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| **PVREC COURSE ONE** |
| Unit FOUR: Flying High (Linear Equations) |
| State Standards:  **Standard:** Students will understand algebraic concepts and applications.  **9-12 Benchmark A.2:** Understand patterns, relations, functions, and graphs.  **Performance Standards:**  **9-12.A.2.1** Distinguish between the concept of a relation and a function.  **9-12.A.2.2** Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function.  **9-12.A.2.3** Translate among tabular, symbolic, and graphical representations of functions and relations.  **9-12.A.2.4** Construct a linear function that represents a given graph.  **9-12.A.2.5** Explain and use function notation in both abstract and contextual situations and evaluate a function at a specific point in  its domain.  **9-12.A.2.6** Graph a linear equation and demonstrate that it has a constant rate of change.  **9-12.A.2.13** Read information and draw conclusions from graphs, and identify properties of a graph that provide useful information about the original problem.  **9-12.A.2.14** Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs.  **9-12.A.2.15** Evaluate estimated rate of change in a contextual situations.  **9-12 Benchmark A.3:** Use mathematical models to represent and understand quantitative relationships.  **Performance Standards**  **9-12.A.3.4** Solve systems of linear equations in two variables algebraically and **graphically**  **9-12.A.3.6** Write an equation of the line that passes through two given points.  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.3.8** Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these.  **Standard:** Students will understand geometric concepts and applications.  **9-12 Benchmark G.1:** Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.  **Performance Standards:**  **9-12.G.1.4** Identify the hypothesis and conclusion in examples of conditional statements.  **9-12.G.1.5** Use definitions in making logical arguments.  **Standard:** Students will understand how to formulate questions, analyze data, and determine probabilities.  **9-12 Benchmark D.2:** Select and use appropriate statistical methods to analyze data and make predictions.  **Performance Standards:**  **9-12.D.2.8** Describe the shape of a scatterplot.  **9-12.D.2.9** Use linear patterns in data to make predictions.  **9-12.D.2.10** Use technological tools to find the line of best fit. |

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| **Literacy Strategies**  (Check all that apply.) | **Habits of Success**  (Check one per unit.) | **Multiple Intelligence Areas** | |
| √ Admit/Exit slips   * Graphic organizer   √ Know/Want to Know/Learn chart (KWL)  √ Open-response questions   * Double-entry/Two-column notes   √ Retelling  √ Reflection   * Jigsaw reading * Anticipation guide * RAFT (Role/Audience/Format/Topic) * Interactive reading guide * Concept definition maps * Frayer model * Visual prediction guide * Other: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | √ Create relationships  √ Teamwork, responsibility, effective communication)  √ Study, manage time, organize  √ (Organization, time management, study skills)  √ Improve reading/writing skills  √ (Use reading and writing to learn strategies)  √ Improve mathematics skills  √ (Estimate, compute, solve, synthesize)  √ Set goals/plan  √ (Set goals, plan, monitor progress)  √ Access resources  √ (Research, analyze, utilize)  √ USE OF TECHNOLOGY | √ Logical/Mathematical  √Spatial   * Musical   √ Bodily—Kinesthetic  √Interpersonal  √Intrapersonal  √ Naturalist  √Linguistic | |
| ASSESSMENTS: | | |
| Pre-Assessment: | | |
| Daily/Weekly: (Included on daily activities plans) | | |
| Post-Assessment: | | |

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| **Daily Lesson Plans—WEEK ONE** | | |
| **DAY ONE** | | |
| Benchmark: **9-12.D.2.8** Describe the shape of a scatterplot.  Learning Objective: The students will be able to create a scatter plot from given data  Assessment: Observation of scatterplot  Materials: Pencil project, graph calculator, scale, ruler | | |
| **Strategy** | **Time** | **Activity** |
| Bell work | 5 minutes | On graph paper, create and label axes, plotting given points  (5, - 3), (4, 2), (6, 9), (7, 3), (0, 5) |
| Introduction/Engage | 5minutes | Define scatter plots and show examples. Show some correlations. The project for this class will be the building and testing of flight for a shoebox airplane. We will learn how to analyze the flight patterns of the airplanes using linear functions. Sometimes the data collected might be other than a straight line. This data can still be plotted and examined. |
| Explore/Review | 20 minutes | Gathering data: Sharpening pencils and weighing. Have students sharpen pencils 7 times and find weight in grams and length in centiimeters for each. They shoud display data in chart form, plot data, and explain correlations.(see handout) They should also plot in the graphing calculator. |
