1. 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 No money is deposited or withdrawn after the initial amount is deposited.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?

2. 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?

3. The value of \(x\) which makes
\[
\frac{2}{3} \left( 4 \cdot x - 2 \right) = \frac{1}{5} \left( 4 \cdot x - 1 \right)
\]
true is

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

5. The following conversion was done correctly:
\[
\frac{3 \text{ miles}}{1 \text{ hour}} \cdot \frac{1 \text{ hour}}{60 \text{ minutes}} = \frac{5280 \text{ feet}}{1 \text{ mile}} \cdot \frac{12 \text{ inches}}{1 \text{ foot}}
\]
What were the final units for this conversion?

6. If \(A = 3x^2 + 5x - 6\) and \(B = -2x^2 - 6x + 7\), then \(A - B\) equals
7 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?

8 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?

9 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

10 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.

11 If \( y = 3x^3 + x^2 - 5 \) and \( z = x^2 - 12 \), which polynomial is equivalent to \( 2(y + z) \)?

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

13 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?

14 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?

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

16 Which graph represents the solution of \( y \leq x + 3 \) and \( y \geq -2x - 2 \)?

17 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

18 If \( a_n = n(a_{n-1}) \) and \( a_1 = 1 \), what is the value of \( a_5 \)?
19 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.

Which interval represents the child constantly moving closer to home?

20 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?

21 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?

22 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

23 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

24 Which function could be used to represent the sequence 8, 20, 50, 125, 312.5, . . ., given that \(a_1 = 8\)?

25 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?

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

The domain of the function is

27 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 \(p\)?
28 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?

29 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.

\[
\begin{align*}
\text{40 yd} & \quad \text{3 ft} & \quad \text{5280 ft} & \quad \text{60 sec} & \quad \text{60 min} \\
\text{4.5 sec} & \quad \text{1 yd} & \quad \text{1 mi} & \quad \text{1 min} & \quad \text{1 hr}
\end{align*}
\]

Which ratio is incorrectly written to convert his speed?

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

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

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

33 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?

34 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?

35 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?

36 Which polynomial is twice the sum of \( 4x^2 - x + 1 \) and \( -6x^2 + x - 4? \)
37 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. $b = 1.035$

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

Which function is related to the graph?

39 Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function $f(t) = n^{2t}$ while Jessica uses the function $g(t) = n^{4t}$, 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?

40 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?

41 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?

42 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?
43 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?

44 Alicia has invented a new app for smartphones 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?

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

48 Which type of function is shown in the graph below?

45 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?

46 Given the following three sequences:

I. 2, 4, 6, 8, 10, ...
II. 2, 4, 8, 16, 32, ...
III. \(a, a + 2, a + 4, a + 6, a + 8, \ldots\)

Which ones are arithmetic sequences?

49 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?

50 If \(f(1) = 3\) and \(f(n) = -2f(n - 1) + 1\), then \(f(5) = \)
51. 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?

52. Which equation(s) represent the graph below?
   - I. \( y = (x + 2)(x^2 - 4x - 12) \)
   - II. \( y = (x - 3)(x^2 + x - 2) \)
   - III. \( y = (x - 1)(x^2 - 5x - 6) \)

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

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

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

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

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

58. 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?
59 A pattern of blocks is shown below.

![Pattern of blocks]

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

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_n$</td>
<td>$n + 4$</td>
<td>$a_1 = 2$</td>
<td>$a_n = 4n - 2$</td>
</tr>
<tr>
<td>$a_n$</td>
<td>$a_{n-1} + 4$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

60 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>Boys</td>
<td>56</td>
<td>74</td>
<td>103</td>
</tr>
<tr>
<td>Girls</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?

61 The solution of the equation $(x + 3)^2 = 7$ is

62 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?

63 The formula for electrical power, $P$, is $P = I^2R$, where $I$ is current and $R$ is resistance. The formula for $I$ in terms of $P$ and $R$ is

64 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?
65 The graphs of \( y = x^2 - 3 \) and \( y = 3x - 4 \) intersect at approximately

66 Which graph represents \( f(x) = \begin{cases} x \quad x < 1 \\ \sqrt{x} \quad x \geq 1 \end{cases} \)?

67 What is a common ratio of the geometric sequence whose first term is 5 and third term is 245?

68 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 \( d \)?

69 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?

70 The expression \( 4x^2 - 25 \) is equivalent to

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

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

73 What is the solution to the equation \( \frac{2}{5} \left( x + \frac{4}{3} \right) = 1.04 \)?

74 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?

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

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

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

78 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
79 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 \( y = \frac{1}{2}x^2 - x - 4 \)?

80 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?

81 What is the value of \( x \) in the equation \( \frac{x - 2}{3} + \frac{1}{6} = \frac{5}{6} \)?

82 What are the solutions to the equation \( 3(x - 4)^2 = 27 \)?

83 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?

