CANYONS SCHOOL DISTRICT
SECONDARY I and I H
SCOPE AND SEQUENCE
2014 – 2015

Secondary I
Ongoing Throughout the Year: Relationships Between Quantities

<table>
<tr><td colspan="2">N.Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</td></tr>
<tr><td>Concepts and Skills to Master
• I can select and use appropriate units of measurement for problems with and without context.
• I can draw conclusions and make inferences from a given graph.
• I can choose appropriate scales to create linear and exponential graphs.
• I can determine from the labels on a graph what the units of the rate of change are (e.g. gallons per hour).</td><td>Sample Task (DOK 1)

What is the area of a strip of wall that is 48 inches by 10 yards?</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 1 Lesson 3: Creating and Graphing Linear Equations in Two Variables
Walch Unit 1 Lesson 3: Creating And Graphing Exponential Equations</td></tr>
<tr><td colspan="2">N.Q.2 Define appropriate quantities for the purpose of descriptive modeling.</td></tr>
<tr><td>Concepts and Skills to Master
• I can choose appropriate measures and units for problems situations.
• I can create a relationship among different units (i.e., feet per second, bacteria per hour, miles per gallon).</td><td>Sample Task (DOK 3)

How would you measure the rate at which a bathtub fills?
Justify your answer.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 1 Lesson 2: Creating Linear Equations in One Variables</td></tr>
</table>

<table>
<tr><td colspan="2">N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</td></tr>
<tr><td>Concepts and Skills to Master
• I can determine whether whole numbers, fractions, or decimals are most appropriate.
• I can determine the appropriate power of ten to reasonable measure a quantity.
• I can determine the resulting accuracy in calculations.
• I can determine what level of rounding should be used in a problem situation.</td><td>Sample Task (DOK 2)
What is a sensible level of accuracy with which to measure:
• The distance from you to the door in inches?
• The distance from you to the moon in miles?
• The weight of an elephant in pounds?
• The volume of a basketball in cubic inches?</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 1 Lesson 2: Creating Linear Equations in One Variable</td></tr>
</table>

Secondary I
Unit 1: Relationships Between Quantities
Regular: 5 – 6 weeks
Honors: 5 weeks
Honors Advanced: 3 weeks

<table>
<tr><td colspan="2">A.SEE.1 a,b: Interpret expressions that represent a quantity in terms of its context
a. Interpret parts of an expression, such as terms, factors and coefficients.
b. Interpret complicated expressions by viewing one or more of their parts as a single entity.</td></tr>
<tr><td>Concepts and Skills to Master
• I can identify parts of an expression (terms, factors, and coefficients).
• I can explain the context of different parts of a formula.
• I can determine the real world context of the variables in an expression.
• I can identify the individual factors of a given term within an expression.</td><td>Sample Task (DOK 1)
Consider the formula Surface Area = 2B + Ph
• What are the terms of this formula?
• What are the coefficients?</td></tr>
<tr><td colspan="2">Curriculum Supports
Walch Unit 1 Lesson 1: 1a - Identifying Terms, Factors, and Coefficients
1b – Interpreting Complicated Expressions</td></tr>
</table>

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear ~~and quadratic functions~~, and ~~simple rational and~~ exponential functions.*

Concepts and Skills to Master	**Sample Task (DOK 2)**
• I can create one-variable linear equations and inequalities from contextual situations (stories). • I can create one-variable exponential equations and inequalities from contextual situations (stories). • I can solve and interpret the solution to multi-step linear equations and inequalities in context. • I can use properties of exponents to solve and interpret the solution to exponential equations and inequalities in context.	Juan pays $52.35 a month for his cable bill and an additional $1.99 for each streamed movie. If his last cable bill was $68.27, how many movies did Juan watch?

Curriculum Supports:
Walch Unit 1 Lesson 2: Creating Linear Equations in One Variable
Walch Unit 1 Lesson 2: Creating Linear Inequalities in One Variable
Walch Unit 1 Lesson 2: Creating Exponential Equations

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Concepts and Skills to Master	**Sample Task (DOK 2)**
• I can write and graph an equation to represent a linear relationship. • I can write and graph an equation to represent an exponential relationship. • I can model a data set using an equation. • I can choose the best form of an equation to model linear and exponential functions.	Write and graph an equation that models the cost of buying and running an air conditioner with a purchase price of $250 which costs $0.38/hr. to run. **Sample Task (DOK 3)** Jeanette can invest $2000 at 3% interest compounded annually or she can incest $1500 at 3.2% interest compounded annually. Which is the better investment and why?

Curriculum Supports:
Walch Unit 1 Lesson 3: Creating and Graphing Linear Equations in Two Variables
Walch Unit 1 Lesson 3: Creating and Graphing Exponential Equations

<table>
<tr><td colspan="2">A.CED.3 Represent constraints by equations or inequalities, and by systems and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</td></tr>
<tr><td>Concepts and Skills to Master
• I can determine whether a point is a solution to an equation or inequality.
• I can determine whether a solution has meaning in a real-world context.
• I can write and graph equations and inequalities representing constraints in contextual situations.</td><td>Sample Task (DOK 2)
Given $y \leq 2x + 1$ and $y > x - 3$ find a point that
• Satisfies both.
• Satisfies one, but not the other.
• Satisfies neither.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 1 Lesson 4: Representing Constraints</td></tr>
<tr><td colspan="2">A.CED.4: Rearrange formulas to highlight a quality of interest, using the same reasoning as in solving equations.</td></tr>
<tr><td>Concepts and Skills to Master
• I can extend the concepts used in solving numerical equations to rearrange formulas for a particular variable.</td><td>Sample Task (DOK 2)
In England, they measure temperature in degrees Celsius. If you know that $C = \frac{5}{9}(F - 32)$, describe how you can find the temperature in Fahrenheit.</td></tr>
<tr><td>Curriculum Supports:
Walch Unit 1 Lesson 5: Rearranging Formulas</td><td></td></tr>
</table>

Secondary I
Unit 2: Linear and Exponential Relationships

Regular: 6 – 7 weeks
Honors: 6 weeks
Honors Advanced: 3 weeks

<table>
<tr><td colspan="2">A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).</td></tr>
<tr><td>Concepts and Skills to Master
• I can identify solutions and non-solutions of linear and exponential equations.
• I can graph points that satisfy linear and exponential equations.
• I can understand that a continuous curve or a line contains an infinite number of solutions.</td><td>Sample Task (DOK 1)
Given a graph of the equation x + 3y = 6, find three solutions that will satisfy the equation.