| Assessment | 10 minutes | Group presentations of relevance of data |
| Closure | 5 minutes | Summarize scatter plots of data in 15 words |
| **DAY TWO** | | |
| Benchmark: **9-12.D.2.10** Use technological tools to find the line of best fit.  Learning Objective: The students will be able to find a line of best fit from scatter plot    Assessment: Observation by teacher of scatter plot created on calculator.  Materials: Pencil project data from previous day, graph calculator | | |
| **Strategy** | **Time** | **Activity** |
| Bell work | 5 minutes | Holt Algebra 1 re-teaching masters Pg 12 Lines of best fit. Review results and discuss. |
| Introduction/Engage | 5 minutes | Review slope and y intercept to write equations. Define line of best fit and purpose. When looking at a group of data plots, it might be useful to compare it with a line. You can then talk about the slope of the data and make predictions. |
| Explore/Review | 20 minutes | Guide the process of putting data into lists in calculators.  Guide finding lines of best fit from calculator. Gathering data for a flight might be a set of separate data points. From these points, a pattern should arise, which will give information on how the flight went. |
| Assessment | 10 minutes | Show instructor results when completed. |
| Closure | 5 minutes | Ticket out the door:  4 sentences:  What did you learn? What worked? What did not work? What would you do different. |

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| **DAY THREE** | | | | | | |
| Benchmark: Review D.1.3  **9-12.G.1.4** Identify the hypothesis and conclusion in examples of conditional statements.  **9-12.G.1.5** Use definitions in making logical arguments.  Learning Objective: The students will be able to use the scientific method including independent and dependent variables.  Assessment: Using the scientific method, determine the independent and dependent variables and solve the problem.  Materials: Laptops or computers with internet access, chart of scientific method | | | | | | |
| **Strategy** | **Time** | | | **Activity** | | |
| Bell work | | 5 minutes | Finding scientific method chart on internet and save or print. | |
| Introduction/Engage | | 10minutes | When problem solving, it is often difficult to be organized and effective in the efforts. This is due in part to the inquisitive nature that sparks the experiment. A standardized method of investigation is the scientific method. Explain the usage of scientific method. Define independent and dependent variables. We will start constructing our models of our airplanes. You will need a shoebox and cardboard boxes. Start gathering your supplies. We will begin construction on Friday. | |
| Explore/Review | | 20 minutes | Have students report to class. Discuss as a class elements and independent and dependent variables. In building our airplane, what might be an independent variable and dependent variable? | |
| Assessment | | 10 minutes | Homework: Come up with an example of scientific method and identify independent and dependent variables. | |
| Closure | | 5 minutes | Ticket out the door: Have students read The Raven and the Jug. Have them come up with a hypothesis and prediction. | |
| **DAY FOUR** | | | | | | |
| Benchmark: Review D.1.3  **9-12.G.1.4** Identify the hypothesis and conclusion in examples of conditional statements.  **9-12.G.1.5** Use definitions in making logical arguments.  Learning Objective: The students will be able to use the scientific method including independent and dependent variables.  Assessment: Explain how the example follows the scientific method and give the reasoning of the choice of independent and dependent variables.  Accommodations:  Tier 2:  Tier 3:  Materials: Laptops or computers with internet access, chart of scientific method | | | | | | |
| **Strategy** | **Time** | | | **Activity** | | |
| Bell work | | 5 minutes | Pair/share on what is meant by predictions and hypotheses. | | |
| Introduction/Engage | | 10minutes | Introduce Raven and the Jug experiment. Ask which is independent and dependent variables and explain answers. Be thinking of a design for your airplane. You will need to think on how you will support the wings and how big they will need to be. How could the scientific method help in making a design for a far flying airplane | | |
| Explore/Review | | 20 minutes | Do Experiment and record results. Find the equation and do the interpretation. Groups of three. | | |
| Assessment | | 10 minutes | Homework: Finish packet on Raven and the Jug. | | |
| Closure | | 5 minutes | Journal entry: Explain the scientific method using the Raven and the Jug. Identify the independent and dependent variables. | | |
| **DAY FIVE** | | | | | | |
