1. The zeros of the function \( f(x) = 3x^2 - 3x - 6 \) are

2. The quadratic equation \( x^2 - 6x = 12 \) is rewritten in the form \((x + p)^2 = q\), where \( q \) is a constant. What is the value of \( p? \)

3. Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter, \( p = 2l + 2w \). Three of their responses are shown below.
   I. \( l = \frac{1}{2}p - w \)
   II. \( l = \frac{1}{2}(p - 2w) \)
   III. \( l = \frac{p - 2w}{2} \)
   Which responses are correct?

4. The distance a free falling object has traveled can be modeled by the equation \( d = \frac{1}{2}at^2 \), where \( a \) is acceleration due to gravity and \( t \) is the amount of time the object has fallen. What is \( t \) in terms of \( a \) and \( d? \)

5. Which recursively defined function has a first term equal to 10 and a common difference of 4?

6. The height of a ball Doreen tossed into the air can be modeled by the function \( h(x) = -4.9x^2 + 6x + 5 \), where \( x \) is the time elapsed in seconds, and \( h(x) \) is the height in meters. The number 5 in the function represents

7. The graphs of \( y = x^2 - 3 \) and \( y = 3x - 4 \) intersect at approximately

8. If \( f(1) = 3 \) and \( f(n) = -2f(n-1) + 1 \), then \( f(5) = \)

9. At an ice cream shop, the profit, \( P(c) \), is modeled by the function \( P(c) = 0.87c \), where \( c \) represents the number of ice cream cones sold. An appropriate domain for this function is

10. The length of a rectangular patio is 7 feet more than its width, \( w \). The area of a patio, \( A(w) \), can be represented by the function

11. A dolphin jumps out of the water and then back into the water. His jump could be graphed on a set of axes where \( x \) represents time and \( y \) represents distance above or below sea level. The domain for this graph is best represented using a set of
12 A population of bacteria can be modeled by the function \( f(t) = 1000(0.98)^t \), where \( t \) represents the time since the population started decaying, and \( f(t) \) represents the population of the remaining bacteria at time \( t \). What is the rate of decay for this population?

13 A company that manufactures radios first pays a start-up cost, and then spends a certain amount of money to manufacture each radio. If the cost of manufacturing \( r \) radios is given by the function \( c(r) = 5.25r + 125 \), then the value 5.25 best represents

14 If Lylah completes the square for \( f(x) = x^2 - 12x + 7 \) in order to find the minimum, she must write \( f(x) \) in the general form \( f(x) = (x - a)^2 + b \). What is the value of \( a \) for \( f(x) \)?

15 Which polynomial is twice the sum of \( 4x^2 - x + 1 \) and \( -6x^2 + x - 4 \)?

16 In 2013, the United States Postal Service charged $0.46 to mail a letter weighing up to 1 oz. and $0.20 per ounce for each additional ounce. Which function would determine the cost, in dollars, \( c(z) \), of mailing a letter weighing \( z \) ounces where \( z \) is an integer greater than 1?

17 Natasha is planning a school celebration and wants to have live music and food for everyone who attends. She has found a band that will charge her $750 and a caterer who will provide snacks and drinks for $2.25 per person. If her goal is to keep the average cost per person between $2.75 and $3.25, how many people, \( p \), must attend?

18 Which expression is equivalent to \( 2(x^2 - 1) + 3x(x - 4) \)?

19 John has four more nickels than dimes in his pocket, for a total of $1.25. Which equation could be used to determine the number of dimes, \( x \), in his pocket?

20 The function \( f(x) \) is graphed below.

The domain of this function is
21 Jenna took a survey of her senior class to see whether they preferred pizza or burgers. The results are summarized in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Pizza</th>
<th>Burgers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>23</td>
<td>42</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>26</td>
</tr>
</tbody>
</table>

Of the people who preferred burgers, approximately what percentage were female?

22 A laboratory technician studied the population growth of a colony of bacteria. He recorded the number of bacteria every other day, as shown in the partial table below.

<table>
<thead>
<tr>
<th>t (time, in days)</th>
<th>0</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>f(t) (bacteria)</td>
<td>25</td>
<td>15,625</td>
<td>9,765,625</td>
</tr>
</tbody>
</table>

Which function would accurately model the technician's data?

23 Which representations are functions?

24 Officials in a town use a function, $C$, to analyze traffic patterns. $C(n)$ represents the rate of traffic through an intersection where $n$ is the number of observed vehicles in a specified time interval. What would be the most appropriate domain for the function?

25 Ian is saving up to buy a new baseball glove. Every month he puts $10 into a jar. Which type of function best models the total amount of money in the jar after a given number of months?

26 The zeros of the function $f(x) = (x + 2)^2 - 25$ are

27 Which trinomial is equivalent to $3(x - 2)^2 - 2(x - 1)$?

28 Given the parent function $f(x) = x^3$, the function $g(x) = (x - 1)^3 - 2$ is the result of a shift of $f(x)$.
29 The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs: 
I. 10 miles
II. 44,880 feet
III. 15,560 yards
Which run(s) are at least 15 kilometers?

30 Mrs. Allard asked her students to identify which of the polynomials below are in standard form and explain why.
I. $15x^4 - 6x + 3x^2 - 1$
II. $12x^3 + 8x + 4$
III. $2x^5 + 8x^2 + 10x$
Which student's response is correct?

31 If a sequence is defined recursively by $f(0) = 2$ and $f(n + 1) = -2f(n) + 3$ for $n \geq 0$, then $f(2)$ is equal to

32 The length of the shortest side of a right triangle is 8 inches. The lengths of the other two sides are represented by consecutive odd integers. Which equation could be used to find the lengths of the other sides of the triangle?

33 Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function $f(t) = n^{2^t}$ while Jessica uses the function $g(t) = n^{4^t}$, where $n$ represents the initial number of bacteria and $t$ is the time, in hours. If Miriam starts with 16 bacteria, how many bacteria should Jessica start with to achieve the same growth over time?

34 Bryan's hockey team is purchasing jerseys. The company charges $250 for a one-time set-up fee and $23 for each printed jersey. Which expression represents the total cost of $x$ number of jerseys for the team?

35 Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, $y$, of one account that was left inactive for a period of $x$ years. What is the $y$-intercept of this equation and what does it represent?

36 If the pattern below continues, which equation(s) is a recursive formula that represents the number of squares in this sequence?

37 Last weekend, Emma sold lemonade at a yard sale. The function $P(c) = .50c - 9.96$ represented the profit, $P(c)$, Emma earned selling $c$ cups of lemonade. Sales were strong, so she raised the price for this weekend by 25 cents per cup. Which function represents her profit for this weekend?

38 On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?
39 The table below shows the number of grams of carbohydrates, $x$, and the number of Calories, $y$, of six different foods.

<table>
<thead>
<tr>
<th>Carbohydrates ($x$)</th>
<th>Calories ($y$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>9.5</td>
<td>138</td>
</tr>
<tr>
<td>10</td>
<td>147</td>
</tr>
<tr>
<td>6</td>
<td>88</td>
</tr>
<tr>
<td>7</td>
<td>108</td>
</tr>
<tr>
<td>4</td>
<td>62</td>
</tr>
</tbody>
</table>

Which equation best represents the line of best fit for this set of data?

40 A survey was given to 12th-grade students of West High School to determine the location for the senior class trip. The results are shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Niagara Falls</th>
<th>Darien Lake</th>
<th>New York City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boys</strong></td>
<td>56</td>
<td>74</td>
<td>103</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td>71</td>
<td>92</td>
<td>88</td>
</tr>
</tbody>
</table>

To the nearest percent, what percent of the boys chose Niagara Falls?

41 A polynomial function contains the factors $x, x - 2,$ and $x + 5$. Which graph(s) below could represent the graph of this function?

42 When written in factored form, $4w^2 - 11w - 3$ is equivalent to

43 An astronaut drops a rock off the edge of a cliff on the Moon. The distance, $d(t)$, in meters, the rock travels after $t$ seconds can be modeled by the function $d(t) = 0.8t^2$. What is the average speed, in meters per second, of the rock between 5 and 10 seconds after it was dropped?

44 The math department needs to buy new textbooks and laptops for the computer science classroom. The textbooks cost $116.00 each, and the laptops cost $439.00 each. If the math department has $6500 to spend and purchases 30 textbooks, how many laptops can they buy?
45. The functions \( f(x) \), \( q(x) \), and \( p(x) \) are shown below.

\[
q(x) = (x - 1)^2 - 6
\]

<table>
<thead>
<tr>
<th>( x )</th>
<th>( p(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

When the input is 4, which functions have the same output value?

46. Joy wants to buy strawberries and raspberries to bring to a party. Strawberries cost $1.60 per pound and raspberries cost $1.75 per pound. If she only has $10 to spend on berries, which inequality represents the situation where she buys \( x \) pounds of strawberries and \( y \) pounds of raspberries?

47. Bamboo plants can grow 91 centimeters per day. What is the approximate growth of the plant, in inches per hour?

48. The value of the \( x \)-intercept for the graph of \( 4x - 5y = 40 \) is

49. If the original function \( f(x) = 2x^2 - 1 \) is shifted to the left 3 units to make the function \( g(x) \), which expression would represent \( g(x) \)?

50. The zeros of the function \( p(x) = x^2 - 2x - 24 \) are
51 To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is $3.00 and the cost of a student ticket is $1.50. If the number of adult tickets sold is represented by \( a \) and student tickets sold by \( s \), which expression represents the amount of money collected at the door from the ticket sales?

52 The function \( h(t) = -16t^2 + 144 \) represents the height, \( h(t) \), in feet, of an object from the ground at \( t \) seconds after it is dropped. A realistic domain for this function is

53 Lizzy has 30 coins that total $4.80. All of her coins are dimes, \( D \), and quarters, \( Q \). Which system of equations models this situation?

54 For which function defined by a polynomial are the zeros of the polynomial \(-4\) and \(-6\)?

55 If \( a_n = n(a_{n-1}) \) and \( a_1 = 1 \), what is the value of \( a_5 \)?

56 During the 2010 season, football player McGee’s earnings, \( m \), were 0.005 million dollars more than those of his teammate Fitzpatrick’s earnings, \( f \). The two players earned a total of 3.95 million dollars. Which system of equations could be used to determine the amount each player earned, in millions of dollars?

57 Which inequality is represented in the graph below?

58 A satellite television company charges a one-time installation fee and a monthly service charge. The total cost is modeled by the function \( y = 40 + 90x \). Which statement represents the meaning of each part of the function?

59 Which of the three situations given below is best modeled by an exponential function?
I. A bacteria culture doubles in size every day.
II. A plant grows by 1 inch every 4 days.
III. The population of a town declines by 5% every 3 years.

60 The expression \(-4.9t^2 + 50t + 2\) represents the height, in meters, of a toy rocket \( t \) seconds after launch. The initial height of the rocket, in meters, is
61 Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Basketball</th>
<th>Soccer</th>
<th>Tennis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls</td>
<td>42</td>
<td>58</td>
<td>20</td>
</tr>
<tr>
<td>Boys</td>
<td>84</td>
<td>41</td>
<td>5</td>
</tr>
</tbody>
</table>

What percentage of the students chose soccer as their favorite sport?

62 The value of \( x \) that satisfies the equation \( \frac{4}{3} = \frac{x + 10}{15} \) is

63 The expression \( 3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5) \) is equivalent to

64 Students were asked to write \( 6x^5 + 8x - 3x^3 + 7x^7 \) in standard form. Shown below are four student responses.

Anne: \( 7x^7 + 6x^5 - 3x^3 + 8x \)
Bob: \( -3x^3 + 6x^5 + 7x^7 + 8x \)
Carrie: \( 8x + 7x^7 + 6x^5 - 3x^3 \)
Dylan: \( 8x - 3x^3 + 6x^5 + 7x^7 \)

Which student is correct?

65 Given the graph of the line represented by the equation \( f(x) = -2x + b \), if \( b \) is increased by 4 units, the graph of the new line would be shifted 4 units

66 The function \( V(t) = 1350(1.017)^t \) represents the value \( V(t) \), in dollars, of a comic book \( t \) years after its purchase. The yearly rate of appreciation of the comic book is

67 The graph of \( f(x) \) is shown below.

What is the value of \( f(-3) \)?

68 The expression \( 4x^2 - 25 \) is equivalent to
69 An outdoor club conducted a survey of its members. The members were asked to state their preference between skiing and snowboarding. Each member had to pick one. Of the 60 males, 45 stated they preferred to snowboard. Twenty-two of the 60 females preferred to ski. What is the relative frequency that a male prefers to ski?