Sample Task (DOK 2)
Find all possible solutions to 3x + 2y = 6.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 2 Lesson 1: Graphing the Set of All Solutions</td></tr>
<tr><td colspan="2">A.REI.11 Explain why the x-coordinates of the point where the graphs of the equations y = f(x) and y=g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g. using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, <s>polynomial, rational, absolute value,</s> or exponential, <s>and logarithmic</s> functions. ★</td></tr>
<tr><td>Concepts and Skills to Master:
• I can approximate solutions to systems of two equations using graphing technology.
• I can approximate solutions to systems of two equations using tables of values.
• I can explain why the x-coordinate of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x).</td><td>Sample Task (DOK 3)
Use technology to graph and compare a beginning salary of $30 per day increased by $5 each day and a beginning salary of $0.01 per day, which doubles each day. When are the salaries equal? Justify your answer.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 2 Lesson 1: Intersecting Graphs</td></tr>
</table>

F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation *y = f(x)*.

Concepts and Skills to Master:	**Sample Task (DOK 3)**
• I can understand the definition of a function. • I can identify functions, including functions represented in equations, tables, graphs, or context. • I can distinguish between domain and range. • I can write a relation in function notation.	Do the ordered pairs (-2, 5), (9, 8), (4, 2), (8, 9) and (2, 5) represent a function? Why or why not?
Curriculum Supports: Walch Unit 2 Lesson 1: Domain and Range	

F.IF.2	Use function notation, evaluation functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Concepts and Skills to Master:	**Sample Task (DOK 4)**
• I can write equations using function notation • I can use function notation to evaluate functions for given inputs in the domain, including combinations and compositions of functions. • I can use function notation to express relationships between contextual variables.	Find a function from science, economics, or sports, write it in function notation and explain its meaning at several points in the domain.
Curriculum Supports: Walch Unit 2 Lesson 1: Function Notation and Evaluating Functions	

F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, negative; ~~relative maximums and minimums; symmetries; end behavior; and periodicity.~~* ★
Concepts and Skills to Master: • Given a graph, I can identify key features such as *x*- and *y*-intercepts; intervals where the function is increasing, decreasing, positive, or negative. • Given a table of values, I can identify key features such as *x*- and *y*-intercepts; intervals where the function is increasing, decreasing, positive, or negative. • I can find key features of a function and use them to graph the function. • I can use interval notation and symbols of inequality to communicate key features of graphs.	**Sample Task (DOK 1)** Identify the intervals where a function is increasing and decreasing. **Sample Task (DOK 4)** Create a story that would generate a linear or exponential function and describe the meaning of key features of the graph as they relate to the story.
Curriculum Supports: Walch Unit 2 Lesson 2: Identifying key Features of Linear and Exponential Graphs	
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) give the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.* ★
Concepts and Skills to Master: • I can identify domains of function given a path. • I can graph a function, given a restricted domain. • I can identify reasonability of a domain in a particular context.	**Sample Task (DOK 1)** You are hoping to make a profit on the school play and have determined the function describing the profit to be $f(t) = 8t - 2654$ where t is the number of tickets sold. What is a reasonable domain for this function? **Sample Task (DOK 3)** Justify your answer for the previous problem.
Curriculum Supports: Walch Unit 2 Lesson 2: Identifying key Features of Linear and Exponential Graphs	

F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. ★

Concepts and Skills to Master:

- I can calculate rate of change given a linear function, from the equation or a table.
- I can calculate rate of change over a given interval in an exponential function from an equation or a table where the domain is a subset of the integers.
- I can use a graph to estimate the rate of change over an interval in a linear or exponential function.

Sample Task (DOK 1)

Find the average rate of change on the interval [-3, 1]

Table 1

X	-3	-2	-1	0	1	2	3
Y	8	3	-2	-7	-12	-17	-22

Table 2

X	-3	-2	-1	0	1	2	3
Y	6	12	24	48	96	192	384

Table 3

X	-3	-2	-1	0	1	2	3
Y	7	2	-1	0	2	4	6

Curriculum Supports:

Walch Unit 2 Lesson 2: Proving Average Rate of Change
Walch Unit 2 Lesson 2: Recognizing Average Rate of Change

F.LE.1 Distinguish between situations that can be modeled with linear function and with exponential functions.

a. Prove that linear functions grow by equal differences over equal intervals; exponential functions grow by equal factors over equal intervals.
b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.
c. Recognize situation in which a quantity grows or decays by a constant percent per unit interval relative to another.

Concepts and Skills to Master:

- I can justify the fact that linear functions grow by equal differences over equal intervals using tables and graphs.
- I can justify the fact that exponential functions grow by equal factors over equal intervals using tables and graphs.
- I can recognize situations that can be modeled linearly or exponentially and describe the rate of change per unit as constant or the growth factor as a constant percent.

Sample Task (DOK 1)

An accountant has two ways of depreciating equipment. One way is to depreciate by a fixed amount each year. The other way is to depreciate by a fixed percentage each year. Which depreciation method is linear? Which depreciation is exponential?

