problems
- a. position, speed, velocity, area, volume and accumulated change.
- b. arc length (BC), surface area (BC), work (BC), force (BC) and centroids (BC).

4.0 Describe and use properties and behaviors of relations, functions and inverses.

A4.1 C Students will describe the continuity and differentiability of a function.

A4.2 C Students are able to use graphs, tables and equations to represent various functions.
- a. Determine limits using graphs, tables and equations.
- b. Determine derivatives using graphs, tables and equations.
- c. Determine definite integrals using graphs, tables and equations.

A4.3 C Students are able to use derivative tests to determine characteristics of a function.
- a. Determine extrema, inflection points, intervals of increasing and decreasing, and concavity of a function.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

Geometry

1.0 Use deductive and inductive reasoning to recognize and apply properties of geometric figures

G 1.1 C Students will apply numerical derivative and integration techniques.
a. Average rate of change, Riemann sums, trapezoid rule

2.0 Use properties of geometric figures to solve problems from a variety of perspectives.

G 2.1 C Develop integrals to calculate area, volumes, arc lengths (BC), surface areas (BC), and centroids (BC).

Measurement

1.0 Apply measurement concepts in practical applications

M 1.2 Students are able to use suitable units when describing rates of change.

Number Sense

1.0 Analyze the structural characteristics of the real number system and its various subsystems. Analyze the concept of value, magnitude, and relative magnitude of real numbers.

2.0 Apply number operations with real numbers and other number systems

3.0 Develop conjectures, predictions or estimations to solve problems and verify or justify the results.

N3.1 C Estimate the values of derivatives and definite integrals

N3.2 C Estimate function values using differentials, Taylor polynomials (BC), and infinite series (BC)

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 1: Limits

Timeline: 8 Days (including review and test)

Essential Questions:

1. What is a limit?
2. How do you determine a limit by analyzing a graph or a table of values? (1.2)
3. What are the various procedures for determining limits and when does a limit not exist? (1.2-1.5, 3.5)
4. What are the three properties of a function that is continuous at a point and how can a graph be discontinuous? (1.4)

Standards:

1.1C Apply procedures and theorems for determining limits of various functions.

4.1C Students will describe the continuity and differentiability of a function.

4.2C Students are able to use graphs, tables and equations to represent various functions.

a. Determine limits using graphs, tables and equations.

Content-Activities-Assessment

Calculus: Larson Hostetler Edawards 7th ed. Chapter 1, Chapter 3 section 5.

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 2: Differentiation

Timeline: 9 Days (including review and test)/ 4 days (including test)

Essential Questions:

Part A (sections 1-5):

1. What is a derivative? (2.1)
2. What are the various procedures for determining derivatives? (2.1-2.5)
3. When does a derivative not exist? (2.1)
4. How are position, velocity, speed and acceleration related and how do you determine each? (2.3)

Part B (sections 5-6):

5. How do you derive an implicitly defined function? (2.5)
6. What is the procedure for solving related rate problems? (2.6)

Standards:

Review:

[A] A4.1C Students will describe the continuity and differentiability of a function.

[B] A1.2 C Apply procedures and theorems for deriving various functions.

A3.1 C Students are able to write the equation of the line tangent to a curve.

Essential:

A1.2 C Apply procedures and theorems for deriving various functions.

A3.1 C Students are able to write the equation of the line tangent to a curve.

A3.2 C Students are able to use the derivative to model problems
a. instantaneous rate of change, speed, velocity, acceleration and related rates.

A4.2C Students are able to use graphs, tables and equations to represent various functions.
b. Determine derivatives using graphs, tables and equations.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

G 1.1 C Students will apply numerical derivative and integration techniques.
a. Average rate of change

M 1.2 Students are able to use suitable units when describing rates of change.

N3.1 C Estimate the values of derivatives

Content-Activities-Assessment (over)

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 2, sections 1-6

AP Calculus AB/BC

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Unit 3A: Applications of the Derivative

Timeline: 9 Days (including review and test)

Essential Questions:

1. What is significant about a derivative value of zero? (3.1-3.4, 3.6)
2. What does the value of the first derivative tell us about the graph of a function? (3.3, 3.6)
3. What does the value of the second derivative tell us about the graph of a function? (3.4, 3.6)
4. How do you determine and verify relative and absolute extrema? (3.3)
5. How do you sketch a graph of a function from its first or second derivative? (3.6)

Standards:

Review: A4.1C Students will describe the continuity and differentiability of a function.

