1. Four functions were graphed. The student was asked which function has a domain \( > 0 \)?
   a) 19% chose the correct response.
   b) 54% chose a function with a positive slope.

2. A verbal description of a function was given, with both variables described, but not defined as dependent or independent. If one of the variables changes, how will the graph change?
   a) Choices included increase in slope, decrease in slope, change in one of the intercepts, and no change.
   b) 60% chose the correct option.
   c) 28% chose an incorrect option which had a positive pBis. This indicates that students who did well on the test tended to miss this question (unexpected).
   d) Other incorrect options had negative pBis (expected)

3. A verbal statement is made describing a function: Some number, \( x \), is a A less than B times \( y \). (A and B are given verbally, as opposed to numerically.) Which could be the equation?
   a) 62% answered correctly.
   b) 26% reversed the subtraction.

   Note: This needs to be addressed in instruction. Many students hear “three less than five” and write “3-5” because they want the verbal order to be the mathematical order.

4. The student was asked to solve an inequality (one variable) with a negative in front of the variable.
   a) 29% solved it correctly EXCEPT they forgot to reverse the inequality.
   b) 43% solved it correctly.

5. A graph is shown. The student is asked for the domain.
   a) 56% got it correct.
   b) 32% gave the range.

6. Students were asked to simplify an equation with a negative coefficient in front of parentheses.
   a) 58% got it correct.
   b) Distributing a negative in front of a set of parentheses continues to be a problem.

7. Another item dealt with simplifying an equation, this one had 2 sets of parentheses and a negative (no coefficient visible) in front of one of the parentheses and subtraction inside the parentheses.
   a) 52% got this one correct.
   b) Distributing a negative in front of a set of parentheses continues to be a problem.

8. A simple three-variable formula is given. Students are asked to identify an equivalent relationship.
   a) For example, the given might be \( a-bc \), or \( a=b+c \), or \( a=b-c \), or \( a=b/c \). Identifying the correct option required solving for a variable other than \( a \).
   b) 61% got this one correct.
9. The student is asked to evaluate a quadratic function for \( f \) of a negative number. For example, 
\[ f(x) = ax^2 - bx + c, \text{ find } f(-2) \]
   a) 49% got it correct
   b) 25% got the answer you get when you just type the numbers in a calculator. (The calculator did not apply the negative to \( x^2 \) properly.)

10. The student is asked to factor a quadratic function. All coefficients were integers less than or equal to 15.
   a) 47% got it correct.

11. Given a quadratic function, the student is told that it has 2 \( x \)-intercepts. The student is asked to identify the axis of symmetry.
   a) 28% gave one of the \( x \)-intercepts as the axis of symmetry.
   b) 52% got it correct.

12. The student is given an absolute value function and is asked to identify the graph of that function.
   a) Options include discrete points, multiple line segments, a line and the correct graph.
   b) 36% got it correct.
   c) 50% chose the line.

13. The student is asked which option shows correct multiplication. In each option, the base is a variable with rational exponents and exponents were unit fractions.
   a) 62% got this correct

14. Given a verbal description of a two-variable situation and an equation that models the situation, students are asked what the coefficient means.
   a) 27% said the coefficient represented the same value that the verbal description defined as one of the variables.
   b) 55% got it correct.

15. Given a graph of a function and a table of values for a different function, students were asked to compare the two functions.
   a) Options asked “…greater slope, \( x \)-intercept, \( y \)-intercept, or value at a given point.”
   b) 55% got it correct.

   Note: If students plotted the points in the table, they could simply look at the graph and answer the question.

16. Given an equation for a linear function with a negative fractional coefficient and given three numbers from the domain, the student was asked for the range at those three points.
   a) 29% ignored the negative in front of the fraction.
   b) 49% got it correct.

17. Students were asked for the best scale for a graph to represent a situation given verbally.
   a) 40% of the students ignored the fact that the units shown in the graph were not used in the verbal description.
   b) 38% got it correct.
18. Student were given a quadratic function and asked for the equivalent equation. Finding this form of the equation required completing the square. All coefficients in the quadratic function were integers less than 12.
  54% got it correct.

19. Given a variable with a rational exponent, the student was asked to identify an equivalent expression. The correct option can be obtained by simply using the definition of rational exponents.
   a) 43% answered correctly.
   b) 40% just put the variable in the numerator and denominator of a fraction, applying the two parts of the exponents to each. (eg. \( M^{4/5} = M^4/M^5 \))

20. Students were asked to simplify a fraction in which the numerator and denominator each had a fractional exponent.
   a) 45% simplified correctly by subtracting exponents.
   b) 15% multiplied exponents.
   c) 21% added exponents.
   d) 19% divided exponents.

21. A function is described verbally. The student is asked if the function is linear, quadratic, exponential or constant.
   a) 54% got it correct.

22. The student was given an expression involving rational and/or irrational numbers. Choosing the correct option involved understanding rational/irrational closure over addition and multiplication
   a) Only 51% got this correct.

23. A situation with a repeated multiplier was described verbally. Students were asked to match the situation with a graph.
   a) 53% thought this was linear.
   b) 41% saw it correctly as exponential.

24. A scatter plot was given. Students were asked to identify the equation that most accurately represented the scatter plot. In the example, the slope and y-intercept are fractional.
   45% answered correctly.
   Note: Students should have been able to visually rule out 2 options because the y-intercept was too high, but 30% chose one of those two options.

25. Students were given a linear inequality and asked to identify the graph that represents the inequality.
   a) 53% got it correct.
   b) 26% chose a slope with the wrong sign.
   c) 21% shaded the wrong side of the correct line.
26. Given a quadratic function and two x values students were asked to find the average rate of change between those x values. To answer this, students must find the y values and then calculate slope.  
   a) 23% got it correct.  
   b) 28% just subtracted the x-values.  
   c) 30% just subtracted the y values.  

27. This item addressed finding the average rate of change. Students were given the graph of a “squiggly” curve. The x-values of points A, B, and C are given. Students are asked to compare the rate of change between A and B with the rate of change between B and C. To answer this one, students must look at the graph to estimate the corresponding y-values and then find the slope or they must estimate the rate of change between the points.  
   28% got this one correct.  

28. A parabola, f(x), is graphed. A second function, g(x) is said to be linear but is not graphed. Two solutions to f(x) = g(x) are given. The student is asked to find the equation of g(x).  
   a) 25% got this one correct.  
   b) 46% just used the two values given as the solutions as the coefficient and constant in the equation.  

29. A function is described; the student is asked to describe the domain. Options included such choices as real, integers, whole, etc.  
   19% got this one correct.  

30. A situation with unit income, unit cost, and set-up fee is given. Students are asked to write an equation.  
   a) 11% got this one correct!  
   b) 42% combined the set-up cost with the unit cost without considering the number of units (just added the two numbers).  
   c) 36% added the unit cost to the unit income.