Curriculum Supports:
Walch Unit 2 Lesson 2: 1a – Proving Average Rate of Change
Walch Unit 2 Lesson 2: 1b, 1c – Recognizing Average Rate of Change

HONORS Represent average rate of change as the slope of the secant line.

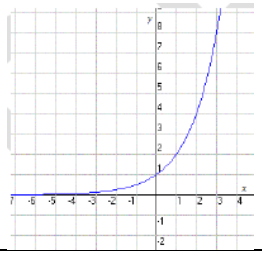
Concepts and Skills to Master:

- I can represent the average rate of change as the slope of the secant line in an exponential function.
- I can understand that the slope of a secant line approximates the rate of change in a given domain.

Sample Task (DOK 1)

Which of the domains below has a secant line with the greatest rate of change?

A) x = {-5, -2}
B) x = {-2, 1}
C) x = {0, 2}
D) x = {2, 4}



Curriculum Supports:
Walch Unit 2 Lesson 2: Representing Average Rate of Change as the Slope of the Secant Line

F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases★

a. Graph linear and ~~quadratic functions~~ and show intercepts~~, maxima, and minima.~~
b. Graph exponential and~~ logarithmic~~ functions, showing intercepts and end behavior, ~~and trigonometric functions, showing period, midline, and amplitude.~~

Concepts and Skills to Master:

- I can graph lines expressed in slope-intercept form or standard form by hand.
- I can graph exponential functions by hand.
- I can use technology to model complex exponential functions.
- I can identify intercepts in graphs of linear and exponential functions.

Sample Task (DOK 2)

The population of salmon in a lake triples each year. The current population is 472. Model the situation graphically. Include the last three years and the next two. Model the situation with a function.

Curriculum Supports:
Walch Unit 2 Lesson 3: 7a – Graphing Linear Functions
Walch Unit 2 Lesson 3: 7b – Graphing Exponential Functions

A.REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
Concepts and Skills to Master: • I can graph the solutions to a linear inequality in two variables. • I can graph the solution set to a system of linear inequalities in two variables. • I can identify the solutions as a region of the plane.	**Sample Task (DOK 2)** Graph the solution set of $x + 2y > 12$ and $3x - y < 9$.
Curriculum Supports: Walch Unit 2 Lesson 3: Solving Linear Inequalities in Two Variables by Graphing	

F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
Concepts and Skills to Master: • I can compare slopes and intercepts of two linear functions where one is represented algebraically, graphically, numerically, in tables, or in a description and the other is modeled using a different form of representation. • I can compare growth rate and intercepts of two exponential functions where one is represented algebraically, graphically, numerically, in tables, or in a description and the other is modeled using a different form of representation.	**Sample Task (DOK 3)** Which has greater slope? • $f(x) = 3x + 5$ • A function representing the number of bottle caps in a shoebox where 5 bottle caps are added each time
Curriculum Supports: Walch Unit 2 Lesson 4: Comparing Linear Functions Walch Unit 2 Lesson 4: Comparing Exponential Functions	

<table>
<tr><td colspan="2">F.LE.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, ~~quadratically, or (more generally) as a polynomial function.~~</td></tr>
<tr><td>Concepts and Skills to Master:
• I can model why a quantity increasing exponentially eventually exceeds a quantity increasing linearly using graphs and tables.</td><td>Sample Task (DOK 3)
What's the better deal: earning $1000 a day for the rest of your life or earning $.01. Explain your reasoning.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 2 Lesson 4: Comparing Linear to Exponential Functions</td></tr>
<tr><td colspan="2">F.BF.1★ Write a function that describes a relationship between two quantities.
a) Determine an explicit expression, a recursive expression, or steps for calculation from a context.
b) Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can combine linear and/or exponential functions using addition, subtraction, multiplication, and division.</td><td>Sample Task (DOK 1)
If $f(x) = x + 4$ and $g(x) = 3x - 5$, find $(f + g)(x)$

Sample Task (DOK 2)
Anne is shopping and finds a $30 sweater on sale for 20% off. When she buys the sweater, she must also pay 6% sales tax. Write an expression for the final price of the sweater in such a way that the original price is still evident.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 2 Lesson 5: 1a – Building Functions from Context
Walch Unit 2 Lesson 6: 1b – Operating on Functions</td></tr>
</table>

F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
Concepts and Skills to Master: • I can construct linear and exponential functions, including arithmetic and geometric sequences, given a graph. • I can construct linear and exponential functions, including arithmetic and geometric sequences, given the description of a relationship. • I can construct linear functions, including arithmetic sequences, given input-output pairs, including those in a table.	**Sample Task (DOK 1)** Write linear and exponential function that passes through (1, 5) and (2, 15) **Sample Task (DOK 3)** Write a function that models the population of Smithville, a town that in 2003 was estimated to have 35,000 people that increases by 2.4% every year. Describe a reasonable way to use your function to predict future population in Smithville.
Curriculum Supports: Walch Unit 2 lesson 5: Constructing Functions from Graphs and Tables	
F.BF.3	Identify the effect on the graph of replacing *f (x)* by *f(x) + k, ~~k f(x), f(kx),~~* and *~~f(x + k)~~* for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *~~Include recognizing even and odd functions from their graphs and algebraic expressions for them.~~*
Concepts and Skills to Master • I can perform vertical translations on linear and exponential graphs. • I can find the value of *k* given *f(x)* replaced by *f(x) + k* on a graph of a linear or exponential function. • I can relate the vertical translation of a linear function to its y-intercept. • I can describe what will happen to a function when *f(x)* is replaced by *f(x) + k* for different values of *k*.	**Sample Task (DOK 2)** Compare and contrast: $f(x) = 2^x$ and $f(x) = 2^x + 2$
Curriculum Supports: Walch Unit 2 Lesson 6: Transformations of Linear and Exponential Functions	