84 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?

85 Which representations are functions?

86 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
87 Compared to the graph of \( f(x) = x^2 \), the graph of \( g(x) = (x - 2)^2 + 3 \) is the result of translating \( f(x) \) \( \ldots \)

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

89 Last weekend, Emma sold lemonade at a yard sale. The function \( P(c) = 0.50c - 9.96 \) 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? \( \ldots \)

90 Given the set \( \{ x \mid -2 \leq x \leq 2, \text{where } x \text{ is an integer} \} \), what is the solution of \(-2(x - 5) < 10\)? \( \ldots \)

91 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? \( \ldots \)

92 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? \( \ldots \)

93 Which inequality is represented in the graph below?

94 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 \( \ldots \)

95 When written in factored form, \( 4w^2 - 11w - 3 \) is equivalent to \( \ldots \)

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

\[ \text{Design 1} \quad \text{Design 2} \quad \text{Design 3} \quad \text{Design 4} \]

Design 1: \( a_1 = 1 \)

Design 2: \( a_2 = 2 \)

Design 3: \( a_3 = 4 \)

Design 4: \( a_4 = 7 \)

Recursive formula: \( a_{n+1} = a_n + n \)
97 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

98 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?

99 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:

\[
\frac{4 \text{ quarts}}{1 \text{ gallon}} \cdot \frac{2 \text{ pints}}{1 \text{ quart}} \cdot \frac{2 \text{ cups}}{1 \text{ pint}} \cdot \frac{1 \text{ cup}}{4 \text{ tablespoons}} \cdot \frac{1 \text{ teaspoon}}{3 \text{ tablespoons}}
\]

Which ratio is incorrectly written in Olivia's conversion?

100 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

101 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

102 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?
103 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?

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

105 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

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

107 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?

108 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 $f(x)$?

109 The box plot below summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida.

The third quartile is
110 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*?

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

112 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

113 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?

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

115 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

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

117 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

118 Which interval represents the range of the function \(h(x) = 2x^2 - 2x - 4\)?
119 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

120 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 $f(x)$?

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

122 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?
123 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?

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

125 The expression $16x^2 - 81$ is equivalent to

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

127 What are the zeros of the function
\[ f(x) = x^2 - 13x - 30? \]

128 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?
129 If the quadratic formula is used to find the roots of the equation \( x^2 - 6x - 19 = 0 \), the correct roots are

130 Given the parent function \( f(x) = x^3 \), the function \( g(x) = (x - 1)^3 - 2 \) is the result of a shift of \( f(x) \)

131 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?

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

The domain of this function is

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

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

135 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?

136 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

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

138 Given: \( y + x > 2 \)

\[ y \leq 3x - 2 \]

Which graph shows the solution of the given set of inequalities?

139 If \( f(x) = \frac{\sqrt{2x + 3}}{6x - 5} \), then \( f\left(\frac{1}{2}\right) = \)
140 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?

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

142 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?

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

144 The graph of $f(x)$ is shown below.

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

145 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

146 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?
147 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.

148 A polynomial function is graphed below.

Which function could represent this graph?

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

150 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?

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

152 Which trinomial is equivalent to 
\( 3(x - 2)^2 - 2(x - 1) \)?

153 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.
154 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 | 80 | 82 | 82 |

The population standard deviation of these data is approximately

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

Which function could represent this graph?

156 What is the range of the box plot shown below?

Which function could represent the graph of \( f(x) \)?

157 The zeros of the function \( p(x) = x^2 - 2x - 24 \) are

158 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?

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

Which function could represent the graph of \( f(x) \)?

160 Which equation is equivalent to \( y = x^2 + 24x - 18 \)?
161 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?

162 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.

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

164 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 \( g(x) \)?

165 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

166 Four expressions are shown below.
I. \( 2(x^2 - 2x - 60) \)
II. \( 4(x^2 - x - 30) \)
III. \( 4(x + 6)(x - 5) \)
IV. \( 4x(x - 1) - 120 \)
The expression \( 4x^2 - 4x - 120 \) is equivalent to

167 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

168 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?

169 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?

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

171 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?
172 If the domain of the function $f(x) = 2x^2 - 8$ is \{-2, 3, 5\}, then the range is

173 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?

174 The solution to $-2(1 - 4x) = 3x + 8$ is

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

176 If $C = 2a^2 - 5$ and $D = 3 - a$, then $C - 2D$ equals

177 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?

178 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 $f(0) = 3$

179 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?

180 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?

181 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
182 The quadratic functions \( r(x) \) and \( q(x) \) are given below.

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

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

The function with the \textit{smaller} minimum value is

183 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?

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

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

185 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?