70 What is the correlation coefficient of the linear fit of the data shown below, to the nearest hundredth?

71 The formula for electrical power, \( P \), is \( P = I^2 R \), where \( I \) is current and \( R \) is resistance. The formula for \( I \) in terms of \( P \) and \( R \) is

72 How many real-number solutions does \( 4x^2 + 2x + 5 = 0 \) have?

73 If \( a_1 = 6 \) and \( a_n = 3 + 2(a_{n-1})^2 \), then \( a_2 \) equals

74 When solving the equation \( 4(3x^2 + 2) - 9 = 8x^2 + 7 \), Emily wrote \( 4(3x^2 + 2) = 8x^2 + 16 \) as her first step. Which property justifies Emily's first step?

75 What are the solutions to the equation \( x^2 - 8x = 24 \)?

76 A grocery store sells packages of beef. The function \( C(w) \) represents the cost, in dollars, of a package of beef weighing \( w \) pounds. The most appropriate domain for this function would be

77 When factored completely, the expression \( p^4 - 81 \) is equivalent to

78 If \( f(x) = x^2 + 2 \), which interval describes the range of this function?

79 If \( f(x) = \sqrt[6]{\frac{2x + 3}{6x - 5}} \), then \( f\left(\frac{1}{2}\right) = \)

80 The equation for the volume of a cylinder is \( V = \pi r^2 h \). The positive value of \( r \), in terms of \( h \) and \( V \), is
81 The solution to $-2(1 - 4x) = 3x + 8$ is

82 What are the zeros of the function $f(x) = x^2 - 13x - 30$?

83 Britney is solving a quadratic equation. Her first step is shown below.

Problem: $3x^2 - 8 - 10x = 3(2x + 3)$

Step 1: $3x^2 - 10x - 8 = 6x + 9$

Which two properties did Britney use to get to step 1?
I. addition property of equality
II. commutative property of addition
III. multiplication property of equality
IV. distributive property of multiplication over addition

84 The value of $x$ which makes

$\frac{2}{3} \left( \frac{1}{4} x - 2 \right) = \frac{1}{5} \left( \frac{4}{3} x - 1 \right)$

true is

86 What is the value of $x$ in the equation

$\frac{x - 2}{3} + \frac{1}{6} = \frac{5}{6}$?

87 Each day, a local dog shelter spends an average of $2.40 on food per dog. The manager estimates the shelter's daily expenses, assuming there is at least one dog in the shelter, using the function $E(x) = 30 + 2.40x$. Which statements regarding the function $E(x)$ are correct?
I. $x$ represents the number of dogs at the shelter per day.
II. $x$ represents the number of volunteers at the shelter per day.
III. 30 represents the shelter's total expenses per day.
IV. 30 represents the shelter's nonfood expenses per day.

88 The function $g(x)$ is defined as $g(x) = -2x^2 + 3x$. The value of $g(-3)$ is

89 The diagrams below represent the first three terms of a sequence.

Assuming the pattern continues, which formula determines $a_n$, the number of shaded squares in the $n$th term?
90 The function \( f \) is shown in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
</tr>
</tbody>
</table>

Which type of function best models the given data?

91 The following table shows the heights, in inches, of the players on the opening-night roster of the 2015-2016 New York Knicks.

| 84  | 80  | 87  | 75  | 77  | 79  | 80  | 74  | 80  | 82  | 82  |
|

The population standard deviation of these data is approximately

92 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

<table>
<thead>
<tr>
<th>Enlargement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (square inches)</td>
<td>15</td>
<td>18.8</td>
<td>23.4</td>
<td>29.3</td>
<td>36.6</td>
</tr>
</tbody>
</table>

What is the average rate of change of the area from the original photograph to the fourth enlargement, to the nearest tenth?

93 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

\[
\frac{40 \text{ yd}}{4.5 \text{ sec}} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}}
\]

Which ratio is incorrectly written to convert his speed?

94 Given: \( f(x) = (x - 2)^2 + 4 \)
\( g(x) = (x - 5)^2 + 4 \)

When compared to the graph of \( f(x) \), the graph of \( g(x) \) is
95 The table below shows the average diameter of a pupil in a person’s eye as he or she grows older.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Average Pupil Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>4.7</td>
</tr>
<tr>
<td>30</td>
<td>4.3</td>
</tr>
<tr>
<td>40</td>
<td>3.9</td>
</tr>
<tr>
<td>50</td>
<td>3.5</td>
</tr>
<tr>
<td>60</td>
<td>3.1</td>
</tr>
<tr>
<td>70</td>
<td>2.7</td>
</tr>
<tr>
<td>80</td>
<td>2.3</td>
</tr>
</tbody>
</table>

What is the average rate of change, in millimeters per year, of a person’s pupil diameter from age 20 to age 80?

96 When solving \( p^2 + 5 = 8p - 7 \), Kate wrote \( p^2 + 12 = 8p \). The property she used is

97 What is the solution to the equation \( \frac{3}{5} \left( x + \frac{4}{3} \right) = 1.04 \)?

98 When the function \( g(x) = \begin{cases} \frac{5x}{3}, & x \leq 3 \\ x^2 + 4, & x > 3 \end{cases} \) is graphed correctly, how should the points be drawn on the graph for an \( x \)-value of 3?

99 If the quadratic formula is used to find the roots of the equation \( x^2 - 6x - 19 = 0 \), the correct roots are

100 A polynomial function is graphed below.

Which function could represent this graph?

101 If \( y = 3x^3 + x^2 - 5 \) and \( z = x^2 - 12 \), which polynomial is equivalent to \( 2(y + z) \)?
102 Let \( f \) be a function such that \( f(x) = 2x - 4 \) is defined on the domain \( 2 \leq x \leq 6 \). The range of this function is

103 If \( 4x^2 - 100 = 0 \), the roots of the equation are

104 The inequality \( 7 - \frac{2}{3}x < x - 8 \) is equivalent to

105 Which value of \( x \) satisfies the equation \( \frac{7}{3} \left( x + \frac{9}{28} \right) = 20 \)?

106 If the function \( f(x) = x^2 \) has the domain \( \{0, 1, 4, 9\} \), what is its range?

107 Four expressions are shown below.

\[
\begin{align*}
\text{I} & \quad 2(2x^2 - 2x - 60) \\
\text{II} & \quad 4(x^2 - x - 30) \\
\text{III} & \quad 4(x + 6)(x - 5) \\
\text{IV} & \quad 4x(x - 1) - 120
\end{align*}
\]

The expression \( 4x^2 - 4x - 120 \) is equivalent to

108 The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

109 The graph of \( y = \frac{1}{2}x^2 - x - 4 \) is shown below. The points \( A(-2, 0) \), \( B(0, -4) \), and \( C(4, 0) \) lie on this graph.

Which of these points can determine the zeros of the equation \( y = \frac{1}{2}x^2 - x - 4 \)?

110 What is the range of the box plot shown below?
111 The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

<table>
<thead>
<tr>
<th>Year</th>
<th>Balance, in Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>380.00</td>
</tr>
<tr>
<td>10</td>
<td>562.49</td>
</tr>
<tr>
<td>20</td>
<td>832.63</td>
</tr>
<tr>
<td>30</td>
<td>1232.49</td>
</tr>
<tr>
<td>40</td>
<td>1824.39</td>
</tr>
<tr>
<td>50</td>
<td>2700.54</td>
</tr>
</tbody>
</table>

Which type of function best models the given data?

112 The graph of \( y = f(x) \) is shown below.

Which point could be used to find \( f(2) \)?

113 Nicci's sister is 7 years less than twice Nicci's age, \( a \). The sum of Nicci's age and her sister's age is 41. Which equation represents this relationship?

114 If \( f(x) = x^2 - 2x - 8 \) and \( g(x) = \frac{1}{4}x - 1 \), for which value of \( x \) is \( f(x) = g(x) \)?

115 The length, width, and height of a rectangular box are represented by \( 2x, 3x + 1, \) and \( 5x - 6, \) respectively. When the volume is expressed as a polynomial in standard form, what is the coefficient of the 2nd term?

116 Which type of function is shown in the graph below?
117 Which equation(s) represent the graph below?
   I \quad y = (x + 2)(x^2 - 4x - 12)
   II \quad y = (x - 3)(x^2 + x - 2)
   III \quad y = (x - 1)(x^2 - 5x - 6)

118 Which equation is equivalent to \( y = x^2 + 24x - 18 \)?

119 Which expression is equivalent to \( x^4 - 12x^2 + 36 \)?

120 A company produces \( x \) units of a product per month, where \( C(x) \) represents the total cost and \( R(x) \) represents the total revenue for the month. The functions are modeled by \( C(x) = 300x + 250 \) and \( R(x) = -0.5x^2 + 800x - 100 \). The profit is the difference between revenue and cost where \( P(x) = R(x) - C(x) \). What is the total profit, \( P(x) \), for the month?

121 Alicia has invented a new app for smart phones that two companies are interested in purchasing for a 2-year contract. Company A is offering her $10,000 for the first month and will increase the amount each month by $5000. Company B is offering $500 for the first month and will double their payment each month from the previous month. Monthly payments are made at the end of each month. For which monthly payment will company B’s payment first exceed company A’s payment?

122 The trinomial \( x^2 - 14x + 49 \) can be expressed as

123 Connor wants to attend the town carnival. The price of admission to the carnival is $4.50, and each ride costs an additional 79 cents. If he can spend at most $16.00 at the carnival, which inequality can be used to solve for \( r \), the number of rides Connor can go on, and what is the maximum number of rides he can go on?

124 The owner of a small computer repair business has one employee, who is paid an hourly rate of $22. The owner estimates his weekly profit using the function \( P(x) = 8600 - 22x \). In this function, \( x \) represents the number of

125 What are the solutions to the equation \( 3(x - 4)^2 = 27 \)?
126 A sunflower is 3 inches tall at week 0 and grows 2 inches each week. Which function(s) shown below can be used to determine the height, \( f(n) \), of the sunflower in \( n \) weeks?
   I. \( f(n) = 2n + 3 \)
   II. \( f(n) = 2n + 3(n - 1) \)
   III. \( f(n) = f(n - 1) + 2 \) where \( f(0) = 3 \)

127 A function is graphed on the set of axes below.

Which function is related to the graph?

128 A student is asked to solve the equation
\[
4(3x - 1)^2 - 17 = 83.
\]
The student's solution to the problem starts as
\[
4(3x - 1)^2 = 100
\]
\[
(3x - 1)^2 = 25
\]
A correct next step in the solution of the problem is

129 The amount Mike gets paid weekly can be represented by the expression \( 2.50a + 290 \), where \( a \) is the number of cell phone accessories he sells that week. What is the constant term in this expression and what does it represent?

130 The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is \( a_1 \), which is an equation for the \( n \)th term of this sequence?

131 A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, \( y \), of the ball from the ground after \( x \) seconds.

For which interval is the ball's height always decreasing?

132 Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy’s age, \( j \), if he is the younger man?

133 Mo's farm stand sold a total of 165 pounds of apples and peaches. She sold apples for $1.75 per pound and peaches for $2.50 per pound. If she made $337.50, how many pounds of peaches did she sell?
134 If \( A = 3x^2 + 5x - 6 \) and \( B = -2x^2 - 6x + 7 \), then \( A - B \) equals

135 When solving the equation
\[
12x^2 - 7x = 6 - 2(x^2 - 1)
\]
Evan wrote
\[
12x^2 - 7x = 6 - 2x^2 + 2
\]
as his first step. Which property justifies this step?

136 The area of a rectangle is represented by
\[
3x^2 - 10x - 8.
\]
Which expression can also be used to represent the area of the same rectangle?

137 The cost of a pack of chewing gum in a vending machine is $0.75. The cost of a bottle of juice in the same machine is $1.25. Julia has $22.00 to spend on chewing gum and bottles of juice for her team and she must buy seven packs of chewing gum. If \( b \) represents the number of bottles of juice, which inequality represents the maximum number of bottles she can buy?

138 If \( f(x) = 4x + 5 \), what is the value of \( f(-3) \)?

139 David wanted to go on an amusement park ride. A sign posted at the entrance read "You must be greater than 42 inches tall and no more than 57 inches tall for this ride." Which inequality would model the height, \( x \), required for this amusement park ride?

140 Last week, a candle store received $355.60 for selling 20 candles. Small candles sell for $10.98 and large candles sell for $27.98. How many large candles did the store sell?

141 The solution of the equation \((x + 3)^2 = 7\) is

142 Which domain would be the most appropriate set to use for a function that predicts the number of household online-devices in terms of the number of people in the household?

143 Corinne is planning a beach vacation in July and is analyzing the daily high temperatures for her potential destination. She would like to choose a destination with a high median temperature and a small interquartile range. She constructed box plots shown in the diagram below.

Which destination has a median temperature above 80 degrees and the smallest interquartile range?
144 The population of a small town over four years is recorded in the chart below, where 2013 is represented by \( x = 0 \). [Population is rounded to the nearest person]

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>3810</td>
<td>3943</td>
<td>4081</td>
<td>4224</td>
</tr>
</tbody>
</table>

The population, \( P(x) \), for these years can be modeled by the function \( P(x) = ab^x \), where \( b \) is rounded to the nearest thousandth. Which statements about this function are true?