F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequences is defined recursively by *f(0) = f(1) = 1, f(n + 1) = f(n) + f(n – 1) for n ≥ 1.*
Concepts and Skills to Master: • I can recognize that sequences are functions. • I can define and express a recursive sequence as a function. • I can recognize that a sequence has a domain, which is a subset of integers. • I can generate a sequence given a recursive function.	**Sample Task (DOK 2)** Write a recursive formula in function notation for the sequence generated by adding 3 to each successive term when beginning with 7.
Curriculum Supports: Walch Unit 2 Lesson 7: Sequences as Functions	
F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two form. ★
Concepts and Skills to Master: • I can write arithmetic sequences both recursively and with an explicit formula. • I can write geometric sequences both recursively and with an explicit formula. • I can model contextual situations with arithmetic or geometric sequences.	**Sample Task (DOK 3)** Write two formulas the model the pattern: 3, 9, 27, 81…
Curriculum Supports: Walch Unit 2 Lesson 7: Arithmetic Sequences Walch Unit 2 Lesson 7: Geometric Sequences	

F.LE.5 Interpret the parameters in a linear or exponential function in terms of a context. ★	
Concepts and Skills to Master: • I can interpret the slope and x- and y-intercepts in a linear function in terms of a context. • I can interpret the base value and vertical shifts in an exponential function of the form $f(x) = b^x + k$ where b is an integer and k can equal zero. • I can interpret the base value and initial value in an exponential function of the form $f(x) = ab^x$ where b is an integer and a can be any positive integer, including 1.	**Sample Task (DOK 2)** You put $500 under your mattress and also deposit $500 in a bank with a 3% annual interest. Write an equation that represents the total amount of money you have at time t. Show how the base and vertical shift are displayed in the explicit form of the function.
Curriculum Supports: Walch Unit 2 Lesson 8: Interpreting Parameters	

★**-** modeling standard

Secondary I
Unit 3: Properties of Linear and Exponential Functions
Regular: 6 – 7 weeks
Honors: 7 weeks
Honors Advanced: 4 weeks

<table>
<tr><td colspan="2">A.REI.1: Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can justify the steps used in solving an equation using algebraic properties.
• I can understand, apply, and explain the results of using inverse operations.</td><td>Sample Task (DOK 3)
Justify the equation solution by writing the property or reason why each solution step works.<table><tr><td>$3x + 7 = 12$</td><td></td></tr><tr><td>$3x + 7 - 7 = 12 - 7$</td><td></td></tr><tr><td>$3x + 0 = 5$</td><td></td></tr><tr><td>$3x = 5$</td><td></td></tr><tr><td>$(3x)(1/3) = (5)(1/3)$</td><td></td></tr><tr><td>$1x = 5/3$</td><td></td></tr><tr><td>$x = 5/3$</td><td></td></tr></table></td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 3 Lesson 1: Properties of Equality</td></tr>
<tr><td colspan="2">A.REI.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can write equations in equivalent forms to solve problems.
• I can analyze and solve literal equations for a specified variable.
• I can understand and apply the properties of inequalities.
• I can verify that a given number or variable is a solution to the equation or inequality.</td><td>Sample Task (DOK 1)
Solve $2(x + 4) - 34 \geq 4x\text{-}2$</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 3 Lesson 1: Solving Linear Equations
Walch Unit 3 Lesson 1: Solving Linear Inequalities</td></tr>
</table>

Walch Unit 3 Lesson 1: Solving Exponential Equations

A.REI.5: Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.

Concepts and Skills to Master:

- I can explain the use of the multiplication property of equality to solve a system of equations.
- I can explain why the sum of two equations is justifiable in the solving of a system of equations (property of equality).
- I can relate the process of linear combinations with the process of substitution for solving a system of linear equations.

Sample Task (DOK 3)

Verify that (-4,13) is the solution to the system.

$$\begin{Bmatrix} 2x+y=5 \\ -5x-2y=-6 \end{Bmatrix}$$

Justify that the following is an equivalent system.

$$\begin{Bmatrix} -3x-y=-1 \\ -5x-2y=-6 \end{Bmatrix}$$

Verify that (-4,13) is the solution to this new system.

Curriculum Supports:

Walch Unit 3 Lesson 2: Proving Equivalencies

A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Concepts and Skills to Master:

- I can solve a system of linear equations exactly through the use of substitution or elimination.
- I can solve a system of linear equations approximately through the use of graphing.
- I can test a solution to the system in both original equations (both graphically and algebraically).
- I can analyze a system of equations using slope to predict one, infinitely many, or no solutions.

Sample Task (DOK 2)

The high school is putting on the musical *Footloose*. The auditorium has 300 seats. Student tickets are $3 and adult tickets are $5. The royalty for the musical is $1300. What combination of student and adult tickets do you need to fill the house and pay the royalty? How could you change the price of tickets so more students can go?

Curriculum Supports:

Walch Unit 3 Lesson 2: Solving Systems of Linear Equations

A.REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
Concepts and Skills to Master: • I can graph the solutions to a linear inequality in two variables. • I can graph the solution set to a system of linear inequalities in two variables. • I can identify the solutions as a region of the plane.	**Sample Task (DOK 1)** Graph the solution set of $x + 2y > 12$ *and* $3x - y < 9$
Curriculum Supports: Walch Unit 3 Lesson 2: Solving Systems of Linear Inequalities	
HONORS: N.VM.6(+)	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
Concepts and Skills to Master: • I can organize data in a matrix. • I can identify and name matrix properties (e.g., dimensions) accurately. • I can interpret data in a matrix. • I can recognize and use matrix notation.	**Sample Task (DOK 1)** At Shop Here oranges are $.32 each plums are $.45 each and apply are $.52 each. At Wonderful Foods oranges are $.35 each, plums are $.58 each, and apples are $.48 each. Organize this information into a 2 x 3 matrix and into a 3 x 2 matrix.
Curriculum Supports: Walch Unit 3 Lesson 3: HONORS: Using Operations on Matrices Walch Unit 3 Lesson 3: HONORS: Performing Operations on Matrices	
HONORS: N.VM.7(+)	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
Concepts and Skills to Master: • I can understand that scalar multiplication does not change the order of elements in a matrix. • I can multiply a matrix by a scalar.	**Sample Task (DOK 3)** Create a story context for: $1.5\begin{bmatrix} 3 & 9 & 11 \\ 11 & 6 & 8 \end{bmatrix}$
Curriculum Supports: Walch Unit 3 Lesson 3: HONORS: Performing Operations on Matrices	