186 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

187 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?
188 Given the following data set:

65, 70, 70, 70, 80, 80, 80, 85, 90, 90, 95, 95, 95, 100

Which representations are correct for this data set?

190 Which graph shows a line where each value of \( y \) is three more than half of \( x \)?

191 The value of \( x \) that satisfies the equation

\[
\frac{4}{3} = \frac{x + 10}{15}
\]

is

192 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?

193 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

194 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 \( P(h) \)?

189 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?
195 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?

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

197 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?

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

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

200 The zeros of the function \(f(x) = x^3 - 9x^2\) are

201 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?

202 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?

203 What is the solution set of the equation \((x - 2)(x - a) = 0\)?

204 Which inequality is represented by the graph below?
205 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?

206 What is the minimum value of the function $y = |x + 3| - 2$?

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

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

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

209 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?

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

211 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

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

213 A laboratory technician used the function $t(m) = 2(3)^{2m+1}$ to model her research. Consider the following expressions:

I. $6(3)^{2m}$  II. $6(6)^{2m}$  III. $6(9)^{m}$

The function $t(m)$ is equivalent to
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?

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>

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

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

Given the function \( f(n) \) defined by the following:

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

Which set could represent the range of the function?

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?
220 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

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

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

What is the graph of \(y = f(x + 1) - 2\)?

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

224 Which polynomial function has zeros at -3, 0, and 4?

225 The shaded boxes in the figures below represent a sequence.

If figure 1 represents the first term and this pattern continues, how many shaded blocks will be in figure 35?

226 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?

227 What is the solution to \(2h + 8 > 3h - 6\)
228 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?

229 The graph of a quadratic function is shown below.

An equation that represents the function could be

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

\[ y = 2x + 8 \]
\[ 3(-2x + y) = 12 \]

231 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?

232 A high school sponsored a badminton tournament. After each round, one-half of the players were eliminated. If there were 64 players at the start of the tournament, which equation models the number of players left after 3 rounds?

233 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?

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

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 $n = 7$?

235 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

236 What are the solutions to the equation
\[ x^2 - 8x = 10? \]
237 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) ) (ºF)</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 \( T(m) \)?

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

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

239 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?

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

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

240 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?

244 The range of the function \( f(x) = x^2 + 2x - 8 \) is all real numbers

246 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 \( g(x) = 3^x \)?

247 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

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

241 The solutions to \( (x + 4)^2 - 2 = 7 \) are
249 A middle school conducted a survey of students to determine if they spent more of their time playing games or watching videos on their tablets. The results are shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Playing Games</th>
<th>Watching Videos</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>138</td>
<td>46</td>
<td>184</td>
</tr>
<tr>
<td>Girls</td>
<td>54</td>
<td>142</td>
<td>196</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>188</td>
<td>380</td>
</tr>
</tbody>
</table>

Of the students who spent more time playing games on their tablets, approximately what percent were boys?

250 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?

251 Which graph represents \( y = \sqrt{x - 2} \)?

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

253 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

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

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

256 What is the solution to the inequality \( 2 + \frac{4}{9} x \geq 4 + x \)?

257 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 \( x \)?

258 The range of the function defined as \( y = 5^x \) is
259 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?

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

Which equation could represent $P(x)$?

261 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?

262 A recursively defined sequence is shown below.

\[
a_1 = 5 \\
\ a_{n+1} = 2a_n - 7
\]

The value of $a_4$ is

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

264 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?

265 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 $t$. 
266 Which expression is equivalent to $16x^2 - 36$?

267 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?

268 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?

269 The zeros of the function $f(x) = 2x^2 - 4x - 6$ are

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

271 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?

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

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

274 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

275 Which value of $x$ makes $\frac{x - 3}{4} + \frac{2}{3} = \frac{17}{12}$ true?

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

277 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 $c(x)$?

278 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?

279 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?
280. 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?

281. Based on the graph below, which expression is a possible factorization of $p(x)$?

282. Which value of $x$ is a solution to the equation $13 - 36x^2 = -12$?

283. If $f(x) = 2(3^x) + 1$, what is the value of $f(2)$?

284. The range of the function $f(x) = |x + 3| - 5$ is

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

286. A population of paramecia, $P$, can be modeled using the exponential function $P(t) = 3(2)^t$, where $t$ is the number of days since the population was first observed. Which domain is most appropriate to use to determine the population over the course of the first two weeks?

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

288. An equation is given below.

$$4(x - 7) = 0.3(x + 2) + 2.11$$

The solution to the equation is
289. What are the solutions to the equation \(3x^2 + 10x = 8\)?

290. 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 \(x\), \(g(x) \neq h(x)\).