I. \( a = 3810 \)
II. \( a = 4224 \)
III. \( b = 0.035 \)
IV. \( b = 1.035 \)

145 Krystal was given $3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?

146 If \( C = 2a^2 - 5 \) and \( D = 3 - a \), then \( C - 2D \) equals

147 The roots of \( x^2 - 5x - 4 = 0 \) are

148 Compared to the graph of \( f(x) = x^2 \), the graph of \( g(x) = (x - 2)^2 + 3 \) is the result of translating \( f(x) \)

149 Keith determines the zeros of the function \( f(x) \) to be \(-6 \) and \( 5 \). What could be Keith's function?

150 What is a common ratio of the geometric sequence whose first term is \( 5 \) and third term is \( 245 \)？

151 A cubic function is graphed on the set of axes below.

Which function could represent this graph?
152 Given the functions $g(x)$, $f(x)$, and $h(x)$ shown below:

$$g(x) = x^2 - 2x$$

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \leq x \leq 3$ is

153 Olivia entered a baking contest. As part of the contest, she needs to demonstrate how to measure a gallon of milk if she only has a teaspoon measure. She converts the measurement using the ratios below:

$$\frac{4 \text{ quarts}}{1 \text{ gallon}} \cdot \frac{2 \text{ pints}}{1 \text{ quart}} \cdot \frac{2 \text{ cups}}{1 \text{ pint}} \cdot \frac{1 \text{ cup}}{4 \text{ tablespoons}} \cdot \frac{3 \text{ teaspoons}}{1 \text{ tablespoon}}$$

Which ratio is *incorrectly* written in Olivia's conversion?

154 The following conversion was done correctly:

$$\frac{3 \text{ miles}}{1 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} \cdot \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}$$

What were the final units for this conversion?

155 Given the set $\{x | -2 \leq x \leq 2$, where $x$ is an integer$,}$ what is the solution of $-2(x - 5) < 10$?
156 The quadratic functions \( r(x) \) and \( q(x) \) are given below.

\[
\begin{array}{c|c}
 x & r(x) \\
-4 & -12 \\
-3 & -15 \\
-2 & -16 \\
-1 & -15 \\
0 & -12 \\
1 & 7 \\
\end{array}
\]

\[ q(x) = x^2 + 2x - 8 \]

The function with the *smaller* minimum value is

157 The solution to \( 4p + 2 < 2(p + 5) \) is

158 Alicia purchased \( H \) half-gallons of ice cream for \$3.50 each and \( P \) packages of ice cream cones for \$2.50 each. She purchased 14 items and spent \$43. Which system of equations could be used to determine how many of each item Alicia purchased?

159 If \( k(x) = 2x^2 - 3\sqrt{x} \), then \( k(9) \) is

160 A cell phone company charges \$60.00 a month for up to 1 gigabyte of data. The cost of additional data is \$0.05 per megabyte. If \( d \) represents the number of additional megabytes used and \( c \) represents the total charges at the end of the month, which linear equation can be used to determine a user's monthly bill?

161 For the sequence \(-27, -12, 3, 18, \ldots\), the expression that defines the \( n \)th term where \( a_1 = -27 \) is

162 The formula for the volume of a cone is \( V = \frac{1}{3} \pi r^2 h \). The radius, \( r \), of the cone may be expressed as

163 Josh graphed the function \( f(x) = -3(x - 1)^2 + 2 \). He then graphed the function \( g(x) = -3(x - 1)^2 - 5 \) on the same coordinate plane. The vertex of \( g(x) \) is

164 If the domain of the function \( f(x) = 2x^2 - 8 \) is \( \{-2, 3, 5\} \), then the range is
165 A pattern of blocks is shown below.

If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the \( n \)th term?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>( a_n = n + 4 )</td>
<td>( a_1 = 2 )</td>
<td>( a_n = 4n - 2 )</td>
</tr>
</tbody>
</table>

166 What are the roots of the equation \( x^2 + 4x - 16 = 0 \)?

167 The expression \( 16x^2 - 81 \) is equivalent to

168 David correctly factored the expression \( m^2 - 12m - 64 \). Which expression did he write?

169 A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of $62 and an overage charge of $30 per gigabyte of data that exceed 2 gigabytes. If \( C \) represents the cost and \( g \) represents the total number of gigabytes of data, which equation could represent this plan when more than 2 gigabytes are used?

170 When \( 3a + 7b > 2a - 8b \) is solved for \( a \), the result is

171 Which interval represents the range of the function \( h(x) = 2x^2 - 2x - 4 \)?

172 The function \( f(x) = 2x^2 + 6x - 12 \) has a domain consisting of the integers from \(-2\) to \(1\), inclusive. Which set represents the corresponding range values for \( f(x) \)?

173 Given the following three sequences:
   I. \( 2, 4, 6, 8, 10, \ldots \)
   II. \( 2, 4, 8, 16, 32, \ldots \)
   III. \( a, a + 2, a + 4, a + 6, a + 8, \ldots \)
Which ones are arithmetic sequences?
174 Materials $A$ and $B$ decay over time. The function for the amount of material $A$ is $A(t) = 1000(0.5)^{2t}$ and for the amount of material $B$ is $B(t) = 1000(0.25)^t$, where $t$ represents time in days. On which day will the amounts of material be equal?

175 The graph of the function $f(x) = \sqrt{x + 4}$ is shown below.

The domain of the function is

176 The value in dollars, $v(x)$, of a certain car after $x$ years is represented by the equation $v(x) = 25,000(0.86)^x$. To the nearest dollar, how much more is the car worth after 2 years than after 3 years?

177 Fred is given a rectangular piece of paper. If the length of Fred's piece of paper is represented by $2x - 6$ and the width is represented by $3x - 5$, then the paper has a total area represented by

178 Gretchen has $50 that she can spend at the fair. Ride tickets cost $1.25 each and game tickets cost $2 each. She wants to go on a minimum of 10 rides and play at least 12 games. Which system of inequalities represents this situation when $r$ is the number of ride tickets purchased and $g$ is the number of game tickets purchased?

179 Beverly did a study this past spring using data she collected from a cafeteria. She recorded data weekly for ice cream sales and soda sales. Beverly found the line of best fit and the correlation coefficient, as shown in the diagram below.

Given this information, which statement(s) can correctly be concluded?
I. Eating more ice cream causes a person to become thirsty.
II. Drinking more soda causes a person to become hungry.
III. There is a strong correlation between ice cream sales and soda sales.
Algebra I Regents Bimodal Worksheet # 23

The table below represents the function $F$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F(x)$</td>
<td>9</td>
<td>17</td>
<td>65</td>
<td>129</td>
<td>257</td>
</tr>
</tbody>
</table>

The equation that represents this function is

180 The table below represents the function $F$.

<table>
<thead>
<tr>
<th>$x$</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F(x)$</td>
<td>9</td>
<td>17</td>
<td>65</td>
<td>129</td>
<td>257</td>
</tr>
</tbody>
</table>

The equation that represents this function is

181 A child is playing outside. The graph below shows the child's distance, $d(t)$, in yards from home over a period of time, $t$, in seconds.

182 If the area of a rectangle is expressed as $x^4 - 9y^2$, then the product of the length and the width of the rectangle could be expressed as

183 Which function could be used to represent the sequence 8, 20, 50, 125, 312.5, ..., given that $a_1 = 8$?

184 When directed to solve a quadratic equation by completing the square, Sam arrived at the equation

$$\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}.$$ Which equation could have been the original equation given to Sam?

185 A ball is thrown into the air from the top of a building. The height, $h(t)$, of the ball above the ground $t$ seconds after it is thrown can be modeled by $h(t) = -16t^2 + 64t + 80$. How many seconds after being thrown will the ball hit the ground?

186 Which inequality is represented by the graph below?
Algebra I Regents Bimodal Worksheets

187 The table below shows the temperature, \( T(m) \), of a cup of hot chocolate that is allowed to chill over several minutes, \( m \).

<table>
<thead>
<tr>
<th>Time, ( m ) (minutes)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature, ( T(m) ) (°F)</td>
<td>150</td>
<td>108</td>
<td>78</td>
<td>56</td>
<td>41</td>
</tr>
</tbody>
</table>

Which expression best fits the data for \( T(m) \)?

188 Which value of \( x \) satisfies the equation \( \frac{5}{6} \left( \frac{3}{8} - x \right) = 16? \)

189 Michael borrows money from his uncle, who is charging him simple interest using the formula \( I = Prt \). To figure out what the interest rate, \( r \), is, Michael rearranges the formula to find \( r \). His new formula is \( r \) equals

190 The expression \( 3(x^2 - 1) - (x^2 - 7x + 10) \) is equivalent to

191 Which polynomial function has zeros at \(-3, 0, \text{ and } 4\)?

192 In a sequence, the first term is 4 and the common difference is 3. The fifth term of this sequence is

193 What is the solution to \( 2h + 8 > 3h - 6 \)

194 If a population of 100 cells triples every hour, which function represents \( p(t) \), the population after \( t \) hours?

195 The range of the function \( f(x) = x^2 + 2x - 8 \) is all real numbers
A public opinion poll was taken to explore the relationship between age and support for a candidate in an election. The results of the poll are summarized in the table below.

<table>
<thead>
<tr>
<th>Age</th>
<th>For</th>
<th>Against</th>
<th>No Opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-40</td>
<td>30</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>41-60</td>
<td>20</td>
<td>40</td>
<td>15</td>
</tr>
<tr>
<td>Over 60</td>
<td>25</td>
<td>35</td>
<td>15</td>
</tr>
</tbody>
</table>

What percent of the 21-40 age group was for the candidate?

Which expression is equivalent to \(2(3g - 4) - (8g + 3)\)?

When \(3x + 2 \leq 5(x - 4)\) is solved for \(x\), the solution is

What are the solutions to the equation \(x^2 - 8x = 10\)?

If \(f(x) = \frac{1}{2}x^2 - \left(\frac{1}{4}x + 3\right)\), what is the value of \(f(8)\)?

The zeros of the function \(f(x) = x^2 - 5x - 6\) are

The equation \(A = 1300(1.02)^7\) is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?

Dan took 12.5 seconds to run the 100-meter dash. He calculated the time to be approximately

Given the functions \(h(x) = \frac{1}{2}x + 3\) and \(j(x) = |x|\), which value of \(x\) makes \(h(x) = j(x)\)?

Milton has his money invested in a stock portfolio. The value, \(v(x)\), of his portfolio can be modeled with the function \(v(x) = 30,000(0.78)^x\), where \(x\) is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?
206 A radio station did a survey to determine what kind of music to play by taking a sample of middle school, high school, and college students. They were asked which of three different types of music they prefer on the radio: hip-hop, alternative, or classic rock. The results are summarized in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Hip-Hop</th>
<th>Alternative</th>
<th>Classic Rock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle School</td>
<td>28</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>High School</td>
<td>22</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>College</td>
<td>16</td>
<td>20</td>
<td>14</td>
</tr>
</tbody>
</table>

What percentage of college students prefer classic rock?

207 The function \( h(x) \), which is graphed below, and the function \( g(x) = 2|x + 4| - 3 \) are given.

Which statements about these functions are true?
I. \( g(x) \) has a lower minimum value than \( h(x) \).
II. For all values of \( x \), \( h(x) < g(x) \).
III. For any value of \( x \), \( g(x) \neq h(x) \).

208 Which expression is equivalent to \( 16x^2 - 36 \)?

209 The graph below shows the distance in miles, \( m \), hiked from a camp in \( h \) hours.

Which hourly interval had the greatest rate of change?

210 What is the solution set of the equation \( (x - 2)(x - a) = 0 \)?
211 The tables below show the values of four different functions for given values of x.

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
<th>x</th>
<th>g(x)</th>
<th>x</th>
<th>h(x)</th>
<th>x</th>
<th>k(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>1</td>
<td>−1</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>−2</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>12</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>26</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>17</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>33</td>
<td>4</td>
<td>13</td>
<td>4</td>
<td>24</td>
<td>4</td>
<td>28</td>
</tr>
</tbody>
</table>

Which table represents a linear function?

212 Morgan throws a ball up into the air. The height of the ball above the ground, in feet, is modeled by the function $h(t) = -16t^2 + 24t$, where $t$ represents the time, in seconds, since the ball was thrown. What is the appropriate domain for this situation?

213 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min. If $t$ represents the number of minutes on the treadmill and $b$ represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?

214 Given the function $f(n)$ defined by the following:

\[
\begin{align*}
f(1) &= 2 \\
f(n) &= -5f(n - 1) + 2
\end{align*}
\]

Which set could represent the range of the function?

215 Which recursively defined function represents the sequence 3, 7, 15, 31, …?

216 Vinny collects population data, $P(h)$, about a specific strain of bacteria over time in hours, $h$, as shown in the graph below.