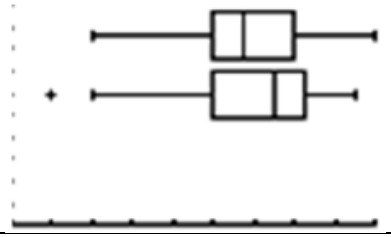
HONORS: N.VM.8(+)	Add, subtract, and multiply matrices of appropriate dimensions.
Concepts and Skills to Master: • I can recognize the necessary conditions for matrix operations. • I can add and subtract matrices by hand and using technology. • I can multiply matrices by hand and using technology. • I can explain the meaning of the result of matrix operations in context.	**Sample Task (DOK 3)** The elements of **A** represent the number of three different parts in production at two factories. The elements of **B** represent the labor hours required to produce each part at each of the two factories. What is the meaning of each element in **AB**? In **BA**? $A=\begin{bmatrix}40 & 30 & 80\\ 20 & 70 & 35\end{bmatrix}, B=\begin{bmatrix}4 & 3\\ 2 & 5\\ 6 & 2\end{bmatrix}$
Curriculum Supports: Walch Unit 3 Lesson 3: HONORS: Performing Operations on Matrices	
HONORS: N.VM.9(+)	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
Concepts and Skills to Master: • I can understand that multiplication of matrices is not commutative. • I can understand that the associative and distributive properties hold for matrix multiplication.	**Sample Task (DOK 2)** Show that the multiplication of square matrices is not commutative.
Curriculum Supports: Walch Unit 3 Lesson 3: Performing Operations on Matrices	
HONORS: N.VM.12(+)	Work with 2×2 matrices as transformation of the plane, and interpret the absolute value of the determinant in terms of area.
Concepts and Skills to Master: • I can recognize matrix transformations as a function. • I can transform geometric figures using 2×2 matrices. • I can find the area of a triangle using determinants.	**Sample Task (DOK 2)** Use matrix arithmetic to translate the triangle with coordinates (2, 4) (-1, 3) and (0, -2) three units to the right and one unit down.
Curriculum Supports: Walch Unit 3 Lesson 3: HONORS: Using Operations on Matrices	

HONORS: Solve systems of linear equations using matrices.	
Concepts and Skills to Master: • I can represent a system of linear equations using matrices. • I can solve a system of two equations with two unknowns by hand using matrices. • I can use technology to solve a system of three or more equations using matrices.	**Sample Task (DOK 1)** Solve using a matrix: $4x - 4y = 5$ $6x + 8y = -3$
Curriculum Supports: Walch Unit 3 Lesson 3: HONORS: Using Operations on Matrices	

★ Modeling Standards

Secondary I
Unit 4: Descriptive Statistics
Regular: 5 weeks
Honors: 5 weeks
Honors Advanced: 3 weeks

<table>
<tr><td colspan="2">S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots).</td></tr>
<tr><td>Concepts and Skills to Master:
• I can graph numerical data on a real number line using dot plots, histograms, and box plots.
• I can describe and give a simple interpretation of a graphical representation of data.
• I can determine which type of data plot would be most appropriate for a specific situation.</td><td>Sample Task (DOK 3)
The following data set shows the number of songs downloaded in one week by each student in Mrs. Jones' class: 10, 20, 12, 14, 12, 27, 88, 2, 7, 30, 16, 32, 15, 25, 15, 4, 0, 15, 6.

Choose and create a plot to represent the data. Justify your reasoning. Explain why you might choose a different plot if you were presenting to:
• Students in class
• Parents
• The school board</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 4 Lesson 1: Representing Data Sets</td></tr>
<tr><td colspan="2">S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can identify similarities and differences in shape, center, and spread given two sets of data or two graphs.
• I can compare data sets and be able to summarize the similarities and differences between the shape, and measures of centers and spreads of the data sets.</td><td>Sample Task (DOK 3)
The boxplots show the distribution of scores on a district writing test in two fifth grade classes at a school. Compare the rand and medians of the scores from the two classes.
  </td></tr>
</table>

Curriculum Supports:
Walch Unit 4 Lesson 1: Comparing Data Sets

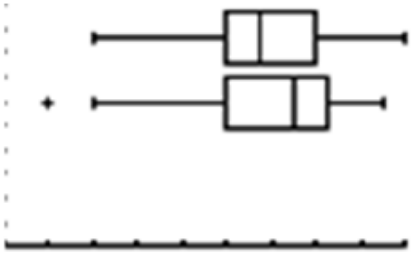
S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Concepts and Skills to Master:

- I can identify similarities and differences in shape, center, and spread given two sets of data or two graphs.
- I can interpret similarities and differences between the shape, and measures of centers and spreads of data sets.
- I can state the effects of any existing outliers.

Sample Task (DOK 3)

The boxplots show the distribution of scores on a district writing test in two fifth grade classes at a school. Which class performed better and why?



Curriculum Supports:
Walch Unit 4 Lesson 1: Interpreting Data Sets

S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.

Concepts and Skills to Master:

- I can create a two-way frequency table showing the relationship between two categorical variables.
- I can find and interpret joint, marginal, and conditional relative frequencies.
- I can analyze possible associations and trends in the data.