291. Given the following expressions:

I. \(\frac{5}{8} + \frac{3}{5}\)  
II. \(\frac{1}{2} + \sqrt{2}\)  
III. \(\sqrt{5} \cdot \sqrt{5}\)  
IV. \(3 \cdot \sqrt{49}\)

Which expression(s) result in an irrational number?

292. The functions \(f(x) = x^2 - 6x + 9\) and \(g(x) = f(x) + k\) are graphed below.

Which value of \(k\) would result in the graph of \(g(x)\)?

293. 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?
Algebra I Regents Bimodal Worksheets
Answer Section

1  ANS: exponential growth function

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

2  ANS: 
y = 14.1x + 5.8

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

3  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

4  ANS: 
the addition property of equality

   PTS:  2       REF: 061909ai       TOP: Identifying Properties

5  ANS: 
inches per minute

   PTS:  2       REF: 011924ai       TOP: Conversions       KEY: dimensional analysis

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

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

7  ANS: 
\[f(t) = (9.05 \times 10^6)(1 + 0.031)^7\]

   PTS:  2       REF: 081507ai       TOP: Modeling Exponential Functions

8  ANS: 
linear

   PTS:  2       REF: 011805ai       TOP: Families of Functions
9 ANS:
hours worked per week

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

10 ANS:
I and III
II is linear.

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

11 ANS:
\[ 6x^3 + 4x^2 - 34 \\
2 \left( 3x^3 + 2x^2 - 17 \right) \]

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

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

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

13 ANS:
\[ 4.50 + 0.79r \leq 16.00; 14 \text{ rides} \]

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

14 ANS:
every day
\[ 1000(0.5)^2 = 1000(0.5^2) = 1000(0.25) \]

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

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

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

16 ANS:

PTS: 2 REF: 081506ai TOP: Graphing Systems of Linear Inequalities
KEY: bimodalgraph | graph
17 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

18 ANS: 
\[
a_2 = n(a_{2-1}) = 2 \cdot 1 = 2, 
\]
\[
a_3 = n(a_{3-1}) = 3 \cdot 2 = 6, 
\]
\[
a_4 = n(a_{4-1}) = 4 \cdot 6 = 24, 
\]
\[
a_5 = n(a_{5-1}) = 5 \cdot 24 = 120
\]
PTs: 2 REF: 061824ai TOP: Sequences KEY: recursive

19 ANS: 
\[
0 \leq t \leq 2
\]
PTs: 2 REF: 081918ai TOP: Relating Graphs to Events

20 ANS: 
whole numbers
PTs: 2 REF: 011506ai TOP: Domain and Range

21 ANS: 
\[
12 \\
0.8(10^2) - 0.8(5^2) = \frac{80 - 20}{5} = 12
\]
PTs: 2 REF: 011521ai TOP: Rate of Change

22 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

23 ANS: 
an integer \geq 0
PTs: 2 REF: 061821ai TOP: Domain and Range
24 ANS: 
\[ a_n = 2.5(a_{n-1}) \]

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

25 ANS: 
\[ \{0,1,2,3,\ldots\} \]
There are no negative or fractional cars.

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

26 ANS: 
\[ \{x | x \geq -4\} \]

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

27 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

28 ANS: 
\[ f(t) = 25t + 1 \]

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

29 ANS: 
\[ \frac{5280 \text{ ft}}{1 \text{ mi}} \]

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

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

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

31 ANS: 
I, only

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

32 ANS: 
\[ [2, \infty) \]

PTS: 2 REF: 061816ai TOP: Domain and Range KEY: real domain, quadratic
33 ANS: 
\((3x + 2)(x - 4)\)

PTS: 2  REF: 011906ai  TOP: Factoring Polynomials
KEY: quadratic

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

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

35 ANS: 
\(j^2 + 2j = 783\)

PTS: 2  REF: 081409ai  TOP: Modeling Quadratics

36 ANS: 
\(-4x^2 - 6\)

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

37 ANS: 
I and IV

PTS: 2  REF: 061916ai  TOP: Regression  KEY: exponential

38 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

39 ANS: 
4

\[ 16^{-2t} = n^{4t} \]
\[ (16^3)' = (n^4)' \]
\[ ((4^3)^3)' = ((n^2)^3)' \]

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

40 ANS: 
1.60x + 1.75y ≤ 10

PTS: 2  REF: 061806ai  TOP: Modeling Linear Inequalities
41 ANS:
6
$116(30) + 439L \leq 6500$
$439L \leq 3020$
$L \leq 6.879$

PTS: 2 
REF: 011904ai 
TOP: Modeling Linear Inequalities

42 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

43 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

44 ANS:
8

\[
\begin{array}{|c|c|c|c|}
\hline
x & A = 5000(x - 1) + 10000 & B = 500(2)^{x-1} \\
\hline
6 & 35,000 & 16,000 \\
7 & 40,000 & 32,000 \\
8 & 45,000 & 64,000 \\
9 & 50,000 & 128,000 \\
\hline
\end{array}
\]