A1.2 C Apply procedures and theorems for deriving various functions.

A3.1 C Students are able to write the equation of the line tangent to a curve.

Essential:

A3.2 C Students are able to use the derivative to model problems

a. instantaneous rate of change, speed, velocity, acceleration and related rates.

A4.2C Students are able to use graphs, tables and equations to represent various functions.

b. Determine derivatives using graphs, tables and equations.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

N3.1 C Estimate the values of derivatives

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 3, sections 1-4, 6

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 3B: More Applications of the Derivative

Timeline: 4 Days (including review and test)

Essential Questions:

1. How do you determine maximum and minimum values of functions that model various real-life situations? (3.7)
2. How can you approximate a function value using the tangent line? (3.9)
3. How can you approximate a function value using differentials? (3.9)

Standards:

Review: A4.1C Students will describe the continuity and differentiability of a function.

A1.2 C Apply procedures and theorems for deriving various functions.

A3.1 C Students are able to write the equation of the line tangent to a curve.

M 1.2 Students are able to use suitable units when describing rates of change.

Essential:

A3.2 C Students are able to use the derivative to model problems

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

N3.1 C Students are able to estimate the values of derivatives.

N3.2 C Students are able to estimate function values using differentials.

Content-Activities-Assessment (over)

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 3, sections 7,9

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 4A: Integration

Timeline: 9 Days (including review and test) / 3 Days

Essential Questions:

Part A :

1. What is an antiderivative? What is an integral? (4.1)
2. What are the two types of solutions to a differential equation and how do you determine them? (4.1)
3. What are the procedures and theorems for determining antiderivatives? (4.1, 4.5)
4. How do you estimate the value of a definite integral using a Riemann sum? (4.2)
5. How do you determine the value of a definite integral using the Fundamental Theorem of Calculus? (4.4)

Part B:

6. Why would you need to use numerical integration? (4.6)
7. What are three ways to approximate the value of a definite integral? (4.6)
8. What is a slope field and how is it used? (supplemented)

Standards:

Review: A1.2 C Apply procedures and theorems for deriving various functions.

A1.3 C Apply procedures and theorems for integrating various functions.

A4.2 C Students are able to use graphs, tables and equations to represent various functions.
c. Determine definite integrals using graphs, tables and equations.

Essential:

A1.3 C Apply procedures and theorems for integrating various functions.

A3.3 C Students are able to use the integral to model problems
a. position, speed, velocity, area.

A4.2C Students are able to use graphs, tables and equations to represent various functions.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

G 1.1 C Students will apply numerical derivative and integration techniques.
a. Average rate of change, Riemann sums, trapezoid rule

Content-Activities-Assessment:

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 4, sections 1-5 ; Supplemental material for Slope Fields

AP Calculus AB/BC

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Unit 5A: Transcendental Functions

Timeline: 9 Days (Including review and test) / 2 Days

Essential Questions:

Part A: (Logarithmic and Exponential)

1. What are the procedures for deriving a logarithmic function and integrating its result? (5.1-5.2, 5.5)
2. What are the procedures for deriving and integrating an exponential function? (5.4-5.5)
3. How do you separate variables in certain expressions and when must you do it? (5.7)

Part B: (Inverse Trig Functions)

4. What are the procedures for deriving inverse trig functions? (5.8)
5. What are the procedures for integrating inverse trig functions? (5.9)

Standards:

Review:

A3.2 C Students are able to use the derivative to model problems.

A3.3 C Students are able to use the integral to model problems
a. position, speed, velocity, area, volume and accumulated change.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

M 1.2 Students are able to use suitable units when describing rates of change.

Essential:

A1.2 C Apply procedures and theorems for deriving various functions.

A1.3 C Apply procedures and theorems for integrating various functions.

A3.2 C Students are able to use the derivative to model problems.

A4.2 C Students are able to use graphs, tables and equations to represent various functions.
b. Determine derivatives using graphs, tables and equations.
c. Determine definite integrals using graphs, tables and equations.