Which equation represents the graph of $P(h)$?

217 An equation is given below.

\[4(x - 7) = 0.3(x + 2) + 2.11\]

The solution to the equation is
218 A parking garage charges a base rate of $3.50 for up to 2 hours, and an hourly rate for each additional hour. The sign below gives the prices for up to 5 hours of parking.

<table>
<thead>
<tr>
<th>Parking Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 hours</td>
</tr>
<tr>
<td>3 hours</td>
</tr>
<tr>
<td>4 hours</td>
</tr>
<tr>
<td>5 hours</td>
</tr>
</tbody>
</table>

Which linear equation can be used to find \( x \), the additional hourly parking rate?

219 What is the solution to the system of equations below?

\[
\begin{align*}
  y &= 2x + 8 \\
  3(-2x + y) &= 12
\end{align*}
\]

220 What is the largest integer, \( x \), for which the value of \( f(x) = 5x^4 + 30x^2 + 9 \) will be greater than the value of \( g(x) = 3^x \)?

221 When factored completely, \( x^3 - 13x^2 - 30x \) is

222 When \( (2x - 3)^2 \) is subtracted from \( 5x^2 \), the result is

223 Faith wants to use the formula \( C(f) = \frac{5}{9}(f - 32) \) to convert degrees Fahrenheit, \( f \), to degrees Celsius, \( C(f) \). If Faith calculated \( C(68) \), what would her result be?

224 Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths, \( x \). Which equation could be used to determine \( x \)?

225 The Celluloid Cinema sold 150 tickets to a movie. Some of these were child tickets and the rest were adult tickets. A child ticket cost $7.75 and an adult ticket cost $10.25. If the cinema sold $1470 worth of tickets, which system of equations could be used to determine how many adult tickets, \( a \), and how many child tickets, \( c \), were sold?

226 Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula \( P_1 V_1 = P_2 V_2 \). When the formula is solved for \( P_2 \), the result is

227 A car leaves Albany, NY, and travels west toward Buffalo, NY. The equation \( D = 280 - 59t \) can be used to represent the distance, \( D \), from Buffalo after \( t \) hours. In this equation, the 59 represents the
228 Lynn, Jude, and Anne were given the function 
\( f(x) = -2x^2 + 32 \), and they were asked to find \( f(3) \). 
Lynn's answer was 14, Jude's answer was 4, and 
Anne's answer was \( \pm 4 \). Who is correct?

229 What is the minimum value of the function 
\( y = |x + 3| - 2 \)?

230 Jordan works for a landscape company during his 
summer vacation. He is paid $12 per hour for 
mowing lawns and $14 per hour for planting 
gardens. He can work a maximum of 40 hours per 
week, and would like to earn at least $250 this 
week. If \( m \) represents the number of hours mowing 
lawns and \( g \) represents the number of hours 
planting gardens, which system of inequalities 
could be used to represent the given conditions?

231 Based on the graph below, which expression is a 
possible factorization of \( p(x) \)?

232 What is the solution of the equation 
\( 2(x + 2)^2 - 4 = 28? \)

233 The formula for the surface area of a right 
rectangular prism is \( A = 2lw + 2hw + 2lh \), where \( l \), 
\( w \), and \( h \) represent the length, width, and height, 
respectively. Which term of this formula is not 
dependent on the height?

234 What is the domain of the relation shown below?
\{ (4, 2), (1, 1), (0, 0), (1, -1), (4, -2) \}

235 The highest possible grade for a book report is 100. 
The teacher deducts 10 points for each day the 
report is late. Which kind of function describes 
this situation?

236 For a recently released movie, the function 
\( y = 119.67(0.61)^x \) models the revenue earned, \( y \), in 
millions of dollars each week, \( x \), for several weeks 
after its release. Based on the equation, how much 
more money, in millions of dollars, was earned in 
revenue for week 3 than for week 5?

237 The zeros of the function \( f(x) = 2x^2 - 4x - 6 \) are
238 A part of Jennifer's work to solve the equation 
\[2(6x^2 - 3) = 11x^2 - x\] is shown below.

Given: \[2(6x^2 - 3) = 11x^2 - x\]
Step 1: \[12x^2 - 6 = 11x^2 - x\]
Which property justifies her first step?

239 A store sells self-serve frozen yogurt sundaes. The function \(C(w)\) represents the cost, in dollars, of a sundae weighing \(w\) ounces. An appropriate domain for the function would be

240 What is the product of \(2x + 3\) and \(4x^2 - 5x + 6\)?

241 The expression \(49x^2 - 36\) is equivalent to

242 The graph of a quadratic function is shown below.

![Graph of a quadratic function](image)

An equation that represents the function could be

243 Kendal bought \(x\) boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes, \(x\), Kendal bought?

244 What is the solution to the inequality 
\[2 + \frac{4}{9}x \geq 4 + x\]?

245 The zeros of the function \(f(x) = 2x^3 + 12x - 10x^2\) are

246 The function \(f(x) = 3x^2 + 12x + 11\) can be written in vertex form as

247 The range of the function defined as \(y = 5^x\) is

248 Sara was asked to solve this word problem: "The product of two consecutive integers is 156. What are the integers?" What type of equation should she create to solve this problem?

249 Which value of \(x\) is a solution to the equation 
\[13 - 36x^2 = -12\]?
250 The line represented by the equation $4y + 2x = 33.6$ shares a solution point with the line represented by the table below.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-5$</td>
<td>$3.2$</td>
</tr>
<tr>
<td>$-2$</td>
<td>$3.8$</td>
</tr>
<tr>
<td>$2$</td>
<td>$4.6$</td>
</tr>
<tr>
<td>$4$</td>
<td>$5$</td>
</tr>
<tr>
<td>$11$</td>
<td>$6.4$</td>
</tr>
</tbody>
</table>

The solution for this system is

251 Wenona sketched the polynomial $P(x)$ as shown on the axes below.

Which equation could represent $P(x)$?

252 Which value of $x$ results in equal outputs for $j(x) = 3x - 2$ and $b(x) = |x + 2|$?

253 Which expression is equivalent to $36x^2 - 100$?

254 In 2014, the cost to mail a letter was $49¢$ for up to one ounce. Every additional ounce cost $21¢$. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

255 In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when $x$ is

256 Which equation and ordered pair represent the correct vertex form and vertex for $j(x) = x^2 - 12x + 7$?

257 The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where $x$ is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?
258 A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by \( c(t) = 125t + 95 \). Which statements about this function are true? 
I. A house call fee costs $95. 
II. The plumber charges $125 per hour. 
III. The number of hours the job takes is represented by \( t \).

259 A sequence of blocks is shown in the diagram below.

![Sequence of blocks diagram]

This sequence can be defined by the recursive function \( a_1 = 1 \) and \( a_n = a_{n-1} + n \). Assuming the pattern continues, how many blocks will there be when \( n = 7 \)?

260 An online company lets you download songs for $0.99 each after you have paid a $5 membership fee. Which domain would be most appropriate to calculate the cost to download songs?

261 What are the solutions to the equation \( 3x^2 + 10x = 8 \)?

262 Andy has $310 in his account. Each week, \( w \), he withdraws $30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?

263 Anne invested $1000 in an account with a 1.3% annual interest rate. She made no deposits or withdrawals on the account for 2 years. If interest was compounded annually, which equation represents the balance in the account after the 2 years?

264 How many of the equations listed below represent the line passing through the points \((2,3)\) and \((4,-7)\)?

\[
\begin{align*}
5x + y &= 13 \\
y + 7 &= -5(x - 4) \\
y &= -5x + 13 \\
y - 7 &= 5(x - 4)
\end{align*}
\]

265 Abigail's and Gina's ages are consecutive integers. Abigail is younger than Gina and Gina's age is represented by \( x \). If the difference of the square of Gina's age and eight times Abigail's age is 17, which equation could be used to find Gina's age?

266 A construction worker needs to move 120 ft³ of dirt by using a wheelbarrow. One wheelbarrow load holds 8 ft³ of dirt and each load takes him 10 minutes to complete. One correct way to figure out the number of hours he would need to complete this job is
267 Which function is shown in the table below?

<table>
<thead>
<tr>
<th>x</th>
<th>f(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>1/9</td>
</tr>
<tr>
<td>-1</td>
<td>1/3</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
</tr>
</tbody>
</table>

268 A construction company uses the function \( f(p) \), where \( p \) is the number of people working on a project, to model the amount of money it spends to complete a project. A reasonable domain for this function would be

269 Given the following expressions:

I. \( \frac{5}{8} + \frac{3}{5} \)

II. \( \frac{1}{2} + \sqrt{2} \)

III. \( \left( \sqrt{5} \right) \cdot \left( \sqrt{5} \right) \)

IV. \( 3 \cdot \left( \sqrt{49} \right) \)

Which expression(s) result in an irrational number?

270 Grisham is considering the three situations below.

I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.

II. The value of a car depreciates at a rate of 15% per year after it is purchased.

III. The amount of bacteria in a culture triples every two days during an experiment.

Which of the statements describes a situation with an equal difference over an equal interval?

271 Which function defines the sequence \(-6, -10, -14, -18, \ldots\), where \( f(6) = -26 \)?

272 The graph of \( f(x) \) is shown below.

Which function could represent the graph of \( f(x) \)?
Algebra I Regents Bimodal Worksheets
Answer Section

1 ANS: 
−1 and 2 

3\(x^2 - 3x - 6 \leq 0\)

3(\(x^2 - x - 2\)) = 0

3(x − 2)(x + 1) = 0

\(x = 2, -1\)

PTS: 2    REF: 081513ai    TOP: Zeros of Polynomials

2 ANS: 
−3 

\(x^2 - 6x = 12\)

\(x^2 - 6x + 9 = 12 + 9\)

(\(x - 3\))^2 = 21

PTS: 2    REF: 061812ai    TOP: Solving Quadratics
KEY: completing the square

3 ANS: 
I, II, and III

PTS: 2    REF: 061823ai    TOP: Transforming Formulas

4 ANS: 
\(t = \sqrt{\frac{2d}{a}}\)

\(d = \frac{1}{2} at^2\)

\(2d = at^2\)

\(\frac{2d}{a} = t^2\)

\(\sqrt{\frac{2d}{a}} = t\)

PTS: 2    REF: 061519ai    TOP: Transforming Formulas

5 ANS: 
\(f(1) = 10\)

\(f(x) = f(x - 1) + 4\)

PTS: 2    REF: 081514ai    TOP: Sequences    KEY: recursive
6 ANS: the initial height of the ball 
\[ h(0) = -4.9(0)^2 + 6(0) + 5 = 5 \]

PTS: 2 REF: 011913ai TOP: Graphing Quadratic Functions KEY: context

7 ANS: 
\((0.38, -2.85)\) and \((2.62, 3.85)\)

PTS: 2 REF: 011810ai TOP: Quadratic-Linear Systems KEY: algebraically

8 ANS: 
\[ f(1) = 3; f(2) = -5; f(3) = 11; f(4) = -21; f(5) = 43 \]

PTS: 2 REF: 081424ai TOP: Sequences KEY: recursive

9 ANS: an integer \(\geq 0\)

PTS: 2 REF: 061821ai TOP: Domain and Range

10 ANS: 
\[ A(w) = w^2 + 7w \]
\[ w(w + 7) = w^2 + 7w \]

PTS: 2 REF: 081920ai TOP: Geometric Applications of Quadratics

11 ANS: positive real numbers 
Time is continuous and positive.

PTS: 2 REF: 081921ai TOP: Domain and Range

12 ANS: 2%

PTS: 2 REF: 061923ai TOP: Modeling Exponential Functions
13 ANS: 
the amount spent to manufacture each radio  
PTS: 2  REF: 061407ai  TOP: Modeling Linear Functions

14 ANS: 
6
\[ x^2 - 12x + 7 \]
\[ x^2 - 12x + 36 - 29 \]
\[ (x - 6)^2 - 29 \]

PTS: 2  REF: 081520ai  TOP: Vertex Form of a Quadratic

15 ANS: 
\[ -4x^2 - 6 \]

PTS: 2  REF: 011813ai  TOP: Operations with Polynomials
KEY: addition

16 ANS: 
\[ c(z) = 0.20(z - 1) + 0.46 \]

PTS: 2  REF: 011523ai  TOP: Modeling Linear Functions

17 ANS: 
\[ 750 < p < 1500 \]
\[ \frac{750 + 2.25p}{p} > 2.75 \]
\[ \frac{750 + 2.25p}{p} < 3.25 \]
\[ 750 + 2.25p > 2.75p \]
\[ 750 + 2.25p < 3.25p \]
\[ 750 > 0.50p \]
\[ 750 < p \]
\[ 1500 > p \]

PTS: 2  REF: 061524ai  TOP: Modeling Linear Inequalities

18 ANS: 
\[ 5x^2 - 12x - 2 \]
\[ 2(x^2 - 1) + 3x(x - 4) = 2x^2 - 2 + 3x^2 - 12x = 5x^2 - 12x - 2 \]

PTS: 2  REF: 081903ai  TOP: Operations with Polynomials
KEY: addition

19 ANS: 
\[ 0.05(x + 4) + 0.10(x) = $1.25 \]

PTS: 2  REF: 061416ai  TOP: Modeling Linear Equations

20 ANS: 
\[ x \geq -1 \]

PTS: 2  REF: 011917ai  TOP: Domain and Range
KEY: graph
21 ANS: 
\[
\frac{26}{42 + 26} = 0.382
\]

PTS: 2  
REF: 061912ai  
TOP: Frequency Tables

KEY: two-way

22 ANS: 
\[
f(t) = 25^{t+1}
\]

PTS: 2  
REF: 061513ai  
TOP: Families of Functions

23 ANS: 
II and IV

PTS: 2  
REF: 081511ai  
TOP: Defining Functions

KEY: mixed

24 ANS: 
\{0,1,2,3,\ldots\}

There are no negative or fractional cars.