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

45 ANS:
65

\[
a + p = 165 \quad 1.75(165 - p) + 2.5p = 337.5
\]

\[
1.75a + 2.5p = 337.5 \quad 288.75 - 1.75p + 2.5p = 337.5
\]

\[
0.75p = 48.75
\]

\[
p = 65
\]

PTS: 2 
REF: 061506ai 
TOP: Modeling Linear Systems
46 ANS: 
I and III, only

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

47 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

48 ANS:  
exponential

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

49 ANS: 
$D + Q = 30$

$.10D + .25Q = 4.80$

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

50 ANS:  
$43$
$f(1) = 3; f(2) = -5; f(3) = 11; f(4) = -21; f(5) = 43$

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

51 ANS:  
$38.2$

$\frac{26}{42 + 26} = 0.382$

PTS: 2       REF: 061912ai       TOP: Frequency Tables

KEY: two-way

52 ANS:  
II, only

$y = (x - 3)(x + 2)(x - 1)$

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

53 ANS:  
$-5$ and $5$

PTS: 2       REF: 081403ai       TOP: Solving Quadratics

KEY: taking square roots
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:
\[ \frac{5 \pm \sqrt{41}}{2} \]
\[ \frac{5 \pm \sqrt{(-5)^2 - 4(1)(-4)}}{2(1)} = \frac{5 \pm \sqrt{41}}{2} \]

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

56 ANS:
\[ (x - 7)^2 \]

PTS: 2 REF: 061810ai TOP: Factoring Polynomials
KEY: quadratic

57 ANS:
I, II, and III

PTS: 2 REF: 061823ai TOP: Transforming Formulas

58 ANS:
\[ 8 \]
\[ L + S = 20 \]
\[ 27.98L + 10.98(20 - L) = 355.60 \]
\[ 27.98L + 10.98S = 355.60 \]
\[ 27.98L + 219.60 - 10.98L = 355.60 \]
\[ 17L = 136 \]
\[ L = 8 \]

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

59 ANS:
II and III

PTS: 2 REF: 061522ai TOP: Sequences KEY: recursive

60 ANS:
\[ 24 \]
\[ \frac{56}{56 + 74 + 103} \approx 0.24 \]

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

\[ -3 \pm \sqrt{7} \]

PTS: 2 \hspace{1em} REF: 081523ai \hspace{1em} TOP: Solving Quadratics

KEY: taking square roots

62 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 \hspace{1em} REF: 061518ai \hspace{1em} TOP: Solving Quadratics

KEY: completing the square

63 ANS:

\[
I = \sqrt{\frac{P}{R}}
\]

\[
P = I^2 R
\]

\[
I^2 = \frac{P}{R}
\]

\[
I = \sqrt{\frac{P}{R}}
\]

PTS: 2 \hspace{1em} REF: 011920ai \hspace{1em} TOP: Transforming Formulas

64 ANS:

\[3000(1 + 0.02)^{16}\]

PTS: 2 \hspace{1em} REF: 011504ai \hspace{1em} TOP: Modeling Exponential Functions
65 ANS:
(0.38, -2.85) and (2.62, 3.85)

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

66 ANS:

PTS: 2  REF: 081516ai  TOP: Graphing Piecewise-Defined Functions
KEY: bimodalgraph

67 ANS:
7

\[ 5r = a_2 \quad a_2 r = 245 \quad 5r = \frac{245}{r} \]

\[ a_2 = \frac{245}{r} \quad 5r^2 = 245 \]

\[ r^2 = 49 \]

\[ r = \pm 7 \]

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

\[ t = \sqrt{\frac{2d}{a}} \]
\[ d = \frac{1}{2} at^2 \]
\[ 2d = at^2 \]
\[ \frac{2d}{a} = t^2 \]
\[ \sqrt{\frac{2d}{a}} = t \]

PTS: 2  REF: 061519ai  TOP: Transforming Formulas

ANS:

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

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

ANS:

\[ (2x + 5)(2x - 5) \]

PTS: 2  REF: 081807ai  TOP: Factoring the Difference of Perfect Squares  KEY: quadratic

ANS:

\[ -1 \text{ and } 2 \]
\[ 3x^2 - 3x - 6 = 0 \]
\[ 3(x^2 - x - 2) = 0 \]
\[ 3(x - 2)(x + 1) = 0 \]
\[ x = 2, -1 \]

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

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
73  ANS:  
 0.4

\[
\frac{3}{5} \left( x + \frac{4}{3} \right) = 1.04
\]

\[
3 \left( x + \frac{4}{3} \right) = 5.2
\]

\[
x + 4 = 5.2
\]

\[
x = 1.2
\]

\[
x = 0.4
\]