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 5, section 1-9.

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 6A: Applications of Integration: Area and Volume

Timeline: 9 Days (including volume project)

Essential Questions:

1. How do you determine the area between to curves? (6.1)
2. How can you determine the volume of a solid of revolution? (6.2-6.3)
3. How can you determine the volume of a solid formed by known cross sections? (6.2)

Standards:

Review:

A1.3 C Apply procedures and theorems for integrating various functions.

Essential:

A3.3 C Students are able to use the integral to model problems
   a. position, speed, velocity, area, volume and accumulated change.

A4.2C Students are able to use graphs, tables and equations to represent various functions.

G 2.1 C Develop integrals to calculate area, volumes, ...

M 1.2 Students are able to use suitable units when describing rates of change.

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 6, sections 1-3

Volume Project: Rubric

AP Calculus AB/**BC**

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 6B: Applications of Integration: Arc Length, Work, Centroids, Force

Timeline: 10 Days (including volume project)

Essential Questions:

1. How do you determine the length of a curve? (6.4)
2. How do you determine the surface area of a solid of revolution? (6.4)
3. How can you compute the work done by a variable force? (6.5)
4. How can you locate the centroid of a planar laminate? (6.6)
5. How do you determine the force exerted by a fluid on a vertical surface? (6.7)

Standards:

Review:

A1.3 C Apply procedures and theorems for integrating various functions.

Essential:

A3.3 C Students are able to use the integral to model problems

A4.2C Students are able to use graphs, tables and equations to represent various functions.
c. Determine definite integrals using graphs, tables and equations.

G 2.1 C Develop integrals to calculate area, volumes, arc lengths (BC), surface areas (BC), and centroids (BC).

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 6, sections 4-7

AP Calculus AB/**BC**

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 7: Advanced Integration Techniques, L'Hôpital's Rule and Improper Integrals

Timeline: 8 Days (including review and test)

Essential Questions:

Part A]

1. How do you determine which parts of an integral to assign to the formula for integration by parts? (7.2)
2. What are the procedures for the partial fractions technique? (7.5)
3. How do you determine which substitution to make when using the Trig Substitution technique* ? (7.3)
4. How do you determine the substitutions needed for the Trig integrals technique* ? (7.4)

Part B]

1. What are the procedures for determining basic limits? (review of unit 1)
2. When is it appropriate to apply L'Hôpital's Rule to determine a limit? (7.7)
3. What is the procedure for applying L'Hôpital's Rule? (7.7)
4. What makes an integral improper? (7.8)
5. What procedures are used in evaluating an improper integral and when does a value not exist? (7.8)

Standards:

Review: A1.1C Apply procedures and theorems for determining limits of various functions.

A1.2 C Apply procedures and theorems for deriving various functions.

A1.3 C Apply procedures and theorems for integrating various functions.

A4.1 C Students will describe the continuity and differentiability of a function.

A4.2 C Students are able to use graphs, tables and equations to represent various functions.
a. Determine limits using graphs, tables and equations.

G 2.1 C Develop integrals to calculate area, volumes, arc lengths (BC), surface areas (BC), and centroids (BC).

A3.3 C Students are able to use the integral to model problems

Essential:

A1.3 C Apply procedures and theorems for integrating various functions.

A3.3 C Students are able to use the integral to model problems
a. position, speed, velocity, area.

A4.2C Students are able to use graphs, tables and equations to represent various functions.
c. Determine definite integrals using graphs, tables and equations.

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 7, sections 1-8

* *These are not required for the AP curriculum and may receive less emphasis depending on time.*

AP Calculus AB/**BC**

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 8: Sequences and Series; Taylor Polynomials and Power Series

Timeline: 7 Days (including review and test) / 4 Days

Essential Questions:

Part A]

1. How do you determine if a sequence converges or diverges? (8.1)
2. What are the distinguishing characteristics of the geometric series, p-series, alternating series, and harmonic series? (8.2-8.6)
3. What are the procedures for testing a series for convergence: n^{th} term test, special series, ratio test, integral test, root test? (8.2-8.6)

Part B]

4. How is a (Taylor) polynomial function developed to represent another function? (8.7)
5. How do you approximate the value of a function using the associated Taylor polynomial? What is the error of such an approximation? How is the interval of convergence determined? (8.7)
6. What is a power series and how is it used? (8.8-9)

Standards:

Review: A1.1C Apply procedures and theorems for determining limits of various functions.
A1.2 C Apply procedures and theorems for deriving various functions.
A1.3 C Apply procedures and theorems for integrating various functions.