| Benchmark:  **9-12.D.2.8** Describe the shape of a scatterplot.  **9-12.D.2.10** Use technological tools to find the line of best fit.  Review D.1.3  **9-12.G.1.4** Identify the hypothesis and conclusion in examples of conditional statements.  **9-12.G.1.5** Use definitions in making logical arguments.  Learning Objective: The students will be able to demonstrate abilities of using scatter plots, lines of best fit, scientific method, and independent and dependent variables.  Assessment: quiz  Materials: Quiz sheet | | | | | | |

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| **Strategy** | | | | | **Time** | | | | | | | | | | **Activity** | | | |
| Introduction/Engage | | | | 10minutes | | | | | | | | | Discussion of project. | | | | | |
| Explore/Review | | | | 10 minutes | | | | | | | | | Review for quiz | | | | | |
| Assessment | | | | 15 minutes | | | | | | | | | Quiz | | | | | |
| Closure | | | | 5 | | | | | | | | | Start construction of airplane. You should submit a drawing of the wing design to the teacher for approval. What type of drawing best shows your design? | | | | | |
| **Daily Lesson Plans—WEEK TWO**  Week 2: Representations of equations and linear functions: Give me three | | | | | | | | | | | | | | | | | | |
| **DAY ONE (6)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.D.2.9** Use linear patterns in data to make predictions.  **9-12.A.2.3** Translate among tabular, symbolic, and graphical representations of functions and relations.  Learning Objective: The student will be able to give three different representations for functions.  Assessment: Given a linear pattern, give three representations of the scenario. Chart, graph, and equation.  Materials: Graph paper, scenarios | | | | | | | | | | | | | | | | | | |
| **Strategy** | | **Time** | | | | | | | **Activity** | | | | | | | | |
| Bell work | 5 minutes | | | | | | | List as many ways as you can think of in which data can be displayed. Think ink pair share. | | | | | | | | | | |
| Introduction/Engage | 5minutes | | | | | | | Write responses on board and identify each as one of the three methods of representations. Define the types and categorize some examples. Did your design of your airplane get approved? If not, why? Make a revision and submit before Friday. | | | | | | | | | | |
| Explore/Review | 20 minutes | | | | | | | Have students give three examples of functions and give three representations of each. (whole numbers)  Graph, table, and equation | | | | | | | | | | |
| Assessment | 10 minutes | | | | | | | Students present one example and discuss as a class. | | | | | | | | | | |
| Closure | 5 | | | | | | | Exit Slip: Why would it be useful to have three different ways to display data? | | | | | | | | | | |
| **DAY TWO (7)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.2** Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function.  **9-12.A.2.1** Distinguish between the concept of a relation and a function.  Learning Objective: The student will be able to distinguish between a function and a relation as defined by a table, set of ordered pairs, an equation, or a graph.  Assessment: Given a list of relations in various forms, distinguish which are functions.  Materials: List of relations in various forms, flash cards of relations and functions | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | | | **Time** | | | | | | | | | | **Activity** | | | |
| Bell work | | | | | | | 5 minutes | | | | | | | What is the difference between these two relations:  (2, 6), (4, 5), (7, 3), (6, 5) and (2, 3), (5, 3), (4, 6), (4, 8). Which of these is a function? | | | |
| Introduction/Engage | | | | | | | 5minutes | | | | | | | Which of these scenarios would be functions? Height and shoe size; Hours worked and take home pay; salary and life style; gas and distance traveled; Study time and grade earned; social security numbers; Price of gas and distance traveled Discuss | | | |
| Explore/Review | | | | | | | 25minutes | | | | | | | Define relations and functions. How can functions be written expressing the ordered pairs. What are some names for the first and last members of the ordered pairs?  Using Flash cards, have students respond by white boards or verbalizations whether the relation is a function or not and why. | | | |
| Assessment | | | | | | | 5 minutes | | | | | | | Given relations in various forms, identify as function or relation. | | | |
| Closure | | | | | | | 5 | | | | | | | Journal writing: Explain why a function is a relation, but a relation does not necessarily mean it is a function. What is meant by function notation? | | | |
| **DAY THREE (8)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.6** Graph a linear equation and demonstrate that it has a constant rate of change.  **9-12.A.2.15** Evaluate estimated rate of change in a contextual situations  Learning Objective: The student will be able to graph a linear equation and estimate rate of change.  Assessment: Given a linear relationship, estimate the rate of change and demonstrate that it is constant.  Materials: Graph paper, scenarios, descriptions of projects. | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | | | **Time** | | | | | | | | | | **Activity** | | | |