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

74  ANS:  

\[
3.50H + 2.50P = 43
\]

\[
H + P = 14
\]

PTS: 2  REF: 011803ai  TOP: Modeling Linear Systems

75  ANS:  

\[f(1) = 10\]

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

PTS: 2  REF: 081514ai  TOP: Sequences  KEY: recursive

76  ANS:  

\[-2 \pm 2\sqrt{5}\]

\[x^2 + 4x = 16\]

\[x^2 + 4x + 4 = 16 + 4\]

\[(x + 2)^2 = 20\]

\[x + 2 = \pm\sqrt{4 \cdot 5}\]

\[= -2 \pm 2\sqrt{5}\]

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

77  ANS:  

\[p < 4\]

\[4p + 2 < 2p + 10\]

\[2p < 8\]

\[p < 4\]

PTS: 2  REF: 061801ai  TOP: Solving Linear Inequalities
78 ANS:

\[ 3x - 1 = \pm 5 \]

PTS: 2  REF: 061521ai  TOP: Solving Quadratics
KEY: taking square roots

79 ANS:

\[ A \text{ and } C, \text{ only} \]

PTS: 2  REF: 011909ai  TOP: Zeros of Polynomials

80 ANS:

\[ m + f = 3.95 \]

\[ f + 0.005 = m \]

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

81 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

82 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

83 ANS:

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

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

84 ANS:

\[ y \text{ is the total cost, } x \text{ is the number of months of service, } $40 \text{ is the installation fee, and } $90 \text{ is the service charge per month.} \]

PTS: 2  REF: 081402ai  TOP: Modeling Linear Functions
85 ANS:
II and IV

PTS: 2 REF: 081511ai TOP: Defining Functions
KEY: mixed

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

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

87 ANS:
2 units right and 3 units up

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

88 ANS:
{0, 1, 16, 81}

PTS: 2 REF: 081806ai TOP: Domain and Range
KEY: limited domain

89 ANS:
\[ P(c) = .75c - 9.96 \]
\[ P(c) = (.50 + .25)c - 9.96 = .75c - 9.96 \]

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

90 ANS:
\[ 1, 2 \]
\[-2(x - 5) < 10 \]
\[ x - 5 > -5 \]
\[ x > 0 \]

PTS: 2 REF: 011817ai TOP: Interpreting Solutions

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

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

92 ANS:
\[ 3.00a + 1.50s \]

PTS: 2 REF: 081503ai TOP: Modeling Expressions

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

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

94 ANS:
1.7%

PTS: 2 REF: 061517ai TOP: Modeling Exponential Functions
95 ANS: 
(4w + 1)(w - 3)

PTS: 2 REF: 061917ai TOP: Factoring Polynomials

KEY: quadratic

96 ANS:

\begin{align*}
a_1 &= 3 \\
a_n &= a_{n-1} + 2
\end{align*}

PTS: 2 REF: 011818ai TOP: Sequences KEY: recursive

97 ANS:

\[ F(x) = 2^x + 1 \]

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

98 ANS:
Pelican Beach

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

99 ANS:

\[ \frac{1}{4} \text{ cup} \]
\[ 4 \text{ tablespoons} \]

PTS: 2 REF: 081812ai TOP: Conversions KEY: dimensional analysis

100 ANS:

\begin{align*}
A(w) &= w^2 + 7w \\
w(w + 7) &= w^2 + 7w
\end{align*}

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

101 ANS:

\begin{align*}
5 \\
f(0 + 1) &= -2f(0) + 3 = -2(2) + 3 = -1 \\
f(1 + 1) &= -2f(1) + 3 = -2(-1) + 3 = 5
\end{align*}

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

102 ANS:

5000, the amount of money in the account initially

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

103 ANS:

\[ \frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04. \]

PTS: 2 REF: 081414ai TOP: Rate of Change
104 ANS:
\[ 5x^2 - 12x - 2 \]
\[ 2(x^2 - 1) + 3(x - 4) = 2x^2 - 2 + 3x - 12 = 5x^2 - 12x - 2 \]
PTS: 2  REF: 081903ai  TOP: Operations with Polynomials
KEY: addition

105 ANS:
II and IV
PTS: 2  REF: 011908ai  TOP: Identifying Properties

106 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

107 ANS:
\[ 0.25 \]
\[ \frac{60 - 45}{60} = \frac{15}{60} = \frac{1}{4} \]
PTS: 2  REF: 081814ai  TOP: Frequency Tables
KEY: two-way