Sample Task (DOK 1)

What is the joint frequency of students who have chores and a curfew? Which marginal frequency is the largest?

	Curfew: Yes	Curfew: No	Total
Chores: Yes	13	5	18
Chores: No	12	3	15
Total	25	8	

Curriculum Supports:
Walch Unit 4 Lesson 2: Summarizing Data Using Two-Way Frequency Tables

S.ID.6: Represent data with plots on two quantitative variables on a scatter plot, and describe how the variables are related.

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.*
b. Informally assess the fit of the function by plotting and analyzing residuals.
c. Fit linear functions for scatter plots that suggest a linear association.

Concepts and Skills to Master:	**Sample Task (DOK 3)**
• I can create a scatter plot of data in two variables. • I can fit my data to a line or other function. • I can assess how closely my data fits to a line or other function. • I can graph the residuals of my data in relation to a line of best fit. • I can assess a line of best fit from my graph of the residuals.	Collect data on forearm length and height in class. Plot the data and estimate a linear function for the data. Compare and discuss different student representations of the data and equations they discover. Could the equation(s) be used to estimate the height for any person with a known forearm length? Why or why not?

Curriculum Supports:
Walch Unit 4 Lesson 2: 6a – Solving Problems Given Functions Fitted to Data
Walch Unit 4 Lesson 2: 6b – Analyzing Residuals
Walch Unit 4 Lesson 2: 6c – Fitting Linear Functions to Data

S.ID.7: Interpret the slope (rate of change) and intercept (constant term) of a linear model in context of the data.

Concepts and Skills to Master:	**Sample Task (DOK 1)**
• I can interpret the slope of a line of best fit as it would apply to the context of the problem. • I can interpret the y-intercept of a line of best fit as it would apply to the context of the problem.	Collect power bills and graph the cost of electricity compared to the number of kilowatt hours used. Find a function that models the data and tell what the intercept and slope mean in the context of the problem.

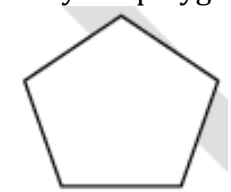
Curriculum Supports:
Walch Unit 4 Lesson 3: Interpreting Slope and Y-Intercept

<table>
<tr><td colspan="2">S.ID.8: Compute (using technology) and interpret the correlation coefficient of a linear fit.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can use technology to find a line of best fit for my data.
• I can use technology to find the correlation constant for my line of best fit.
• I can interpret a correlation constant in the context of the problem.
• I can determine whether the correlation coefficient shows a weak positive, strong positive, weak negative, strong negative, or no correlation.</td><td>Sample Task (DOK 2)
The correlation coefficient of a given data set is 0.97. List three specific things this tells you about the data.

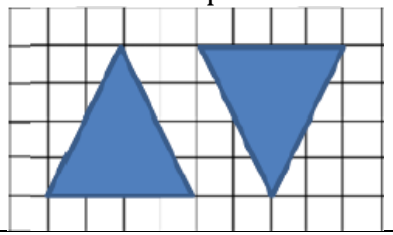
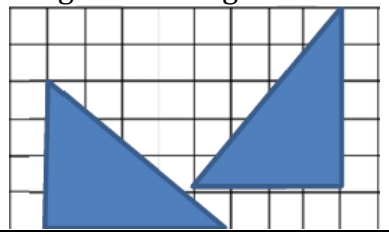
Sample Task (DOK 4)
Hypothesize the correlation between two sets of seemingly related data. Gather data to support or refute your hypothesis.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 4 Lesson 3: Calculating and Interpreting the Correlation Coefficient</td></tr>
<tr><td colspan="2">S.ID.9: Distinguish between correlation and causation.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can distinguish between correlation and causation.
• I can interpret my data in a way that a correlation between two variables is not causality in the context of the problem.</td><td>Sample Task (DOK 3)
Give an example of a data set that has strong correlation but no causation and describe why this is so. Give an example of a data set that has both strong correlation and causation and write a description of why this is so.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 4 Lesson 3: Distinguishing Between Correlation and Causation</td></tr>
</table>

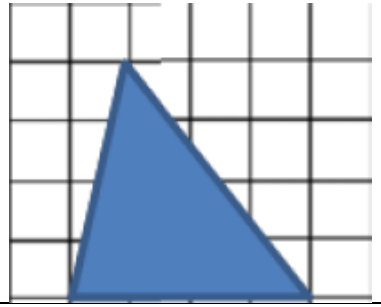
Secondary I
Unit 5: Congruence, Proof, and Constructions
Regular: 6 weeks
Honors: 6 weeks
Honors Advanced: 4 weeks

<table>
<tr><td colspan="2">G.CO.1 Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can give the definition for an angle, circle, perpendicular line, parallel line, and line segment based on the notion of point, line, distance along a line, and distance around a circular arc.
• I can use precise definitions to identify and model an angle, circle, perpendicular line, parallel line, and line segment.
• I can demonstrate mathematical notation for each term.</td><td>Sample Task (DOK 2)
Identify real-life examples of each term in the student's environment, using definitions.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 1: Defining Terms</td></tr>
<tr><td colspan="2">G.CO.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).</td></tr>
<tr><td>Concepts and Skills to Master:
• I can represent different transformations on an object using different types of media.
• I can compare transformations that preserve distance and angle to those that do not.
• I can understand transformations as functions that take points in the plane as inputs and give other points as outputs.</td><td>Sample Task (DOK 1)
Which of the following preserves distance and which does not?
$(x, y) \rightarrow (x+1, y+2)$
$(x, y) \rightarrow (x^2, y+1)$</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 1: Transformations as Functions</td></tr>
</table>