| Bell work | | | | | | | 5 minutes | | | | | | | What real life situations would be better to use a graph? Share/report out/discuss | | | |
| Introduction/Engage | | | | | | | 5minutes | | | | | | | Is there a relationship between the circumference and diameter of a circle? Can we use the scientific method to investigate? What would be our hypothesis? How would you measure a round distance using a straight ruler?. | | | |
| Explore/Review | | | | | | | 25minutes | | | | | | | Have students measure 6 different circles (diameter and circumference). Have them arrange into list from smallest to largest. Graph two at a time and use ruler to demonstrate that rate of change is constant. Have them write an equation using this information. Alternative assignments: bridge break from connected math or pennies, cup ruler using distance and lever. | | | |
| Assessment | | | | | | | 5 minutes | | | | | | | Exit slip: Predict the circumference for a diameter of 14”, 23’, 16 ½ cm. | | | |
| Closure | | | | | | | 5 | | | | | | | What can we say about the relationship of the diameter to the circumference? Can we make a similar statement about the relationship between the radius and circumference? Why or why not? | | | |
| **DAY FOUR (9)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.6** Graph a linear equation and demonstrate that it has a constant rate of change.  **9-12.A.2.15** Evaluate estimated rate of change in a contextual situations  Learning Objective: The student will be able to graph a linear equation and estimate rate of change.  Assessment: Given a linear relationship, estimate the rate of change and demonstrate that it is constant.  Materials: Graph paper, tape, cards with coordinate points and functions. | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | | | | | | | | | **Time** | | | | | | **Activity** | |
| Bell work | | | | | | | | | | | 5 minutes | | | | | Name different ways a rate of change could be described. Write responses on board. Discuss why a consistent way of describing it is necessary. | |
| Introduction/Engage | | | | | | | | | | | 5minutes | | | | | Introduce the process of the Algebra walk. Explain the grid on the floor and where the axes are. | |
| Explore/Review | | | | | | | | | | | 25minutes | | | | | Create grid on floor. Give each student an x value. Have them line up according to flash cards with functions on them. Check results and change flash cards. Have students use y= on calculator to create lots of different functions and graph. Be inventive and experiment with exponents. Why are these always functions? Alternative assignments: Treasure map or **taxicab** instructions. | |
| Assessment | | | | | | | | | | | 5 minutes | | | | | Given same functions on paper, have students give the slopes. | |
| Closure | | | | | | | | | | | 5 | | | | | Journal writing: Give three functions and explain what the slope is and how it relates to the vertical distance and horizontal distance. | |
| **DAY FIVE (10)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.2** Determine whether a relation defined by a graph, a set of ordered pairs, a table of values, an equation, or a rule is a function.  **9-12.A.2.1** Distinguish between the concept of a relation and a function.  **9-12.D.2.9** Use linear patterns in data to make predictions.  **9-12.A.2.3** Translate among tabular, symbolic, and graphical representations of functions and relations.  **9-12.A.2.6** Graph a linear equation and demonstrate that it has a constant rate of change.  **9-12.A.2.15** Evaluate estimated rate of change in a contextual situations  Learning Objective: The student will be able to demonstrate abilities to identify relations and functions, translate between different forms of a function, and estimate rates of change.  Assessment: Quiz  Materials: quiz, CBL, calculators | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | | | | **Time** | | | | | | **Activity** | | | | | | |
| Bell work | | | | | | | 5 minutes | | | | | What is the difference between a relation and a function?  What are the three ways to display functions?  What is the rate of change and what does it mean? | | | | | |
| Introduction/Engage | | | | | | |  | | | | |  | | | | | |
| Explore/Review | | | | | | | 25minutes | | | | | Using CBL, do wall-walk where students test ability to keep same slope as pattern. Have students work on airplanes and take turns using CBL activity. | | | | | |
| Assessment | | | | | | | 10minutes | | | | | Quiz | | | | | |
| Closure | | | | | | | 5 | | | | | For all approved, build the model. Keep in mind that you want as long a flight as possible. Make sure the wings are self supporting and the plane will hold together through several flights. | | | | | |
| **Daily Lesson Plans—WEEK THREE** | | | | | | | | | | | | | | | | | | |