108 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

109 ANS:
90
PTS: 2  REF: 061805ai  TOP: Box Plots  KEY: interpret

110 ANS:
5.4
\[ \frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4 \]
PTS: 2  REF: 061511ai  TOP: Rate of Change

111 ANS:
1.49
\[ \frac{91 \text{ cm}}{\text{day}} \times \frac{1 \text{ day}}{24 \text{ hrs}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \approx \frac{1.49 \text{ in}}{\text{hr}} \]
PTS: 2  REF: 061924ai  TOP: Conversions  KEY: dimensional analysis
112 ANS: 
$$6x^2 - 28x + 30$$

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

113 ANS: 
$$a_n = 4n + 8$$

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

114 ANS: 
$$f(x) = (x - 5)(x + 6)$$

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

115 ANS: 
$$r = \sqrt{\frac{V}{\pi h}}$$

PTS: 2 REF: 011516ai TOP: Transforming Formulas

116 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

117 ANS: 
7 units below the vertex of $$f(x)$$

$$-5 - 2 = -7$$

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

118 ANS: 
$$[-4.5, \infty)$$

$$x = \frac{-(-2)}{2(2)} = \frac{1}{2} \cdot h\left(\frac{1}{2}\right) = -\frac{9}{2}$$

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

119 ANS: 
$$h(x), f(x), g(x)$$

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 $$g(x) = \frac{3 - 0}{3 - 0} = \frac{3}{3} = 1$$.

PTS: 2 REF: spr1301ai TOP: Comparing Functions
120 ANS:
\[6 \quad x^2 - 12x + 7 \quad x^2 - 12x + 36 - 29 \quad (x - 6)^2 - 29\]
PTS: 2 REF: 081520ai TOP: Vertex Form of a Quadratic

121 ANS:
\[23x + 250\]
PTS: 2 REF: 081901ai TOP: Modeling Expressions

122 ANS:
\[0.75(7) + 1.25b \leq 22\]
PTS: 2 REF: 081505ai TOP: Modeling Linear Inequalities

123 ANS:
\[f(x), \quad q(x), \quad \text{and} \quad p(x)\]
\[f(4) = q(4) = p(4) = 3\]
PTS: 2 REF: 011921ai TOP: Comparing Functions

124 ANS:
\[8.25 \quad \frac{7}{3} \left( x + \frac{9}{28} \right) = 20 \quad \frac{7}{3} x + \frac{3}{4} = \frac{80}{4} \quad \frac{7}{3} x = \frac{77}{4} \quad x = \frac{33}{4} = 8.25\]
PTS: 2 REF: 061405ai TOP: Solving Linear Equations
KEY: fractional expressions

125 ANS:
\[(4x - 9)(4x + 9)\]
PTS: 2 REF: 081908ai TOP: Factoring the Difference of Perfect Squares
KEY: quadratic

126 ANS:
\[-7 \quad f(-3) = -12 + 5 = -7\]
PTS: 2 REF: 061902ai TOP: Functional Notation
127 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

128 ANS: 
Anne

PTS: 2 REF: 061905ai TOP: Modeling Expressions

129 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

130 ANS: 
1 unit right and 2 units down

PTS: 2 REF: 011910ai TOP: Graphing Polynomial Functions

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

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

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

PTS: 2 REF: 011917ai TOP: Domain and Range
KEY: graph

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

PTS: 2 REF: 081408ai TOP: Graphing Linear Functions
134 ANS:
\[ a_2 = 3 + 2(6)^2 = 75 \]

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

135 ANS:
I. only

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

136 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

137 ANS:
\( (m-16)(m+4) \)

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

138 ANS:

\[ \sqrt{\frac{2}{1} + 3} - \frac{5}{6} = 2 - 2 = -1 \]

PTS: 2  REF: 061404ai  TOP: Graphing Systems of Linear Inequalities  KEY: bimodalgraph | graph

139 ANS:

\[ \sqrt{\frac{2}{1} + 3} - \frac{5}{6} = \frac{4}{-2} - \frac{2}{-2} = -1 \]

PTS: 2  REF: 081512ai  TOP: Functional Notation
140 ANS: exponential growth function

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

141 ANS: −0.93

PTS: 2 REF: 061411ai TOP: Correlation Coefficient

142 ANS: 2%

PTS: 2 REF: 061923ai TOP: Modeling Exponential Functions

143 ANS: 153

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

PTS: 2 REF: 061802ai TOP: Functional Notation

144 ANS: 6

PTS: 2 REF: 081805ai TOP: Functional Notation

145 ANS: shifted 3 units to the right

PTS: 2 REF: 061904ai TOP: Graphing Polynomial Functions

146 ANS: 

\[ f(x) = (x - 1)(x^2 - 4) \]

\[ = (x - 1)(x - 2)(x + 2) \]