Essential:

A1.3 C Apply procedures and theorems for integrating various functions.
A4.2 C Students are able to use graphs, tables and equations to represent various functions.
A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 8, sections 1-9

AP Calculus AB/**BC**

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Unit 9: Parametric and Vector Functions; Polar Functions

Timeline: 8 Days / 4 Days

Essential Questions:

Part A]

1. How do you graph a parametric function? a vector function? (9.2, 11.1)
2. What is the procedure for deriving parametric functions? vector functions? (9.3, 11.2)
3. What is the procedure for integrating parametric functions? vector functions? (9.3, 11.2)
4. How do you apply the dervative and integral to determine slopes, velocity, speed, acceleration, arc length and surface area of parametric functions? of vector functions? (9.4-5)

Part B]

5. How do you graph a polar function? (9.4)
6. What is the procedure for deriving polar functions? (9.4)
7. What is the procedure for integrating polar functions? (9.5)
8. How do you apply the dervative and integral to determine slopes, velocity, speed, acceleration, arc length and surface area of parametric functions? of vector functions? (9.4-5)

Standards:

Review:

A1.2 C Apply procedures and theorems for deriving various functions.

A1.3 C Apply procedures and theorems for integrating various functions.

A3.1 C Students are able to write the equation of the line tangent to a curve.

A3.3 C Students are able to use the integral to model problems
- a. position, speed, velocity, area, volume and accumulated change.
- b. arc length (BC), surface area (BC),

Essential:

A1.3 C Apply procedures and theorems for integrating various functions.

A4.2 C Students are able to use graphs, tables and equations to represent various functions.

A4.4 C Students are able to apply the derivative to determine instantaneous rate of change, slope of a tangent line, slope of a curve and other situations as it applies.

G 2.1C Develop integrals to calculate area, volumes, arc lengths (BC), surface areas (BC),...

Content-Activities-Assessment

Calculus: Larson, Hostetler, Edwards (7th ed.) Chapter 9 sections 1-6, Chapter 10 section 1, and Chapter 11 sections 1-5

AP Calculus AB/BC

Calculus is the mathematics of change and of motion. This course will include Differential and Integral Calculus. Derivatives of functions (polynomial, rational, algebraic, trigonometric, and transcendental) will be studied rigorously using the limit concept of derivatives. Integral Calculus will include measuring areas between curves, the length of a curved line, volumes of solids of revolution, and various other techniques and applications of integration. Additional topics may include polar and vector functions, sequences and series.

Post-AP Test Unit 10: Introduction to Statistics

Timeline: 8-10 Days

Essential Questions:

1. What is the study of statistics?
2. What are the characteristics of the various types of sampling techniques?
3. What are some examples of bad statistics?
4. How are the various Centers of Data and Variance determined?
5. Describe the ways to illustrate data.

Standards:

Review:

the essential standards below are first introduced in middle school and then possibly in algebra II, and are thus "review", but several years prior to this course…

Essential:

9-12.S.1.1 Students are able to draw conclusions from a set of data.

9-12.S.1.2 Students are able to compare multiple one-variable data sets using range, interquartile range, mean, median, and mode.

9-12.S.1.3 Students are able to represent a set of data in a variety of graphical forms and draw conclusions.

Content-Activities-Assessment

Elementary Statistics, Triola, Mario F. Eighth Edition, 2001, Addision Wesley Longman. Chapters 1-2; Supplementary material from various websites.

Survey of Calculus

Course Description: Calculus is the mathematics of change and motion. It provides methods for finding the rate at which a variable quantity is changing and for finding a function when its rate of change is given. This course will provide an overview of some topics in differential and integral calculus.

Unit Name: Limits

Timeline: 7 days

Essential Questions:

How do you find limits of rational functions?

How do you find limits by looking at graphs?

What is a limit?