<table>
<tr><td colspan="2">G.CO.3 Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can move an object (rectangle, parallelogram, trapezoid, or regular polygon) through a given series of transformations.
• I can describe and identify lines and points of symmetry.
• I can describe rotations and reflections which take a rectangle, parallelogram, trapezoid, or regular polygon onto itself.</td><td>Sample Task (DOK 1)
Draw the lines of reflection symmetry that would carry the polygon onto itself.
  </td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 1: Applying Lines of Symmetry</td></tr>
<tr><td colspan="2">G.CO.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can show, explain, and define rotation, reflection, and translation through observations and conjectures.
• I can define rotations, reflections, and translations using angles, circles, perpendicular lines, parallel lines, and line segments.</td><td>Sample Task (DOK 2)
Perform a rotation, reflection, and translation with a given polygon and give a written explanation of how each step meets the definitions of each transformation using correct mathematical terms.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 2: Defining Rotations, Reflections, and Translations</td></tr>
<tr><td colspan="2">G.CO.5 Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can transform an object and write the series of transformations through which I took the object.
• I can perform rotations, reflections, and translations using a variety of methods.
• I can understand that the composition of transformations is not commutative.</td><td>Sample Task (DOK 2)
Given a transformation, work backwards to discover the sequence that led to that transformation.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 2: Applying Rotations, Reflections, and Translations</td></tr>
</table>

<table>
<tr><td colspan="2">G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can copy and construct a segment and an angle and explain why my procedure works.
• I can bisect a segment and an angle and explain why my procedure works.
• I can construct perpendicular lines and the perpendicular bisector of a segment and parallel lines and explain why my procedure works.
• I can construct a line parallel to a given line through a point not on the line and explain why my procedure works.</td><td>Sample Task (DOK 1)
Various Constructions</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 3: Copying Segments and Angles
Walch Unit 5 Lesson 3: Bisecting Segments and Angles
Walch Unit 5 Lesson 3: Constructing Perpendicular and Parallel Lines</td></tr>
<tr><td colspan="2">G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can construct an equilateral triangle, a square, and a regular hexagon in a circle and explain why my procedure works.</td><td>Sample Task (DOK 1)
Construct an equilateral triangle inscribed in a circle using a compass and straight-edge.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 4: Constructing Equilateral Triangles Inscribed in Circles
Walch Unit 5 Lesson 4: Constructing Squares Inscribed in Circles
Walch Unit 5 Lesson 4: Constructing Regular Hexagons Inscribed in Circles</td></tr>
</table>

<table>
<tr><td colspan="2">G.CO.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can predict the effects of transformations and use them to determine if two objects are congruent.
• I can transform figures using geometric descriptions of rigid motions.
• I can justify the congruence of two figures using properties of rigid motions.</td><td>Sample Task (DOK 2)
Describe a series of transformations that would generate the second triangle from the first. What is the relationship between the two triangles?
  </td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 5: Describing Rigid Motions and Predicting the Effects
Walch Unit 5 Lesson 5: Defining Congruence in Terms of Rigid Motions</td></tr>
<tr><td colspan="2">G.CO.7 Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can use rigid motion to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
• I can identify corresponding parts of two triangles.</td><td>Sample Task (DOK 1)
Identify the corresponding parts of the two congruent triangles.
  </td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 6: Triangle Congruency</td></tr>
</table>

<table>
<tr><td colspan="2">G.CO.8 Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.</td></tr>
<tr><td>Concepts and Skills to Master:
• I can understand, explain, and demonstrate how ASA, SAS and SSS follow from the definition of congruence in terms of rigid motions.
• I can identify the minimum conditions necessary for triangle congruence (ASA, SAS, and SSS).
• I can understand, explain, and demonstrate why SSA and AAA are not sufficient to show congruence.</td><td>Sample Task (DOK 3)
Use rigid motions to transform three segments or angles of the triangle and determine whether or not the resulting triangle is congruent. Explain your conclusion.
  </td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 6: Explaining ASA, SAS, and SSS</td></tr>
<tr><td colspan="2">HONORS: I.5.G.H.1 Understand and use logical reasoning to make and evaluate arguments (e.g., conditional statements, converse, inverse, contrapositive, counter-example, Law of Syllogism, and “if and only if” statements).</td></tr>
<tr><td>Concepts and Skills to Master:
• I can write conditional statements.
• I can write inverse converse, inverse and contrapositive statements and analyze the truth-value of each.
• I can provide counter-examples for conjectures.
• I can use the Law of Syllogism to create an argument.
• I can understand that “if and only if” statements imply that the conditional statement and the converse are both true.</td><td>Sample Task (DOK 3)
Find an example of an if-then statement in the media. Write the converse. Is the converse true? How do you know? Justify your answer.</td></tr>
<tr><td colspan="2">Curriculum Supports:
Walch Unit 5 Lesson 7: HONORS: Understanding and Use Logical Reasoning to Make and Evaluate Arguments</td></tr>
</table>

Secondary Strand I
Unit 6: Connecting Algebra and Geometry Through Coordinates

Regular: 5 – 6 weeks
Honors: 7 weeks
Honors Advanced: 4 weeks

<table>
<tr><td>G.GPE.4</td><td colspan="2">Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, $\sqrt{3}$) lies on the circle centered at the origin and containing the point (0, 2).</td></tr>
<tr><td colspan="2">Concepts and Skills to Master:
• I can use coordinates to prove simple geometric theorems algebraically, focusing on lines, segments, and angles.
• I can prove that points in a plane determine defined geometric figures.</td><td>Sample Task (DOK 3)
Prove or disprove that triangle ABC with coordinates A(-1, 2), B(1, 5), C(-2, 7) is an isosceles right triangle.</td></tr>
<tr><td colspan="3">Curriculum Supports:
Walch Unit 6 Lesson 1: Using Coordinates to Prove Geometric Theorems with Slope and Distance.</td></tr>
<tr><td>G.GPE.5</td><td colspan="2">Prove the slope criteria for parallel and perpendicular lines; use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).</td></tr>
<tr><td colspan="2">Concepts and Skills to Master:
• I can prove that the slope of parallel lines are equal.
• I can find the equation of a line parallel to a given line that passes through a given point.
• I can find the equation of a line perpendicular to a given line that passes through a given point.
• I can use slope criteria for parallel and perpendicular lines to solve geometric problems.
• I can prove that the product of the slopes of perpendicular lines is -1.</td><td>Sample Task (DOK 1)
Find an equation of a line perpendicular to $y = 3x - 4$ that passes through (3, 4).