PTS: 2  
REF: 061402ai  
TOP: Domain and Range

25 ANS: 
linear

PTS: 2  
REF: 011805ai  
TOP: Families of Functions

26 ANS: 
\[-7 \text{ and } 3\]
\[
(x + 2)^2 - 25 = 0
\]
\[
((x + 2) + 5)((x + 2) - 5) = 0
\]
\[
x = -7, 3
\]

PTS: 2  
REF: 081418ai  
TOP: Zeros of Polynomials

27 ANS: 
\[
3x^2 - 14x + 14
\]
\[
3(x^2 - 4x + 4) - 2x + 2 = 3x^2 - 12x + 12 - 2x + 2 = 3x^2 - 14x + 14
\]

PTS: 2  
REF: 081524ai  
TOP: Operations with Polynomials

KEY: multiplication

28 ANS: 
1 unit right and 2 units down

PTS: 2  
REF: 011910ai  
TOP: Graphing Polynomial Functions
29 ANS: 
I, only 

I. $10 \text{ mi} \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) = 16.09 \text{ km}$; 
II. $44880 \text{ ft} \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) \approx 13.6765 \text{ km}$; 
III. $15560 \text{ yd} \left( \frac{3 \text{ ft}}{1 \text{ yd}} \right) \left( \frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left( \frac{1.609 \text{ km}}{1 \text{ mi}} \right) \approx 14.225 \text{ km}$

PTS: 2 REF: 061815ai TOP: Conversions KEY: dimensional analysis

30 ANS: 
Fred said II and III because the exponents are decreasing.

PTS: 2 REF: 061819ai TOP: Modeling Expressions

31 ANS: 
$f(0 + 1) = -2f(0) + 3 = -2(2) + 3 = -1$
$f(1 + 1) = -2f(1) + 3 = -2(-1) + 3 = 5$

PTS: 2 REF: 011520ai TOP: Sequences KEY: recursive

32 ANS: 
$x^2 + 8^2 = (x + 2)^2$

PTS: 2 REF: spr1304ai TOP: Geometric Applications of Quadratics

33 ANS: 
$16^{2i} = n^{4i}$
$(16^2)^i = (n^4)^i$
$((4^2)^i)^i = ((n^2)^2)^i$

PTS: 2 REF: 011519ai TOP: Modeling Exponential Functions

34 ANS: 
$23x + 250$

PTS: 2 REF: 081901ai TOP: Modeling Expressions

35 ANS: 
5000, the amount of money in the account initially

PTS: 2 REF: 011515ai TOP: Modeling Exponential Functions

36 ANS: 
$a_1 = 3$
a$_n$ = $a_{n-1} + 2$

PTS: 2 REF: 011818ai TOP: Sequences KEY: recursive
37 ANS: 
\[ P(c) = .75c - 9.96 \]
\[ P(c) = (.50 + .25)c - 9.96 = .75c - 9.96 \]

PTS: 2 REF: 011807ai TOP: Modeling Linear Functions

38 ANS:

\[ d = \frac{37 - 31}{6 - 3} = 2 \quad a_n = 2n + 25 \]
\[ a_{20} = 2(20) + 25 = 65 \]

PTS: 2 REF: 061807ai TOP: Sequences KEY: explicit

39 ANS:

\[ y = 14.1x + 5.8 \]

PTS: 2 REF: 081421ai TOP: Regression KEY: linear

40 ANS:

\[ \frac{56}{56 + 74 + 103} \approx 0.24 \]

PTS: 2 REF: 081906ai TOP: Frequency Tables KEY: two-way

41 ANS:

I, only

PTS: 2 REF: 011524ai TOP: Graphing Polynomial Functions

42 ANS:

\[ (4w + 1)(w - 3) \]

PTS: 2 REF: 061917ai TOP: Factoring Polynomials KEY: quadratic

43 ANS:

\[ 12 \]
\[ \frac{0.8(10^2) - 0.8(5^2)}{10 - 5} = \frac{80 - 20}{5} = 12 \]

PTS: 2 REF: 011521ai TOP: Rate of Change

44 ANS:

\[ 6 \]
\[ 116(30) + 439L \leq 6500 \]
\[ 439L \leq 3020 \]
\[ L \leq 6.879 \]

PTS: 2 REF: 011904ai TOP: Modeling Linear Inequalities
ANS: 
\[ f(x), q(x), \text{ and } p(x) \]
\[ f(4) = q(4) = p(4) = 3 \]

PTS: 2  REF: 011921ai  TOP: Comparing Functions

ANS: 
\[ 1.60x + 1.75y \leq 10 \]

PTS: 2  REF: 061806ai  TOP: Modeling Linear Inequalities

ANS: 
\[ \frac{91 \text{ cm}}{\text{day}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \approx \frac{1.49 \text{ in}}{\text{hr}} \]

PTS: 2  REF: 061924ai  TOP: Conversions  KEY: dimensional analysis

ANS: 
\[ 10 \]
\[ 4x - 5(0) = 40 \]
\[ 4x = 40 \]
\[ x = 10 \]

PTS: 2  REF: 081408ai  TOP: Graphing Linear Functions

ANS: 
\[ 2(x + 3)^2 - 1 \]

PTS: 2  REF: 011819ai  TOP: Graphing Polynomial Functions

ANS: 
\[ -4 \text{ and } 6 \]
\[ p(x) = x^2 - 2x - 24 = (x - 6)(x + 4) = 0 \]
\[ x = 6, -4 \]

PTS: 2  REF: 061804ai  TOP: Zeros of Polynomials

ANS: 
\[ 3.00a + 1.50s \]

PTS: 2  REF: 081503ai  TOP: Modeling Expressions

ANS: 
\[ 0 \leq t \leq 3 \]
\[ 0 = -16t^2 + 144 \]
\[ 16t^2 = 144 \]
\[ t^2 = 9 \]
\[ t = 3 \]

PTS: 2  REF: 081423ai  TOP: Domain and Range
53 ANS:
\[ D + Q = 30 \]
\[ .10D + .25Q = 4.80 \]

PTS: 2  REF: 081809ai  TOP: Modeling Linear Systems

54 ANS:
\[ y = x^2 + 10x + 24 \]
\[ (x+4)(x+6) = 0 \]
\[ x^2 + 10x + 24 = 0 \]

PTS: 2  REF: spr1303ai  TOP: Zeros of Polynomials

55 ANS:
\[ 120 = n(a_{2-1}) = 2 \cdot 1 = 2, a_3 = n(a_{3-1}) = 3 \cdot 2 = 6, a_4 = n(a_{4-1}) = 4 \cdot 6 = 24, a_5 = n(a_{5-1}) = 5 \cdot 24 = 120 \]

PTS: 2  REF: 061824ai  TOP: Sequences  KEY: recursive

56 ANS:
\[ m+f = 3.95 \]
\[ f + 0.005 = m \]

PTS: 2  REF: 081419ai  TOP: Modeling Linear Systems

57 ANS:
\[ y \geq -3x + 4 \]

PTS: 2  REF: 061505ai  TOP: Graphing Linear Inequalities

58 ANS:
y is the total cost, \( x \) is the number of months of service, $40 is the installation fee, and $90 is the service charge per month.

PTS: 2  REF: 081402ai  TOP: Modeling Linear Functions

59 ANS:
I and III
II is linear.

PTS: 2  REF: 081823ai  TOP: Families of Functions

60 ANS:
\[ 2(\vphantom{0} -4.9(0)^2 + 50(0) + 2) \]

PTS: 2  REF: 011811ai  TOP: Graphing Quadratic Functions

KEY: context
61 ANS: 39.6%  
\[ \frac{58 + 41}{42 + 58 + 20 + 84 + 41 + 5} = \frac{99}{250} = 0.396 \]  
PTS: 2  REF: 061809ai  TOP: Frequency Tables  
KEY: two-way

62 ANS:  
\[ \frac{4}{3} = \frac{x + 10}{15} \]  
\[ 3x + 30 = 60 \]  
\[ x = 10 \]  
PTS: 2  REF: 081904ai  TOP: Solving Linear Equations  
KEY: fractional expressions

63 ANS:  
\[ -13x^2 + 34x - 29 \]  
\[ 3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5) = 3x^2 + 6x - 9 - 16x^2 + 28x - 20 = -13x^2 + 34x - 29 \]  
PTS: 2  REF: 061803ai  TOP: Operations with Polynomials  
KEY: subtraction

64 ANS: Anne  
PTS: 2  REF: 061905ai  TOP: Modeling Expressions

65 ANS: up  
PTS: 2  REF: 081501ai  TOP: Graphing Polynomial Functions

66 ANS: 1.7%  
PTS: 2  REF: 061517ai  TOP: Modeling Exponential Functions

67 ANS: 6  
PTS: 2  REF: 081805ai  TOP: Functional Notation

68 ANS:  
\[ (2x + 5)(2x - 5) \]  
PTS: 2  REF: 081807ai  TOP: Factoring the Difference of Perfect Squares  
KEY: quadratic
69 ANS: 
\[
\frac{60 - 45}{60} = \frac{15}{60} = \frac{1}{4}
\]

PTS: 2 REF: 081814ai TOP: Frequency Tables
KEY: two-way

70 ANS: 
\[-0.93\]

PTS: 2 REF: 061411ai TOP: Correlation Coefficient

71 ANS: 
\[
I = \sqrt{\frac{P}{R}} \\
P = I^2 R \\
I^2 = \frac{P}{R} \\
I = \sqrt{\frac{P}{R}}
\]

PTS: 2 REF: 011920ai TOP: Transforming Formulas

72 ANS: 
zero 
\[
b^2 - 4ac = 2^2 - 4(4)(5) = -76
\]

PTS: 2 REF: 061822ai TOP: Using the Discriminant

73 ANS: 
\[75\] 
\[
a_2 = 3 + 2(6)^2 = 75
\]

PTS: 2 REF: 081919ai TOP: Sequences KEY: recursive

74 ANS: 
addition property of equality

PTS: 2 REF: 061401ai TOP: Identifying Properties
75 ANS:
\[ x = 4 \pm 2\sqrt{10} \]
\[ x^2 - 8x + 16 = 24 + 16 \]
\[ (x - 4)^2 = 40 \]
\[ x - 4 = \pm \sqrt{40} \]
\[ x = 4 \pm 2\sqrt{10} \]

PTS: 2  REF: 061523ai  TOP: Solving Quadratics
KEY: completing the square

76 ANS:
positive rational numbers

PTS: 2  REF: 061920ai  TOP: Domain and Range

77 ANS:
\[(p^2 + 9)(p + 3)(p - 3)\]

PTS: 2  REF: 011522ai  TOP: Factoring the Difference of Perfect Squares
KEY: higher power

78 ANS:
\([2, \infty)\]

PTS: 2  REF: 061816ai  TOP: Domain and Range
KEY: real domain, quadratic

79 ANS:
\[ -1 \frac{\sqrt{2\left(\frac{1}{2}\right)^2 + 3}}{6\left(\frac{1}{2}\right)^2 - 5} = \frac{\sqrt{4}}{-2} = \frac{2}{-2} = -1 \]

PTS: 2  REF: 081512ai  TOP: Functional Notation

80 ANS:
\[ r = \sqrt{\frac{V}{\pi h}} \]

PTS: 2  REF: 011516ai  TOP: Transforming Formulas
81 ANS:
2  
$$-2 + 8x = 3x + 8$$  
$$5x = 10$$  
$$x = 2$$

