ALGEBRA I COMPREHENSIVE MIDTERM EXAMINATION

CPT DAUGHTRY   **FRIDAY, OCTOBER 18, 2013**

1. Organize the justifications for dismissal into a table of values. Illustrate via a single scatter plot where rational for termination (misconduct, dereliction of duty, etc.) serves as the independent variable or domain on the x-axis whereas the numerical value of applicable personnel reside on the y-axis as an output or range. Identify an equation of a reasonable trend line and express in appropriate slope-intercept, point-slope, and standard form of a linear equation. Identify the x and y-intercepts. Find the slope of a line parallel as well as one perpendicular to the equation provided. Is the equation a direct variation? If so, find the constant of the variation. Identify the domain and range of each relation. Write a function rule to describe this relationship and create a table of values. Identify the dependent and independent variables. Graph the data and label each section, create a mapping diagram, and determine whether a function exists via the Vertical-Line Test. Please be advised that responses may vary as a plethora of potential trend lines exist and are subject to the interpretation of the student. *Create a fictitious mathematical scenario in lieu of passage which is presently not provided.*
   (MA.912.A.1.4; MA.912.A.2.13; MA.912.A.10.1; MA.912.A.2.2; MA.912.A.2.3; MA.912.A.2.4)

2. Effectively employ the process referred to as unit or dimensional analysis and write out the appropriate conversion factors necessary to determine the amount of money Alex Rodriguez receives per at bat, assuming he participates in 92 percent of the 162-game season and has four plate appearances per game. Income provided in question four.
   (MA.912.A.10.1; MA.912.A.1.4; MA.912.A.2.13; MA.912.A.1.5)

3. In 1930, the average annual income was approximately $1970 whereas according to information obtained from the United States Census suggests the median household income is presently $50,500. New York Yankees third baseman Alex Rodriguez earns approximately 67 times the major league baseball minimum annual salary of $480,000. Write a function rule to describe this relationship. Evaluate your function for an input value and explain what the output represents. What advantages can you see of having a function rule instead of a table of values for a function?
   (MA.912.A.1.4; MA.912.A.2.13; MA.912.A.2.3)

4. 4. On March 8, 1930 – Babe Ruth signed a two-year contract valued at $160,000. In an effort to assure posterity, Yankees General Manager Ed Barrow said, "No one in baseball will ever be paid more than Ruth." Alex Rodriguez earned $32 million in 2009 as part of a ten-year $275 million deal. Proportionately, how much more did Rodriguez earn annually than Ruth? **(MA.912.A.10.1; MA.912.A.5.4; MA.912.A.2.13; MA.912.A.5.1)**

5. Tommy Two Times is a disgruntled federal employee who initially encountered insurmountable overdraft fees provided a human resources data entry error and now involuntarily subjected to an undetermined number of unpaid furlough days. As a necessary supplemental means of income, he is pursuing independent employment via the lawn care industry. Tommy purchases a John Deere D140 22 HP V-Twin Hydrostatic 48-in Riding Lawn Mower with Briggs & Stratton Engine for $2075 and charges $50 per lawn. Define a variable for the number of lawns mowed and another for profit. Write the equation in slope-intercept form. Identify the slope and y-intercept. Transform the equation to standard form. Design a table, which includes a domain, range, and function rule. Graph the results. Identify the rate of change and the type of correlation present. Is the equation a direct variation? Find the constant of the variation. Identify the domain and range of each relation. Identify the dependent and independent variables. Create a mapping diagram, and determine whether a function exists via the Vertical-Line Test.
   (MA.912.A.3.7 – MA.912.A.3.13; MA.912.A.1.4; MA.912.A.2.13; MA.912.A.2.2 - MA.912.A.2.4)

6. The slope of a line describes its steepness. A higher slope value indicates a steeper incline. The slope is defined as the ratio of the "rise" divided by the "run" between two points on a line, or in other words, the ratio of the altitude change to the horizontal distance between any two points on the line. Given two points (x1,y1) and (x2,y2) on a line, the slope m of the line. Illustrate and example of each and determine whether each statement regarding slope is accurate. In the event it is incorrect, explain: A rate of change must be either positive or negative. All horizontal lines have the same slope. A line with slope 1 always passes through the origin (0,0). The slope of a line that passes through Quadrant III must be negative. Two points with the same x-coordinate are always on the same vertical-line and therefore, a function exists.
   (MA.912.A.1.4; MA.912.A.2.13; MA.912.A.10.1; MA.912.A.2.1 - MA.912.A.2.4, MA.912.A.3.7 – MA.912.A.3.12)

THAT IS ALL.