| **DAY ONE (11)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.6** Graph a linear equation and demonstrate that it has a constant rate of change  Learning Objective:  Given two points, the student will construct a line and calculate the slope of the line in at least 80% of the given problems based on a team score of 15 out of 20.  Assessment:  Materials:  Quad paper | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | **Time** | | | | | | | **Activity** | | | | | | | |
| Bell work | | | 5 | | | | | | | Use your calculator’s random number generator to randomly generate 10 pairs of numbers. (dice can be used instead if calculators are not available) Record your 10 pairs in (x,y) format. | | | | | | | | |
| Introduction/Engage | | | 5 | | | | | | | Describe activity: Get with a partner. Use the quad paper to plot two of your ten points. Exchange with your partner and they draw the line and compute the slope. Trade back and check your partner’s answer. If you agree, give you team a point. (2 points possible per round). Repeat until all 10 pairs ( 5 per partner) are completed. High team score would be 20 points. (Can be used for group grade if desired) | | | | | | | | |
| Cooperative Learning | | | 10 | | | | | | | Complete “Graph my line” activity described above. (Team score of 15 points or higher is proficient) If team is not proficient, then addition independent practice can be sent home as homework. See link for practice sheets:  <http://www.kutasoftware.com/FreeWorksheets/Alg1Worksheets/Slope%20From%20a%20Graph.pdf> | | | | | | | | |
| Group Instruction | | | 10 | | | | | | | Introduce the equation for slope: . Model using the equation to find the slope of a few of the created lines from the activity above. | | | | | | | | |
| Cooperative Learning | | | 10 | | | | | | | Have the students work together to go back and “confirm” the slopes they calculated during the activity. | | | | | | | | |
| Closure | | | 5 | | | | | | | Share with the class any problems your team had. Calculate the “class average” number of points. Restate the two ways to find the slope of a line. | | | | | | | | |
| **DAY TWO (12)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.2.14** Understand the relationship between the coefficients of a linear equation and the slope and x- and y- intercepts of its graphs.  Learning Objective:  Given different graphs of real world scenarios, the student will describe what the x and y intercepts represents and why they are important with 80% accuracy as determined by teacher observation.  Assessment:  Materials:  Teacher Created real world scenarios for activity stations (see link for ideas)  Real world scenario organizer (4 sheets per group) | | | | | | | | | | | | | | | | | | |
| **Strategy** | | | | | **Time** | | | | | | | | | | **Activity** | | | |
| Bell work | | | | | | | 5 | | | | | | | Complete teacher determined number of problems from page:  <http://www.mathwarehouse.com/algebra/linear_equation/student-worksheets/Wrksht-real-world-linear-equations.pdf> | | | |
| Introduction | | | | | | | 5 | | | | | | | Discuss different real world scenarios that can be represented by a linear model. (Food consumption, cell phone minutes, miles until empty, cab fares, calories burned while exercising) What do the intercepts of all of these graphs represent (x and y intercept) | | | |
| Learning Groups/Activity Stations | | | | | | | 20 | | | | | | | Set up 4 stations around the classroom. Each station should have a scenario (see document in unit 4 file)and an associated data table. Divide the class among the stations. Each group should work together to draw the graph that represents the problem, write the equation for the line, identify the slope and the x and y-intercepts. Rotate through all 4 stations. | | | |
| Discussion | | | | | | | 10 | | | | | | | Class discussion about the different problems. Does everyone agree? Compare graphs and equations. What were some difficulties that you encountered? | | | |
| Closure | | | | | | | 5 | | | | | | | Exit pass: Describe one more scenario that is a linear function and identify the independent and dependent variables and what the intercepts represent. | | | |
| **DAY THREE (13)** | | | | | | | | | | | | | | | | | | |
| Benchmark:  **9-12.A.3.6** Write an equation of the line that passes through two given points.  **9-12.A.3.8** Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective:  Assessment:  Materials: | | | | | | | | | | | | | | | | | | |

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| **Strategy** | | | | **Time** | **Activity** | | | | |
| Bell work (Pre-assess) | | | | 5 | What is the slope intercept form for a line?  What are the two numbers (a coefficient and a constant) you need to know in order to write an equation in slope-intercept form?  What letters represent the above coefficients? | | | | |
| Introduction | | | | 5 | SIMMS Module 3 Activity 2 pg. 66-67 | | | | |