PTS: 2  REF: 081804ai  TOP: Solving Linear Equations  
KEY: integral expressions

82 ANS:
15 and -2  
$$x^2 - 13x - 30 = 0$$  
$$(x - 15)(x + 2) = 0$$  
$$x = 15, -2$$

PTS: 2  REF: 061510ai  TOP: Zeros of Polynomials

83 ANS:
II and IV

PTS: 2  REF: 011908ai  TOP: Identifying Properties

84 ANS:
$$-11.3$$  
$$\frac{2}{3} \left( \frac{1}{4} x - 2 \right) = \frac{1}{5} \left( \frac{4}{3} x - 1 \right)$$  
$$10(3x - 24) = 3(16x - 12)$$  
$$30x - 240 = 48x - 36$$  
$$-204 = 18x$$  
$$x = -11.3$$

PTS: 2  REF: 011822ai  TOP: Solving Linear Equations  
KEY: fractional expressions

85 ANS:
90

PTS: 2  REF: 061805ai  TOP: Box Plots  KEY: interpret
86 ANS:

\[
\frac{x - 2}{3} = \frac{4}{6}
\]

\[6x - 12 = 12\]

\[6x = 24\]

\[x = 4\]

PTS: 2 REF: 081420ai TOP: Solving Linear Equations KEY: fractional expressions

87 ANS:

I and IV

PTS: 2 REF: 081817ai TOP: Modeling Linear Functions

88 ANS:

\[-27\]

\[g(-3) = -2(-3)^2 + 3(-3) = -18 - 9 = -27\]

PTS: 2 REF: 011902ai TOP: Functional Notation

89 ANS:

\[a_n = 4n + 8\]

PTS: 2 REF: 061424ai TOP: Sequences KEY: explicit

90 ANS:

exponential growth function

PTS: 2 REF: 061906ai TOP: Families of Functions

91 ANS:

3.5

PTS: 2 REF: 061922ai TOP: Dispersion KEY: basic

92 ANS:

\[5.4\]

\[\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4\]

PTS: 2 REF: 061511ai TOP: Rate of Change

93 ANS:

\[
\frac{5280}{1}\text{ ft} \quad \text{mi}
\]

PTS: 2 REF: 011502ai TOP: Conversions KEY: dimensional analysis

94 ANS:

shifted 3 units to the right

PTS: 2 REF: 061904ai TOP: Graphing Polynomial Functions
95 ANS:
−0.04
\[
\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.
\]

PTS: 2  REF: 081414ai  TOP: Rate of Change

96 ANS:
the addition property of equality

PTS: 2  REF: 061909ai  TOP: Identifying Properties

97 ANS:
0.4
\[
\frac{3}{5} \left( x + \frac{4}{3} \right) = 1.04
\]
\[
3 \left( x + \frac{4}{3} \right) = 5.2
\]
\[
3x + 4 = 5.2
\]
\[
3x = 1.2
\]
\[
x = 0.4
\]

PTS: 2  REF: 011905ai  TOP: Solving Linear Equations
KEY: decimals

98 ANS:
a closed circle at (3,15) and an open circle at (3,13)

PTS: 2  REF: 081815ai  TOP: Graphing Piecewise-Defined Functions

99 ANS:
\[
3 \pm 2\sqrt{7}
\]
\[
x^2 - 6x = 19
\]
\[
x^2 - 6x + 9 = 19 + 9
\]
\[
(x - 3)^2 = 28
\]
\[
x - 3 = \pm\sqrt{4 \cdot 7}
\]
\[
x = 3 \pm 2\sqrt{7}
\]

PTS: 2  REF: fall1302ai  TOP: Solving Quadratics
KEY: quadratic formula

100 ANS:
\[
f(x) = (x - 1)(x^2 - 4)
\]
\[
f(x) = (x - 1)(x^2 - 4) = (x - 1)(x - 2)(x + 2)
\]

PTS: 2  REF: 061908ai  TOP: Graphing Polynomial Functions
101 ANS:
\[ 6x^3 + 4x^2 - 34 \]
\[ \div 2\left(3x^3 + 2x^2 - 17\right) \]

PTS: 2 REF: 081813ai TOP: Operations with Polynomials
KEY: addition

102 ANS:
\[ 0 \leq y \leq 8 \]
\[ f(2) = 0 \]
\[ f(6) = 8 \]

PTS: 2 REF: 081411ai TOP: Domain and Range
KEY: limited domain

103 ANS:
\[ -5 \text{ and } 5 \]

PTS: 2 REF: 081403ai TOP: Solving Quadratics
KEY: taking square roots

104 ANS:
\[ x > 9 \]
\[ 7 - \frac{2}{3} x < x - 8 \]
\[ 15 < \frac{5}{3} x \]
\[ 9 < x \]

PTS: 2 REF: 011507ai TOP: Solving Linear Inequalities

105 ANS:
\[ 8.25 \]
\[ \frac{7}{3}\left(x + \frac{9}{28}\right) = 20 \]
\[ \frac{7}{3} x + \frac{3}{4} = \frac{80}{4} \]
\[ \frac{7}{3} x = \frac{77}{4} \]
\[ x = \frac{33}{4} = 8.25 \]

PTS: 2 REF: 061405ai TOP: Solving Linear Equations
KEY: fractional expressions
106 ANS: \{0,1,16,81\}
PTS: 2 REF: 081806ai TOP: Domain and Range
KEY: limited domain

107 ANS: I, II, and IV
PTS: 2 REF: 081509ai TOP: Factoring Polynomials
KEY: quadratic

108 ANS: 
\[ f(t) = (9.05 \times 10^6)(1 + 0.031)^7 \]
PTS: 2 REF: 081507ai TOP: Modeling Exponential Functions

109 ANS: A and C, only
PTS: 2 REF: 011909ai TOP: Zeros of Polynomials

110 ANS: 7

8 – 1 = 7

PTS: 2 REF: 081915ai TOP: Box Plots KEY: interpret

111 ANS: exponential growth function

PTS: 2 REF: 061406ai TOP: Families of Functions

112 ANS: A
PTS: 2 REF: 061420ai TOP: Functional Notation

113 ANS: 
\[ a + (2a - 7) = 41 \]

PTS: 2 REF: 061915ai TOP: Modeling Linear Equations

114 ANS: 

\[-1.75 \text{ and } 4\]

\[ x^2 - 2x - 8 = \frac{1}{4} x - 1 \]

\[ 4x^2 - 8x - 32 = x - 4 \]

\[ 4x^2 - 9x - 28 = 0 \]

\[ (4x + 7)(x - 4) = 0 \]

\[ x = -\frac{7}{4}, 4 \]

PTS: 2 REF: 081517ai TOP: Quadratic-Linear Systems
115 ANS:
\[
-26
\]
\[
(6x^2 + 2x)(5x - 6) = 30x^3 - 36x^2 + 10x^2 - 12x = 30x^3 - 26x^2 - 12x
\]

PTS: 2     REF: 081824ai     TOP: Operations with Polynomials
KEY: multiplication

116 ANS:
exponential

PTS: 2     REF: 081907ai     TOP: Families of Functions

117 ANS:
II, only
\[
y = (x - 3)(x + 2)(x - 1)
\]

PTS: 2     REF: 061512ai     TOP: Graphing Polynomial Functions

118 ANS:
\[
y = (x + 12)^2 - 162
\]
\[
y = x^2 + 24x + 144 - 18 - 144
\]
\[
y = (x + 12)^2 - 162
\]

PTS: 2     REF: 081911ai     TOP: Vertex Form of a Quadratic

119 ANS:
\[
(x^2 - 6)(x^2 - 6)
\]

PTS: 2     REF: 081415ai     TOP: Factoring Polynomials
KEY: higher power

120 ANS:
\[
P(x) = -0.5x^2 + 500x - 350
\]
\[
P(x) = -0.5x^2 + 800x - 100 - (300x + 250) = -0.5x^2 + 500x - 350
\]

PTS: 2     REF: 081406ai     TOP: Operations with Functions
121 ANS: 8

\[ A = 5000(x - 1) + 10000 \]
\[ B = 500(2)^{x-1} \]

<table>
<thead>
<tr>
<th>x</th>
<th>A = 5000(x - 1) + 10000</th>
<th>B = 500(2)^{x-1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>35,000</td>
<td>16,000</td>
</tr>
<tr>
<td>7</td>
<td>40,000</td>
<td>32,000</td>
</tr>
<tr>
<td>8</td>
<td>45,000</td>
<td>64,000</td>
</tr>
<tr>
<td>9</td>
<td>50,000</td>
<td>128,000</td>
</tr>
</tbody>
</table>

PTS: 2  REF: 081518ai  TOP: Families of Functions

122 ANS: \((x - 7)^2\)

PTS: 2  REF: 061810ai  TOP: Factoring Polynomials

KEY: quadratic

123 ANS: 
4.50 + 0.79r ≤ 16.00; 14 rides

PTS: 2  REF: 011513ai  TOP: Modeling Linear Inequalities

124 ANS: hours worked per week

PTS: 2  REF: 011501ai  TOP: Modeling Linear Functions

125 ANS: 
1 and 7

\[ 3(x - 4)^2 = 27 \]
\[ (x - 4)^2 = 9 \]
\[ x - 4 = \pm 3 \]
\[ x = 1, 7 \]

PTS: 2  REF: 011814ai  TOP: Solving Quadratics

KEY: taking square roots

126 ANS: 
1 and III

PTS: 2  REF: 061421ai  TOP: Sequences  KEY: recursive
127 ANS:
\[ f(x) = \begin{cases} 
 x^2, & x < 1 \\
 \frac{1}{2}x + \frac{1}{2}, & x > 1 
\end{cases} \]

PTS: 2  REF: 081422ai  TOP: Graphing Piecewise-Defined Functions

128 ANS:
\[ 3x - 1 = \pm 5 \]

PTS: 2  REF: 061521ai  TOP: Solving Quadratics

KEY: taking square roots

129 ANS:
290, the amount he is guaranteed to be paid each week

PTS: 2  REF: 061817ai  TOP: Modeling Linear Functions

130 ANS:
\[ a_n = 8n - 14 \]

PTS: 2  REF: 081416ai  TOP: Sequences  KEY: explicit

131 ANS:
\[ 2.5 < x < 5.5 \]

PTS: 2  REF: 061409ai  TOP: Graphing Quadratic Functions

KEY: context

132 ANS:
\[ j^2 + 2j = 783 \]

PTS: 2  REF: 081409ai  TOP: Modeling Quadratics

133 ANS:
\[
\begin{align*}
 a + p &= 165 \\
 1.75(165 - p) + 2.5p &= 337.5 \\
 1.75a + 2.5p &= 337.5 \\
 288.75 - 1.75p + 2.5p &= 337.5 \\
 0.75p &= 48.75 \\
 p &= 65
\end{align*}
\]

PTS: 2  REF: 061506ai  TOP: Modeling Linear Systems

134 ANS:
\[ 5x^2 + 11x - 13 \]

PTS: 2  REF: 061403ai  TOP: Operations with Polynomials

KEY: subtraction

135 ANS:
distributive property of multiplication over subtraction

PTS: 2  REF: 011801ai  TOP: Identifying Properties
136 ANS: 

$$(3x + 2)(x - 4)$$ 

PTS: 2  REF: 011906ai  TOP: Factoring Polynomials

KEY: quadratic

137 ANS: 

$$0.75(7) + 1.25b \leq 22$$ 

PTS: 2  REF: 081505ai  TOP: Modeling Linear Inequalities

138 ANS: 

$$-7$$ 

$$f(-3) = -12 + 5 = -7$$ 

PTS: 2  REF: 061902ai  TOP: Functional Notation

139 ANS: 

$$42 < x \leq 57$$ 

PTS: 2  REF: 061910ai  TOP: Modeling Linear Inequalities

140 ANS: 

$$8$$ 

$$L + S = 20$$ 

$$27.98L + 10.98(20 - L) = 355.60$$ 

$$27.98L + 219.60 - 10.98L = 355.60$$ 

$$17L = 136$$ 

$$L = 8$$ 

PTS: 2  REF: 081510ai  TOP: Modeling Linear Systems

141 ANS: 

$$-3 \pm \sqrt{7}$$ 

PTS: 2  REF: 081523ai  TOP: Solving Quadratics

KEY: taking square roots

142 ANS: 

whole numbers 

PTS: 2  REF: 011506ai  TOP: Domain and Range

143 ANS: 

Pelican Beach 

PTS: 2  REF: 011514ai  TOP: Central Tendency and Dispersion

144 ANS: 

I and IV 

PTS: 2  REF: 061916ai  TOP: Regression  KEY: exponential
ANS: 3000 \((1 + 0.02)^{16}\)  

PTS: 2  
REF: 011504ai  
TOP: Modeling Exponential Functions

ANS:  
\[2a^2 + 2a - 11\]  
\[2a^2 - 5 - 2(3 - a) = 2a^2 - 5 - 6 + 2a = 2a^2 + 2a - 11\]  

PTS: 2  
REF: 011911ai  
TOP: Operations with Polynomials  
KEY: subtraction

ANS:  
\[\frac{5 \pm \sqrt{41}}{2}\]  
\[\frac{5 \pm \sqrt{(-5)^2 - 4(1)(-4)}}{2(1)} = \frac{5 \pm \sqrt{41}}{2}\]  

PTS: 2  
REF: 061921ai  
TOP: Solving Quadratics  
KEY: quadratic formula

ANS:  
2 units right and 3 units up  

PTS: 2  
REF: 081808ai  
TOP: Graphing Polynomial Functions

ANS:  
\[f(x) = (x - 5)(x + 6)\]  

PTS: 2  
REF: 061412ai  
TOP: Zeros of Polynomials

ANS:  
7  
\[5r = a_2, \quad a_2r = 245, \quad 5r = \frac{245}{r}\]  
\[a_2 = \frac{245}{r}, \quad 5r^2 = 245\]  
\[r^2 = 49\]  
\[r = \pm 7\]  

PTS: 2  
REF: 081924ai  
TOP: Sequences  
KEY: difference or ratio

ANS:  
\[g(x) = (x + 3)(x + 1)(x - 1)\]  

PTS: 2  
REF: 061818ai  
TOP: Graphing Polynomial Functions
Over the interval $0 \leq x \leq 3$, the average rate of change for $h(x) = \frac{9 - 2}{3 - 0} = \frac{7}{3}$, $f(x) = \frac{7 - 1}{3 - 0} = \frac{6}{3} = 2$, and $g(x) = \frac{3 - 0}{3 - 0} = \frac{3}{3} = 1$.