7. The Washington Monument, standing 555 feet tall, is 267 feet taller than the U.S. Capitol. Because the base of the Washington Monument is 30 feet above sea level, and that of the Capitol is 88 feet above sea level, the top of the Washington Monument is 209 feet higher than the top of the Capitol Building. The United States Capitol is the meeting place of the U.S. Congress, the legislature of the U.S. federal government. Located in Washington, D.C., it sits atop Capitol Hill at the eastern end of the National Mall. The bronze Statue of Freedom by Thomas Crawford is the crowning feature of the Dome of the United States Capitol as it stands 288 feet above the ground and casts a massive shadow of approximately 128 ft. Overwhelmingly frustrated with elected officials' blatant inability to work collaboratively, 52-year-old 73-inch tall United States President, Barack Obama, briefly exits the facility to regain his composure. Illustrate the diagram and use proportions to determine the dimensions of Obama's shadow. (www.aoc.gov/facts/capitol-hill) **(MA.912.A.10.1; MA.912.A.5.4; MA.912.A.2.13; MA.912.A.5.1)**

8. In 1995, the government experienced two shutdowns. The U.S. Census suggests the median household income was approximately $34,076 and a gallon of regular unleaded gasoline was $1.12. Currently, the median household income is approximately $50,502 and according to AAA's Daily Fuel Gauge Report gasoline is $3.48. Solve a proportion to convert the $1.12 into today's value and the $3.48 into 1995 dollars.
(MA.912.A.10.1; MA.912.A.5.4; MA.912.A.2.13; MA.912.A.5.1)

9. Explain the primary differences and similarities as they pertain to theoretical and experimental probability and design a unique example from the passage above of each. Interchangeably as a fraction, decimal, and percent determine the probability of a federally funded agency and an individual employee being affected by a payroll malfunction. What is the absolute value difference of the complements of the two aforementioned events? *See supplemental resource.*
(MA.912.A.10.1; MA.912.A.5.4; MA.912.A.2.13; MA.912.A.5.1)

10. Secretary of State, John Kerry, said Arab countries have offered to pay for a full invasion of Syria to oust President Bashar Assad. "With respect to Arab countries offering to bear costs and to assess, the answer is profoundly yes," Kerry told the House Foreign Affairs Committee during a hearing Wednesday, according to The Washington Post. Thus far, estimates have ranged between five and $21 billion. Illustrate these preliminary findings on a graph as a compound inequality. Explain your mathematical reasoning in selecting either an open or closed dot as you graph your inequality. Explain how one might interpret phrases like "at least" and "at most" in an inequality in a real-world situation. What precautionary measures might the U.S. first evaluate prior to merely accepting foreign aid?
(MA.912.A.10.1; MA.912.A.1.4; MA.912.A.2.13; MA.912.A.2.1; MA.912.A.2.2; MA.912.A.3.4; MA.912.A.3.5)

11. Define a variable, write, and solve an algebraic equation for the following scenario: AT&T has counterpunched Verizon's heavily promoted Share Everything Plan with a shared data option of its own, the cleverly named Mobile Share plan. On the surface, the two offerings seem very similar, even in pricing; however, there are minor variations. The plans from both AT&T and Verizon sport the same basic structure, dishing out unlimited talk and text along with a central pool of data that several devices can sip from. The cost of the plan depends on a few specifics; the base cost depends on the size of the data pool (NBC News, 2012). Each monthly smartphone device is $40 per month; however, provided a local state employee discount – AT&T is $6 less. Additional data consumed with AT&T is approximately $15 per GB whereas on average subject to the number of devices, Verizon is $10 per GB. For what number of GB of data use will each plan cost the same? What factors might one want to consider prior to entering into a 2-year cell phone plan? Explain your reasoning in paragraph form. **(MA.912.A.10.1; MA.912.A.2.13; MA.912.A.3.5)**

12. Define a variable; write an algebraic expression, and accurately modeling three unique phrases based into an input-output table. Compare and contrast the differences and similarities as they pertain to algebraic expressions and equations. **(MA.912.A.10.1; MA.912.A.2.13; MA.912.A.3.5)**

13. Deductive reasoning is the process of reasoning logically from given facts to a conclusion whereas with inductive reasoning we simply utilize patterns to make predictions. Design an algebraic equation that effectively models a situation. Using deductive reasoning, meticulously justify each step with specific reasons such as properties, definitions, and rules not limited to but to include the distributive, associative, and communicative properties of real numbers. Construct a modified two-column proof to differentiate between the mathematics and properties applied in determining the solution. **(MA.912.A.10.1; MA.912.A.2.13; MA.912.A.3.5; MA.912.A.3.2)**

THAT IS ALL.