| Exploration | | | | 20 | Read Activity 2 Exploration  Complete parts a-e in groups | | | | |
| Vocabulary | | | | 5 | Math Note pg. 67, y-intercept and slope-intercept form  Exploration part f & g | | | | |
| Class Discussion | | | | 5 | Discussion a-d  Math Note pg. 68, slope of parallel lines | | | | |
| Closure | | | | 5 | Exit pass based on discussion f pg. 68: given the slope and y-intercept of a line, write the equation in slope intercept form. (Have the students write an equation with their shoes size as the slope and their height or age as y-intercept) | | | | |
| Homework | | | |  | Flashback 1 | | | | |
| **DAY FOUR (14)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.6** Write an equation of the line that passes through two given points.  **9-12.A.3.8** Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective:  Assessment:  Materials: | | | | | | | | | |
| **Strategy** | | | | **Time** | **Activity** | | | | |
| Bellwork | | | | 5 | Compare your answers to Flashback 1 with a partner. Note any differences in your answers. | | | | |
| Proficiency Check | | | | 5 | Check Flashback 1 | | | | |
| Vocabulary | | | | 20 | Review Math Note pg. 68 (SIMMS)  Play BINGO where students find matching slope to given equations. | | | | |
| Assessment | | | | 5 | Warm-Up 1-3 pg. 68-69 (SIMMS) | | | | |
| Closure | | | | 5 | Exit pass: Pick a partner and each of you write an equation of a line, the lines must be parallel. | | | | |
| **DAY FIVE (15)** | | | | | | | | | |
| **9-12.A.3.6** Write an equation of the line that passes through two given points.  **9-12.A.3.8** Determine whether the graphs of two given linear equations are parallel, perpendicular, coincide or none of these.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective:  Assessment:  Materials:  2 different colored die | | | | | | | | | |
| **Strategy** | | | | **Time** | **Activity** | | | | |
| Bellwork | | | | 5 | Identify the slopes of the following lines:  Y=3x+4; Y=-2x+5; Y=1/2 x – 5  Write the equation of the line with a slope of ¾ and a y-intercept of -7. Graph the line. Write the equation of a line that would be parallel to this one. | | | | |
| Proficiency Check | | | | 5 | Check Bellwork | | | | |
| Introduce/Engage | | | | 5 | What happens if you don’t know where to begin (no y-intercept is given, so no “b”)? We have another form that we can use to graph a line. | | | | |
| Whole class Instruction | | | | 5 | Math Note pg. 71 (SIMMS)  Point-slope form | | | | |
| Learning Groups | | | | 10 | Groups of three, person A rolls two die (of different colors)to determine a single point (x,y). Person B rolls a single dice to determine the slope. Person C uses the point and slope to find “b”. Refer to link for additional instructions if SIMMS isn’t clear enough.  <http://www.mathwarehouse.com/algebra/linear_equation/slope-intercept-form.php> | | | | |
| Closure | | | | 5 | Summarize the daily lesson, what we learned & what we did. Restate the process of “finding b” (3 steps). | | | | |
| **Daily Lesson Plans—WEEK FOUR**  **Expanded use of point slope formula and standard formula.** | | | | | | | | | |
| **DAY ONE (16)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective: The student will be able to determine if a point lies on a line given an equation.  Assessment: Given a list of points and functions, determine if the point(s) lie on the line.  Materials: functions and points, scenarios | | | | | | | | | |
| **Strategy** | | **Time** | | | | | **Activity** | |
| Bell work | | 5 minutes | | | | | Does the point (4, 8) lie on the line y= x + 4? How do you know if this is true or false. What does it mean that a point lies on a line? | |
| Introduction/Engage | | 5minutes | | | | | Discuss answers to bell work questions.  Put an equation in the calculator and graph. Use trace function to see if particular points lie on the lines. How would you do this without the trace? | |
| Explore/Review | | 15 minutes | | | | | Net worth scenario: Have students pick a net worth they would like to have in 5 years and again in 10 years. Using these points, have the students plot the points on a graph using appropriate scales. Have them identify the initial investment needed to achieve these results. Have the students write an equation using this information. Have them guess the value at 2 years, 6 years, 7 years, 15 years, and 20 years. Find if your guesses lie on the line. | |
| Assessment | | 20 minutes | | | | | Predict at 25 years and see if your guess lies on the line. How far were you off? Put function in calculator and use trace to check answers. Document your results. | |
| Closure | | 0 | | | | | Net worth is only one example of how this skill is used. Give examples of other ways it could be used. Share with your neighbor and write one on an exit slip. | |