153 ANS: 
\[
\frac{1}{4} \text{ cup} \\
4 \text{ tablespoons}
\]

154 ANS: 
inches per minute

155 ANS: 
1, 2
$-2(x - 5) < 10$
$x - 5 > -5$
$x > 0$

156 ANS: 
r(x), and the value is $-16$
The minimum of $r(x)$ is $-16$. The minimum of $q(x)$ is $-9 \left\{ x = \frac{-2}{2(1)} = -1; q(-1) = -9 \right\}$.

157 ANS: 
p < 4
$4p + 2 < 2p + 10$
$2p < 8$
p < 4

158 ANS: 
$3.50H + 2.50P = 43$
$H + P = 14$
159 ANS:

\[ k(9) = 2(9)^2 - 3\sqrt{9} = 162 - 9 = 153 \]

PTS: 2  REF: 061802ai  TOP: Functional Notation

160 ANS:

\[ c = 60 + 0.05d \]

PTS: 2  REF: 061422ai  TOP: Modeling Linear Equations

161 ANS:

\[-27 + 15(n - 1)\]

PTS: 2  REF: 081820ai  TOP: Sequences  KEY: explicit

162 ANS:

\[ \sqrt{\frac{3V}{\pi h}} \]

\[ V = \frac{1}{3} \pi r^2 h \]

\[ 3V = \pi r^2 h \]

\[ \frac{3V}{\pi h} = r^2 \]

\[ \sqrt{\frac{3V}{\pi h}} = r \]

PTS: 2  REF: 061423ai  TOP: Transforming Formulas

163 ANS:

7 units below the vertex of \( f(x) \)

\[-5 - 2 = -7 \]

PTS: 2  REF: 081905ai  TOP: Graphing Polynomial Functions

164 ANS:

\{0, 10, 42\}

\( f(-2) = 0, f(3) = 10, f(5) = 42 \)

PTS: 2  REF: 011812ai  TOP: Domain and Range  KEY: limited domain

165 ANS:

II and III

PTS: 2  REF: 061522ai  TOP: Sequences  KEY: recursive
166 ANS:
\[-2 \pm 2\sqrt{5}\]
\[x^2 + 4x = 16\]
\[x^2 + 4x + 4 = 16 + 4\]
\[(x + 2)^2 = 20\]
\[x + 2 = \pm \sqrt{20}\]
\[= -2 \pm 2\sqrt{5}\]

PTS: 2  REF: 061410ai  TOP: Solving Quadratics
KEY: completing the square

167 ANS:
\[(4x - 9)(4x + 9)\]

PTS: 2  REF: 081908ai  TOP: Factoring the Difference of Perfect Squares
KEY: quadratic

168 ANS:
\[(m - 16)(m + 4)\]

PTS: 2  REF: 081803ai  TOP: Factoring Polynomials
KEY: quadratic

169 ANS:
\[C = 62 + 30(g - 2)\]

PTS: 2  REF: 081508ai  TOP: Modeling Linear Equations

170 ANS:
\[a > -15b\]
\[a + 7b > -8b\]
\[a > -15b\]

PTS: 2  REF: 061913ai  TOP: Solving Linear Inequalities

171 ANS:
\[-4.5, \infty\)
\[x = \frac{-(-2)}{2(2)} = \frac{1}{2} \cdot \frac{1}{2} = \frac{-9}{2}\]

PTS: 2  REF: 081923ai  TOP: Domain and Range
KEY: real domain, quadratic

172 ANS:
\[-16, -12, -4\]
\[f(-2) = f(-1) = -16, f(0) = -12, f(1) = -4\]

PTS: 2  REF: 011914ai  TOP: Domain and Range
KEY: limited domain
173 ANS: I and III, only

PTS: 2 REF: 061919ai TOP: Sequences KEY: difference or ratio

174 ANS: every day

\[1000(0.5)^{2t} = 1000(0.5^2)^t = 1000(0.25)^t\]

PTS: 2 REF: 011923ai TOP: Modeling Exponential Functions

175 ANS: \(\{x| x \geq -4\}\)

PTS: 2 REF: 061509ai TOP: Domain and Range

KEY: graph

176 ANS: 2589

\[25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60\]

PTS: 2 REF: 011508ai TOP: Functional Notation

177 ANS: \(6x^2 - 28x + 30\)

PTS: 2 REF: 011510ai TOP: Operations with Polynomials

KEY: multiplication

178 ANS: \(1.25r + 2g \leq 50\)

\(r \geq 10\)

\(g \geq 12\)

PTS: 2 REF: 081810ai TOP: Modeling Systems of Linear Inequalities

179 ANS: III, only

PTS: 2 REF: 061516ai TOP: Analysis of Data

180 ANS: \(F(x) = 2^t + 1\)

PTS: 2 REF: 061415ai TOP: Families of Functions

181 ANS: \(0 \leq t \leq 2\)

PTS: 2 REF: 081918ai TOP: Relating Graphs to Events
182 ANS:
\[(x^2 - 3y)(x^2 + 3y)\]

PTS: 2 REF: 061503ai TOP: Factoring the Difference of Perfect Squares
KEY: multivariable

183 ANS:
\[a_n = 2.5(a_{n-1})\]

PTS: 2 REF: 011919ai TOP: Sequences KEY: recursive

184 ANS:
\[x^2 - 5x + 3 = 0\]
\[x^2 - 5x = -3\]
\[x^2 - 5x + \frac{25}{4} = \frac{-12}{4} + \frac{25}{4}\]
\[\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}\]

PTS: 2 REF: 061518ai TOP: Solving Quadratics
KEY: completing the square

185 ANS:
\[h(t) = 0\]
\[-16t^2 + 64t + 80 = 0\]
\[t^2 - 4t - 5 = 0\]
\[(t - 5)(t + 1) = 0\]
\[t = 5, -1\]

PTS: 2 REF: 081910ai TOP: Graphing Quadratic Functions
KEY: context

186 ANS:
\[y \geq 2x - 3\]

PTS: 2 REF: 011605ai TOP: Graphing Linear Inequalities
Algebra I Regents Bimodal Worksheets
Answer Section

187 ANS:

\[ 150(0.85)^n \]

PTS: 2 REF: 081617ai TOP: Modeling Exponential Functions

188 ANS:

\[ -18.825 \]

\[ 6 \left( \frac{5}{6} \left( \frac{3}{8} - x \right) \right) = 16 \]

\[ 8 \left( \frac{5}{8} - x \right) = 96 \]

\[ 15 - 40x = 768 \]

\[ -40x = 753 \]

\[ x = -18.825 \]

PTS: 2 REF: 081713ai TOP: Solving Linear Equations

189 ANS:

\[ \frac{I}{Pt} \]

PTS: 2 REF: 011606ai TOP: Transforming Formulas

190 ANS:

\[ 2x^2 + 7x - 13 \]

\[ 3(x^2 - 1) - (x^2 - 7x + 10) \]

\[ 3x^2 - 3 - x^2 + 7x - 10 \]

\[ 2x^2 + 7x - 13 \]

PTS: 2 REF: 061610ai TOP: Operations with Polynomials

191 ANS:

\[ f(x) = x(x + 3)(x - 4) \]

PTS: 2 REF: 061710ai TOP: Zeros of Polynomials

192 ANS:

\[ a_n = 3n + 1 \]

\[ a_5 = 3(5) + 1 = 16 \]

PTS: 2 REF: 061613ai TOP: Sequences KEY: explicit
193 ANS:
\[ h < 14 \]
\[ 2h + 8 > 3h - 6 \]
\[ 14 > h \]
\[ h < 14 \]

PTS: 2 REF: 081607ai TOP: Solving Linear Inequalities

194 ANS:
\[ p(t) = 100(3)^t \]

PTS: 2 REF: 081714ai TOP: Families of Functions

195 ANS:
greater than or equal to \(-9\)
\[ f(x) = x^2 + 2x - 8 = x^2 + 2x + 1 - 9 = (x + 1)^2 - 9 \]

PTS: 2 REF: 061611ai TOP: Domain and Range
KEY: real domain, quadratic

196 ANS:
\[ \frac{30}{30 + 12 + 8} = 0.6 \]

PTS: 2 REF: 061615ai TOP: Frequency Tables
KEY: two-way

197 ANS:
\[ -2g - 11 \]
\[ 2(3g - 4) - (8g + 3) = 6g - 8 - 8g - 3 = -2g - 11 \]

PTS: 2 REF: 011707ai TOP: Operations with Polynomials
KEY: subtraction

198 ANS:
\[ x \geq 11 \]
\[ 3x + 2 \leq 5x - 20 \]
\[ 22 \leq 2x \]
\[ 11 \leq x \]

PTS: 2 REF: 061609ai TOP: Solving Linear Inequalities
199 ANS:
\[ 4 \pm \sqrt{26} \]
\[ x^2 - 8x + 16 = 10 + 16 \]
\[ (x - 4)^2 = 26 \]
\[ x - 4 = \pm \sqrt{26} \]
\[ x = 4 \pm \sqrt{26} \]

PTS: 2 REF: 061722ai TOP: Solving Quadratics
KEY: completing the square

200 ANS:
\[ f(8) = \frac{1}{2} (8)^2 - \left( \frac{1}{4} (8) + 3 \right) = 32 - 5 = 27 \]

PTS: 2 REF: 081704ai TOP: Functional Notation

201 ANS:
\[-1 \text{ and } 6 \]
\[ f(x) = x^2 - 5x - 6 = (x + 1)(x - 6) = 0 \]
\[ x = -1, 6 \]

PTS: 2 REF: 061612ai TOP: Zeros of Polynomials

202 ANS:
\[ 2\% \text{ growth} \]

PTS: 2 REF: 011608ai TOP: Modeling Exponential Functions

203 ANS:
\[ 0.2083 \text{ minute} \]
\[ 12.5 \text{ sec} \times \frac{1 \text{ min}}{60 \text{ sec}} = 0.2083 \text{ min} \]

PTS: 2 REF: 061608ai TOP: Conversions KEY: dimensional analysis

204 ANS:
\[ -2 \]
\[ \frac{1}{2} x + 3 = |x| \]
\[ -\frac{1}{2} x - 3 = x \]
\[ \frac{1}{2} x + 3 = x \]
\[ -x - 6 = 2x \]
\[ x + 6 = 2x \]
\[ -6 = 3x \]
\[ x = 2x \]
\[ -2 = x \]
\[ 6 = x \]

PTS: 2 REF: 011617ai TOP: Other Systems
205 ANS:
It decreases 22% per year.