Standard:

A1.1C Apply procedures and theorems for determining limits of various functions.

Survey of Calculus

Course Description: Calculus is the mathematics of change and motion. It provides methods for finding the rate at which a variable quantity is changing and for finding a function when its rate of change is given. This course will provide an overview of some topics in differential and integral calculus.

Unit Name: Limits

Timeline: 7 days

Essential Questions:

How do you find limits of rational functions?

How do you find limits by looking at graphs?

What is a limit?

Standard:

A1.1C Apply procedures and theorems for determining limits of various functions.

Survey of Calculus

Course Description: Calculus is the mathematics of change and motion. It provides methods for finding the rate at which a variable quantity is changing and for finding a function when its rate of change is given. This course will provide an overview of some topics in differential and integral calculus.

Unit Name: Derivatives

Timeline: 14 days

Essential Questions:

What is a derivative?

How do you find a derivative using the definition of the derivative?

How do you find derivatives of various types of functions using differentiation rules?

Standard:

A.1.1C Apply procedures and theorems for deriving various functions.

A.3.1C Students are able to write the equation of the line tangent to a curve.

A.4.4C Students are able to apply the derivative to determine instantaneous rate of change and slope of a tangent line.

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Unit Name: Applications of Differentiation

Timeline: 2 weeks

Essential Questions:

How do you find relative extrema?

What are critical numbers?

How do you find intervals where functions increase and decrease?

How do you determine where a functions is concave up or concave down?

Standard:

A.1.2C Apply procedures and theorems for deriving various functions.

A.4.1C Students will describe the continuity and differentiability of a function.

A.4.3C Students are able to use derivative tests to determine characteristics of a function.
a. Determine extrema, inflection points, intervals of increasing and decreasing, and concavity of a function.

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Unit Name: Integration

Timeline: 2 weeks

Essential Questions:

What is an antiderivative?

How do you find the indefinite integral?

How do you use the fundamental theorem of calculus?

How do you use integration by substitution?

Standard:

A.1.3C Apply procedures and theorems for integrating various functions.

G.1.1C Students will apply numerical derivative and integration techniques.

a. Average rate of change and Riemann sums

Survey of Calculus

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Unit Name: Logarithmic and Exponential Functions

Timeline: 7 days

Essential Questions:

How do you find the derivative of a natural logarithmic function?

How do you integrate a natural logarithmic function?

What are the steps to find the derivative and integral of the natural exponential function?

Standard:

A.1.2C Apply procedures and theorems for deriving various functions.

A.1.3C Apply procedures and theorems for integrating various functions.

Statistics

Course description: Statistics is the collection, interpretation, and presentation of numerical data. This upper level math course will focus on data analysis, a critical study by which information is extracted from data. Students will work with data through assignments, graphical displays, and computer simulations. Topics of study includes frequency distribution, measures of location, measures of variation, probability, distribution, standard deviation, analysis of variance, regression, and correlation.

Unit Name: Introduction to Statistics

Timeline: 2 weeks

Essential Questions:

How do I find a five-number summary?
What statistical value is most appropriate for a given situation?
How do you create a graphical display for a set of data?
What type of bias might affect the results of different types of surveys?
How do you calculate the standard deviation and variance of a set of data?
What do the standard deviation and variance tell you about a set of data?

Standards: S.1.1, S.1.2, S.1.3, S.1.1A, S.1.2A, S.1.3A

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Unit Name: Probability and Statistics

Timeline: 6 days

Essential Questions:

How do you find probabilities of compound, complementary, independent and mutually exclusive events?

Why are probabilities helpful in solving problems?

What is the difference in theoretical and experimental probabilities?

Standards: S.2.1A, S.2.2A, S.2.3A

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Unit Name: Z-scores and t-scores

Timeline: 4 weeks

Essential Questions:

What is the standard normal distribution?

What do z-scores or t-scores tell you?

How do you interpret z-scores or t-scores?

How do you work with binomial probability distributions?

Why are confidence intervals important?

Standards: S.1.4A

Statistics

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Unit Name: Correlations and best-fit lines

Timeline: 1 week

Essential Questions:

How do you write a line of best fit?

How do you find a correlation coefficient?

What does the value of a correlation coefficient mean?

Standards: S.1.5A