| **DAY TWO (17)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective: The student will be able to write an equation using a point and the slope.  Assessment: Given a list of points and slopes, give the corresponding functions.  Materials: Point-slope formula, list of points and functions cards. | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** |
| Bell work | 5 minutes | | | | | | | Start at the point (3, - 2). From this point find four points using the slope ½. From the same point, find two points using the slope -3. |
| Introduction/Engage | 5 minutes | | | | | | | Do these points make a straight line? Why or why not? Share with a partner and describe the resulting function. List two aspects of these lines. |
| Explore/Review | 25minutes | | | | | | | Explain the process of finding the equation of a line using a point and the slope. Using flash cards, find the equation for a point and slope. Use a pairing technique such as inner outer circle, colors, matching symbols etc. Students should keep a record of every equation written including the point and slope used. Key of possible outcomes posted so students can check results. |
| Assessment | 5 minutes | | | | | | | Find the equation for the following:  Slope of ½ and goes through the point (4, -2)  Point (1, -4) and slope of 2/3.  From ( 2, 4) use a slope of 4/5. |
| Closure | 5 minutes | | | | | | | Exit slip: What would be some real life examples where someone would know the rate of change and a point to start from. Can you see a function written from this information being helpful? Why or why not |
| **DAY THREE (18)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective: The student will be able to write an equation using a graph  Assessment: Given graphs, write the function in x, y form and function notation form,  Materials: Graphing flash cards (Archie will compile this and send to members) | | | | | | | | | |
| **Strategy** | | | **Time** | | | **Activity** | | | |
| Bell work | | | 5 minutes | | | Write the equation builder. What part is the slope? What part is the y intercept? Why is this called the equation builder? Share your answers with your shoulder partner and discuss. | | | |
| Introduction/Engage | | | 5 minutes | | | Where do we see lines? What do we need to find the equation of any line? How do we decide if an equation would be helpful? Think, ink, pair, share. How might we use data from a flight to build an equation. How would we set up axes? What type of data do you expect to get from our practice flights? | | | |
| Explore/Review | | | 25 minutes | | | Using a graph of an equation (y = ¼ x – 6), demonstrate the process of finding the equation. Have students put the process in their journals and explain each step. Are there alternative methods? If so, describe them. Students pair off, each with a graph paper. Students create a line and hand to partner, who writes the equation. If the partner gives an incorrect response, the original student can challenge the equation. Whoever gets the correct equation first gets the point. Students take turns making lines. Each line should go through at least two integer points. Any discrepancies should be checked using calculator. | | | |
| Assessment | | | 5 minutes | | | Find the equation for the following:  Given 3 graphs, have students give the equations. | | | |
| Closure | | | 5 minutes | | | Exit slip: Why do you think equations might be a good tool for understanding functions. Name and explain an example of where an equation might be used to better understand a function. | | | |
| **DAY FOUR (19)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective: The student will be able to write standard and slope intercept form of equations given other forms.  Assessment: Change the following to other form:   1. y = 6x – 7 2. 2x – 3y = 11 3. y = 2 – x 4. x = 5y + 9   Accommodations: Group work  Tier 2:  Tier 3:  Materials: | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** |
| Bell work | 5 minutes | | | | | | | Solve the equation 2x – 7 = 15. Explain each step using known operations. |
| Introduction/Engage | 5 minutes | | | | | | | Show examples of both types of equations and convert to other form. Why do we need different forms of equations? What use is the slope-intercept form? What advantage does the standard form have? If your airplane flight gives you a function of y = -1/3x + 15, how would you display this as a standard equation? |
| Explore/Review | 20minutes | | | | | | | Holt practice workbook 5.5 pg 30. |
| Assessment | 10 minutes | | | | | | | Change forms of 4 equations |
| Closure | 5 minutes | | | | | | | Exit slip: Why do you think different forms of an equation are necessary. Give an example. |
| **DAY FIVE (20)** | | | | | | | | | |
| Benchmark:  **9-12.A.3.7** Verify that a point lies on a line, given an equation of the line, and be able to derive linear equations given a point and a slope.  **9-12.A.2.4** Construct a linear function that represents a given graph.  Learning Objective: The student will be able to demonstrate abilities to use point- slope, standard forms of linear functions  Assessment: Quiz  Materials: quiz Archie will write quiz and send to members | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** |