PTS: 2  REF: 081624ai  TOP: Modeling Exponential Functions

206 ANS:
28%
\[
\frac{14}{16 + 20 + 14} = 28\%
\]

PTS: 2  REF: 011705ai  TOP: Frequency Tables

KEY: two-way

207 ANS:
I and III, only

PTS: 2  REF: 081718ai  TOP: Comparing Functions

208 ANS:
\[4(2x + 3)(2x - 3)\]
\[16x^2 - 36 = 4(2x + 3)(2x - 3)\]

PTS: 2  REF: 011701ai  TOP: Factoring the Difference of Perfect Squares

KEY: quadratic

209 ANS:
hour 0 to hour 1
The graph is steepest between hour 0 and hour 1.

PTS: 2  REF: 081601ai  TOP: Rate of Change

210 ANS:
2 and \(a\)

PTS: 2  REF: 011702ai  TOP: Solving Quadratics

KEY: factoring

211 ANS:
f(x)

PTS: 2  REF: 061606ai  TOP: Families of Functions
212 ANS:
\[0 \leq t \leq 1.5\]
\[0 = -16t^2 + 24t\]
\[0 = -8t(2t - 3)\]
\[t = 0, \frac{3}{2}\]

PTS: 2 REF: 061724ai TOP: Graphing Quadratic Functions KEY: context

213 ANS:
5b

PTS: 2 REF: 081712ai TOP: Modeling Expressions

214 ANS:
\{2, -8, 42, -208, \ldots \}
\[f(1) = 2; \; f(2) = -5(2) + 2 = -8; \; f(3) = -5(-8) + 2 = 42; \; f(4) = -5(42) + 2 = -208\]

PTS: 2 REF: 061718ai TOP: Sequences KEY: recursive

215 ANS:
\[f(1) = 3, \; f(n + 1) = 2f(n) + 1\]

PTS: 2 REF: 011618ai TOP: Sequences KEY: recursive

216 ANS:
\[P(h) = 4(2)^h\]

PTS: 2 REF: 061707ai TOP: Families of Functions

217 ANS:
8.3
\[4(x - 7) = 0.3(x + 2) + 2.11\]
\[4x - 28 = 0.3x + 0.6 + 2.11\]
\[3.7x - 28 = 2.71\]
\[3.7x = 30.71\]
\[x = 8.3\]

PTS: 2 REF: 061719ai TOP: Solving Linear Equations KEY: decimals

218 ANS:
\[2x + 3.50 = 14.50\]

PTS: 2 REF: 081614ai TOP: Modeling Linear Equations
219 ANS:
no solution
\[3(-2x + 2x + 8) = 12\]
\[24 \neq 12\]

PTS: 2          REF: 061708ai       TOP: Solving Linear Systems
KEY: substitution

220 ANS:
9

PTS: 2          REF: 061621ai       TOP: Families of Functions

221 ANS:
\[x(x+2)(x-15)\]

PTS: 2          REF: 011612ai       TOP: Factoring Polynomials
KEY: higher power

222 ANS:
\[x^2 + 12x - 9\]
\[5x^2 - (4x^2 - 12x + 9) = x^2 + 12x - 9\]

PTS: 2          REF: 011610ai       TOP: Operations with Polynomials
KEY: multiplication

223 ANS:
20° Celsius
\[C(68) = \frac{5}{9} (68 - 32) = 20\]

PTS: 2          REF: 011710ai       TOP: Conversions KEY: formula

224 ANS:
\[(10 + x)(12 + x) = 180\]

PTS: 2          REF: 011611ai       TOP: Geometric Applications of Quadratics

225 ANS:
\[a + c = 150\]
\[10.25a + 7.75c = 1470\]

PTS: 2          REF: 061605ai       TOP: Modeling Linear Systems
226 ANS: 
\[ \frac{P_1V_1}{V_2} \]

PTS: 2  REF: 011704ai  TOP: Transforming Formulas

227 ANS: speed of the car

PTS: 2  REF: 011709ai  TOP: Modeling Linear Functions

228 ANS: Lynn, only

\[ f(3) = -2(3)^2 + 32 = -18 + 32 = 14 \]

PTS: 2  REF: 061705ai  TOP: Functional Notation

229 ANS:  

PTS: 2  REF: 011712ai  TOP: Graphing Absolute Value Functions

230 ANS:  

\[ m + g \leq 40 \]

\[ 12m + 14g \geq 250 \]

PTS: 2  REF: 061711ai  TOP: Modeling Systems of Linear Inequalities

231 ANS: 

\[ (x + 3)(x - 2)(x - 4) \]

PTS: 2  REF: 081623ai  TOP: Graphing Polynomial Functions

232 ANS: 

\[ 2 \text{ and } -6 \]

\[ 2(x + 2)^2 = 32 \]

\[ (x + 2)^2 = 16 \]

\[ x + 2 = \pm 4 \]

\[ x = -6, 2 \]

PTS: 2  REF: 061619ai  TOP: Solving Quadratics

KEY: taking square roots

233 ANS: 

\[ 2lw \]

PTS: 2  REF: 061702ai  TOP: Dependent and Independent Variables

234 ANS: 

\{0, 1, 4\}

PTS: 2  REF: 081710ai  TOP: Domain and Range

KEY: limited domain
235 ANS: linear

PTS: 2   REF: 081717ai   TOP: Families of Functions

236 ANS: 17.06
119.67(0.61)^5 - 119.67(0.61)^3 ≈ 17.06

PTS: 2   REF: 011603ai   TOP: Evaluating Functions

237 ANS: 3 and -1
2x^2 - 4x - 6 = 0
2(x^2 - 2x - 3) = 0
2(x - 3)(x + 1) = 0

x = 3, -1

PTS: 2   REF: 011609ai   TOP: Zeros of Polynomials

238 ANS: distributive property of multiplication over subtraction

PTS: 2   REF: 081701ai   TOP: Identifying Properties

239 ANS: nonnegative rational numbers

PTS: 2   REF: 061623ai   TOP: Domain and Range

240 ANS: 8x^3 + 2x^2 - 3x + 18
(2x + 3)(4x^2 - 5x + 6) = 8x^3 - 10x^2 + 12x + 12x^2 - 15x + 18 = 8x^3 + 2x^2 - 3x + 18

PTS: 2   REF: 081612ai   TOP: Operations with Polynomials
KEY: multiplication

241 ANS: (7x - 6)(7x + 6)

PTS: 2   REF: 081703ai   TOP: Factoring the Difference of Perfect Squares
KEY: quadratic
242 ANS: 
\[ q(x) = -\frac{1}{2} (x - 15)^2 + 25 \]
Vertex (15,25), point (10,12.5) 
\[ 12.5 = a(10 - 15)^2 + 25 \]
\[ -12.5 = 25a \]
\[ \frac{1}{2} = a \]

PTS: 2 REF: 061716ai TOP: Graphing Quadratic Functions

KEY: no context

243 ANS: 
\[ 12x - 24 = 60 \]

PTS: 2 REF: 081616ai TOP: Modeling Linear Equations

244 ANS: 
\[ x \leq -\frac{18}{5} \]
\[ 2 + \frac{4}{9} x \geq 4 + x \]
\[ -2 \geq \frac{5}{9} x \]
\[ x \leq -\frac{18}{5} \]

PTS: 2 REF: 081711ai TOP: Solving Linear Inequalities

245 ANS: 
\[ \{0,2,3\} \]
\[ 2x^3 + 12x - 10x^2 = 0 \]
\[ 2x(x^2 - 5x + 6) = 0 \]
\[ 2x(x - 3)(x - 2) = 0 \]
\[ x = 0,2,3 \]

PTS: 2 REF: 081719ai TOP: Zeros of Polynomials

246 ANS: 
\[ f(x) = 3(x + 2)^2 - 1 \]
\[ 3x^2 + 4x + 4 - 12 + 11 \]
\[ 3(x + 2)^2 - 1 \]

PTS: 2 REF: 081621ai TOP: Vertex Form of a Quadratic
247 ANS: 
\[ y > 0 \]

PTS: 2  REF: 011619ai  TOP: Domain and Range  
KEY: real domain, exponential

248 ANS: 
quadratic

PTS: 2  REF: 061624ai  TOP: Families of Functions

249 ANS: 
\[ \frac{5}{6} \]

\[ 36x^2 = 25 \]

\[ x^2 = \frac{25}{36} \]

\[ x = \pm \frac{5}{6} \]

PTS: 2  REF: 011715ai  TOP: Solving Quadratics  
KEY: taking square roots

250 ANS: 
(6,0,5.4)

\[ m = \frac{5 - 4.6}{4 - 2} = \frac{4}{2} = 0.2 \]

4(0.2x + 4.2) + 2x = 33.6  
\[ y = 0.2(6) + 4.2 = 5.4 \]

\[ 5 = 0.2(4) + b \]

0.8x + 16.8 + 2x = 33.6  
\[ 2.8x = 16.8 \]

4.2 = b  
\[ x = 6 \]

PTS: 2  REF: 061618ai  TOP: Solving Linear Systems  
KEY: substitution

251 ANS: 
\[ P(x) = (x + 1)(x - 2)^2 \]

PTS: 2  REF: 081707ai  TOP: Graphing Polynomial Functions
252 \text{ ANS:} \\
\begin{align*}
|x + 2| &= 3x - 2 \\
x + 2 &= 3x - 2 \\
4 &= 2x \\
x &= 2
\end{align*}
\text{PTS: 2} \quad \text{REF: 081702ai} \quad \text{TOP: Other Systems}

253 \text{ ANS:} \\
4(3x + 5)(3x - 5) \\
36x^2 - 100 = 4(9x^2 - 25) = 4(3x + 5)(3x - 5)
\text{PTS: 2} \quad \text{REF: 081608ai} \quad \text{TOP: Factoring the Difference of Perfect Squares} \quad \text{KEY: quadratic}

254 \text{ ANS:} \\
a_1 = 49; \ a_n = a_{n-1} + 21
\text{PTS: 2} \quad \text{REF: 011708ai} \quad \text{TOP: Sequences} \quad \text{KEY: recursive}

255 \text{ ANS:} \\
2
\text{PTS: 2} \quad \text{REF: 011601ai} \quad \text{TOP: Vertex Form of a Quadratic}

256 \text{ ANS:} \\
j(x) = (x - 6)^2 - 29, (6, -29) \\
j(x) = x^2 - 12x + 36 + 7 - 36 \\
= (x - 6)^2 - 29
\text{PTS: 2} \quad \text{REF: 061616ai} \quad \text{TOP: Vertex Form of a Quadratic}

257 \text{ ANS:} \\
\text{whole numbers}
\text{PTS: 2} \quad \text{REF: 011719ai} \quad \text{TOP: Domain and Range}

258 \text{ ANS:} \\
I, II, and III
\text{PTS: 2} \quad \text{REF: 081709ai} \quad \text{TOP: Modeling Linear Functions}

259 \text{ ANS:} \\
28 \\
1, 3, 6, 10, 15, 21, 28, ...
\text{PTS: 2} \quad \text{REF: 081715ai} \quad \text{TOP: Sequences} \quad \text{KEY: recursive}

260 \text{ ANS:} \\
\text{whole numbers greater than or equal to one}
\text{PTS: 2} \quad \text{REF: 081620ai} \quad \text{TOP: Domain and Range}
\[ \frac{2}{3} \text{ and } -4 \]
\[ 3x^2 + 10x - 8 = 0 \]
\[ (3x - 2)(x + 4) = 0 \]
\[ x = \frac{2}{3}, -4 \]

PTS: 2  
REF: 081619ai  
TOP: Solving Quadratics  
KEY: factoring

\[ 280 - 30(w - 1) \]

PTS: 2  
REF: 011718ai  
TOP: Modeling Expressions

\[ A = 1000(1 + 0.013)^2 \]

PTS: 2  
REF: 061712ai  
TOP: Modeling Exponential Functions

\[ m = \frac{3 - (-7)}{2 - 4} = -5 \]
\[ 3 = (-5)(2) + b \]
\[ y = -5x + 13 \]
represents the line passing through the points (2,3) and (4,-7). The
\[ b = 13 \]

fourth equation may be rewritten as \( y = 5x - 13 \), so it is a different line.

PTS: 2  
REF: 081720ai  
TOP: Writing Linear Equations  
KEY: other forms

\[ x^2 - 8(x - 1) = 17 \]

PTS: 2  
REF: 081723ai  
TOP: Modeling Quadratics

\[ \frac{120 \text{ ft}^3}{1} \cdot \frac{1 \text{ load}}{8 \text{ ft}^3} \cdot \frac{10 \text{ min}}{1 \text{ load}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \]

PTS: 2  
REF: 061720ai  
TOP: Conversions  
KEY: dimensional analysis

\[ f(x) = 3^x \]

PTS: 2  
REF: 011616ai  
TOP: Families of Functions

\[ \text{positive integers} \]

PTS: 2  
REF: 011615ai  
TOP: Domain and Range
269 ANS: II, only
I. $\frac{-5}{8} + \frac{3}{5} = \frac{-1}{40}$; III. $\left(\sqrt{5}\right) \cdot \left(\sqrt{5}\right) = \frac{5}{1}$; IV. $3 \cdot \left(\sqrt{49}\right) = \frac{21}{1}$

PTS: 2 REF: 011604ai TOP: Operations with Radicals
KEY: classify

270 ANS: I, only

PTS: 2 REF: 011623ai TOP: Families of Functions

271 ANS: $f(x) = -4x - 2$

PTS: 2 REF: 081610ai TOP: Sequences KEY: explicit

272 ANS: $f(x) = (x + 2)(x^2 + 3x - 4)$
$f(x) = (x + 2)(x + 4)(x - 1)$

PTS: 2 REF: 081504ai TOP: Graphing Polynomial Functions