Sample Task (DOK 3)
Verify that the distance between two parallel lines is constant. Justify your answer.</td></tr>
<tr><td colspan="3">Curriculum Supports:
Walch Unit 6 Lesson 1: Using Coordinates to Prove Geometric Theorems with Slope and Distance
Walch Unit 6 Lesson 1: Working with Parallel and Perpendicular Lines</td></tr>
</table>

G.GPE.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.★

Concepts and Skills to Master:	**Sample Task (DOK 1)**
• I can calculate the perimeter of any polygon given coordinates by using the distance formula. • I can calculate the area of triangles and rectangles given coordinates by using the distance formula.	Calculate the area of triangle ABC with altitude $\overline{CD}$, given A(-4, -2), B(8, 7), C(1, 8), and D(4, 4).

Curriculum Supports:
Walch Unit 6 Lesson 2: Calculating Perimeter and Area

HONORS: N.VM.1(+)	Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes.

Concepts and Skills to Master:	**Sample Task (DOK 2)**
• I can recognize vector quantities as having both magnitude and direction. • I can represent vector quantities by directed line segments, and use appropriate symbols for vectors *(v)* and their magnitudes (e.g., $\lvert v \rvert$, $\lVert v \rVert$, v). • I can find the magnitude of a vector.	A car has driven 125 km due west, then 60 km due south. Represent the displacement of the car with a vector. Find the magnitude of the vector to find the displacement of the car.

Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Represent and Model with Vector Quantities

HONORS: N.VM.2(+)	Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.

Concepts and Skills to Master:	**Sample Task (DOK 2)**
I can find the horizontal and vertical components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.	Create pairs of initial and terminal points that represent the vector **v** = <-2, 5>

Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Represent and Model with Vector Quantities

<table>
<tr><td colspan="2">HONORS:
N.VM.3(+)</td><td>Solve problems involving velocity and other quantities that can be represented by vectors.</td></tr>
<tr><td colspan="2">Concepts and Skills to Master:
• I can represent real world context with geometric vector models.
• I can solve contextual problems involving velocity and other quantities that can be represented by vectors in a variety of disciplines (e.g., science, sports, medicine).</td><td>Sample Task (DOK 2)
You are going to swim across a 20 m river with a current of 6 kph. Draw a scale model of the vector that represents the path of your swim and estimate how far downstream you are when you reach the other side.</td></tr>
<tr><td colspan="3">Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Represent and Model with Vector Quantities</td></tr>
<tr><td colspan="2">HONORS:
N.VM.4(+)</td><td>Add and subtract vectors.
a) Add vectors end to end, component-wise, and by the parallelogram rule. Understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
b) Given two vectors ~~in magnitude and direction form~~, determine the magnitude ~~and direction~~ of their sum.
c) Understand vector subtraction v – w as v + (-w), where –w is the additive inverse of w, with the same magnitude as w and pointing in the opposite direction. Represent vector subtraction graphically by connecting the tips in the appropriate order, and perform vector subtraction component-wise.</td></tr>
<tr><td colspan="2">Concepts and Skills to Master:
• I can draw vectors end to end to find the resultant sum of the vectors.
• I can add vectors using components.
• I can use the parallelogram rule to find the sum of two vectors.
• I can understand that the magnitude of a sum of two vectors is typically not the sum of the magnitudes.
• I can understand vector subtraction as the vector you would add to $\boldsymbol{w}$ to get $\boldsymbol{v}$.</td><td>Sample Task (DOK 1)
Given the vectors <4, 7> and <-1, 2> select a method to find their sum. What is the magnitude?</td></tr>
<tr><td colspan="3">Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Perform Operations on Vectors</td></tr>
</table>

HONORS: N.VM.5(+)	Multiply a vector by a scalar. a) Represent scalar multiplication graphically by scaling vectors and possibly reversing their direction; perform scalar multiplication component-wise. b) Compute the magnitude of a scalar multiple cv using $\|cv\| = \|c\|v$. Compute the direction of cv knowing that when $\|c\| \ v \neq 0$, the direction of cv is either along v (for $c > 0$) or against v (for $c < 0$).

Concepts and Skills to Master:	**Sample Task (DOK 1)**
• I can represent scalar multiplication graphically. • I can compute the product of a scalar and a vector.	Draw and find the magnitude of -3**v** where **v** = <-2, 3>

Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Perform Operations on Vectors

HONORS: N.VM.10(+)	Understand that the zero and identify matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Concepts and Skills to Master:	**Sample Task (DOK 1)**
• I can recognize and create matrices that are identity matrices. • I can determine additive and multiplicative identities and inverses of a matrix when they exist. • I can find the determinant of a matrix using technology. • I can use the determinant to determine if a square matrix has an inverse.	Find the inverse of the following matrix, if it exists: $\begin{bmatrix} 3 & -4 \\ -2 & 5 \end{bmatrix}$

Curriculum Supports:
Walch Unit 6 Lesson 3: HONORS: Descriminants and Vectors

HONORS: N.VM.11(+)	Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.

Concepts and Skills to Master:	**Sample Task (DOK 2)**
• I can recognize matrix transformations as a function. • I can transform geometric figures using 2×2 matrices. • I can find the area of a triangle using determinants.	Transform the vector <2, 1> using the transformation matrix $\begin{bmatrix} -2 & 0 \\ 0 & 2 \end{bmatrix}$ and describe the result.

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