| Bell work | 5 minutes | | | | | | | Find the function of the line that passes through the point(2, -6) and has a slope of -1/2. Change this function to standard form. |
| Introduction/Engage | 5 minutes | | | | | | | Discuss the bellwork and expand as necessary. |
| Explore/Review | 15minutes | | | | | | | Review for the quiz. Memory cards. |
| Assessment | 15minutes | | | | | | | Quiz |
| Closure | 5 | | | | | | | Put final touches on airplane. Small test flight to see if they fly. |
| **Daily Lesson Plans—WEEK FIVE** | | | | | | | | | |
| **DAY ONE (21)** | | | | | | | | | |
| Benchmark:  **9-12.A.2.5** Explain and use function notation in both abstract and contextual situations and evaluate a function at a specific point in its domain.  Learning Objective: The student will be able to identify domain and range in an assortment of functions  Assessment: Competition identifying domain and range of functions.  Materials: individual white boards | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** |
| Bell work | 5 minutes | | | | | | | Write 4x +2y = 5 in function notation. What values are possible for x? What values are possible for f(x)? How would we say this mathematically? |
| Introduction/Engage | 5 minutes | | | | | | | Discuss the bell work and expand as necessary. Use KWL  Explain correct notations. Use either D: (-5, 7), D: {x: x ε R} |
| Explore/Review | 15minutes | | | | | | | Practice finding domain and range using correct notation. White boards or other individual student response methods.  Plug in some values and test range and domain for different types of functions |
| Assessment | 15 minutes | | | | | | | Create own functions in calculators and find domain and range in correct notation. Have students exchange papers and do a think aloud.  Presentation of think aloud to class. |
| Closure | 5 | | | | | | | Journal writing,: Why is correct notation for domain and range so important?  Make adjustments as needed to airplanes |
| **DAY TWO (22)** | | | | | | | | | |
| Benchmark:  **9-12.A.2.5** Explain and use function notation in both abstract and contextual situations and evaluate a function at a specific point in its domain.  Learning Objective: The student will be able to describe the characteristics of linear functions given any form.  Assessment: Start with random points not including zero’s, and find slope of line, function, domain and range, x and y intercepts.  Materials: | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** |
| Bell work | 5 minutes | | | | | | | Define the terms: slope, x and y intercepts, domain, range, function, graph, rule, and table |
| Introduction/Engage | 5 minutes | | | | | | | Discuss the definitions and test for good understanding of each term. Explain that these are the characteristics of a linear function. These should be a part of any discussion of your airplane trials. |
| Explore/Review | 15minutes | | | | | | | Have students create functions and describe characteristics of each. Use Pair-Share. Start with random points not including zero’s, and find slope of line, function, domain and range, x and y intercepts. |
| Assessment | 15 minutes | | | | | | | Start with random points not including zero’s, and find slope of line, function, domain and range, x and y intercepts. |
| Closure | 5 | | | | | | | Review data sheets and go over process of data collection for next day’s activities  Make adjustments as needed to airplanes |
| **DAY THREE-FIVE (23-25)** | | | | | | | | | |
| Benchmark:  **9-12.D.2.9** Use linear patterns in data to make predictions.  Learning Objective: The student will be able to perform experiment, collect data using utilities, write equation, give characteristics of linear equations, and present information to class.  Assessment: Presentations of results  Materials: CBL, data sheets, shoebox airplane | | | | | | | | | |
| **Strategy** | **Time** | | | | | | | **Activity** | |
| Bell work | 5 minutes | | | | | | | Explain process of day’s activities | |
| Introduction/Engage | 5 minutes | | | | | | | Discuss the procedures from the day before and the day’s activities for today. | |
| Explore/Review | 20minutes | | | | | | | Do trials, work on data collection, and prepare presentation | |
| Assessment | 0 | | | | | | | N/A | |
| Closure | 5 | | | | | | | Review data sheets and go over process of data collection for next day’s activities  Make adjustments as needed to airplanes | |

NOTES FROM TEAM REVIEW:

* Be sure to use interval notation when addressing Domain and Range
* Include a review of y= vs. function notation
* Please check with Archie and Francis about the Equation Builder if you do not know what that is.

**Teacher Reflections on the Unit:**