PTS: 2 REF: 061908ai TOP: Graphing Polynomial Functions

147 ANS: 

KEY: bimodalgraph

up

PTS: 2 REF: 081410ai TOP: Families of Functions

148 ANS: 

\[ f(x) = (x - 1)(x^2 - 4) \]

\[ = (x - 1)(x - 2)(x + 2) \]

PTS: 2 REF: 061908ai TOP: Graphing Polynomial Functions
\[ g(-3) = -2(-3)^2 + 3(-3) = -18 - 9 = -27 \]

**ANS:**
-27

**PTS:** 2  
**REF:** 011902ai  
**TOP:** Functional Notation

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

**PTS:** 2  
**REF:** 061819ai  
**TOP:** Modeling Expressions

**ANS:**
\((x^2 - 6)(x^2 - 6)\)

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

**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

**ANS:**
III, only

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

**ANS:**
3.5

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

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

**PTS:** 2  
**REF:** 061818ai  
**TOP:** Graphing Polynomial Functions

**ANS:**
7
\[8 - 1 = 7\]

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

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

**PTS:** 2  
**REF:** 061804ai  
**TOP:** Zeros of Polynomials
158 ANS: 

![Graph](image)

PTS: 2  REF: 061507ai  TOP: Graphing Step Functions

KEY: bimodalgraph

159 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

160 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

161 ANS:

\[ c = 60 + 0.05d \]

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

162 ANS:

I and IV

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

163 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

164 ANS:

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

PTS: 2  REF: 011819ai  TOP: Graphing Polynomial Functions
165 ANS:
\((x^2 - 3y)(x^2 + 3y)\)

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

166 ANS:
I, II, and IV

PTS: 2 REF: 081509ai TOP: Factoring Polynomials KEY: quadratic

167 ANS:
positive rational numbers

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

168 ANS:
\(42 < x \leq 57\)

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

169 ANS:
\(a_n = 8n - 14\)

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

170 ANS:
\((p^2 + 9)(p + 3)(p - 3)\)

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

171 ANS:
addition property of equality

PTS: 2 REF: 061401ai TOP: Identifying Properties

172 ANS:
\(\{0, 10, 42\}\)
\(f(-2) = 0, f(3) = 10, f(5) = 42\)

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

173 ANS:
2589
\(25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60\)

PTS: 2 REF: 011508ai TOP: Functional Notation
174 ANS:
\[2\]
\[-2 + 8x = 3x + 8\]
\[5x = 10\]
\[x = 2\]

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

175 ANS:
\[-27 + 15(n - 1)\]

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

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

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

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

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

178 ANS:
I and III

PTS: 2  REF: 061421ai  TOP: Sequences  KEY: recursive

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

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

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

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

181 ANS:
\[2\]
\[-4.9(0)^2 + 50(0) + 2\]

PTS: 2  REF: 011811ai  TOP: Graphing Quadratic Functions
KEY: context
ANS: $r(x)$, and the value is $-16$

The minimum of $r(x)$ is $-16$. The minimum of $q(x)$ is $-9 \left( x = \frac{-2}{2(1)} = -1; \; q(-1) = -9 \right)$.

PTS: 2  REF: 081917ai  TOP: Comparing Functions

ANS: 5

$h(t) = 0$

$-16t^2 + 64t + 80 = 0$

$t^2 - 4t - 5 = 0$

$(t - 5)(t + 1) = 0$

$t = 5, -1$

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

KEY: context

ANS: $A$

PTS: 2  REF: 061420ai  TOP: Functional Notation

ANS: $750 < p < 1500$

$\frac{750 + 2.25p}{p} > 2.75 \quad \frac{750 + 2.25p}{p} < 3.25$

$750 + 2.25p > 2.75p \quad 750 + 2.25p < 3.25p$

$750 > .50p \quad 750 < p$

$1500 > p$

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

ANS: the amount spent to manufacture each radio

PTS: 2  REF: 061407ai  TOP: Modeling Linear Functions

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

ANS: I, II, and III

PTS: 2  REF: 012022ai  TOP: Dot Plots
189 ANS:
\[1.25r + 2g \leq 50\]
\[r \geq 10\]
\[g \geq 12\]

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

190 ANS:
\[
\begin{align*}
\text{Graph of a linear function.}
\end{align*}
\]

PTS: 2 REF: 081413ai TOP: Graphing Linear Functions
KEY: bimodalgraph

191 ANS:
\[10\]
\[ \frac{4}{3} = \frac{x + 10}{15} \]
\[3x + 30 = 60\]
\[x = 10\]

PTS: 2 REF: 081904ai TOP: Solving Linear Equations
KEY: fractional expressions

192 ANS:
distributive property of multiplication over subtraction

PTS: 2 REF: 011801ai TOP: Identifying Properties

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

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

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

PTS: 2 REF: 061707ai TOP: Families of Functions
Algebra I Regents Bimodal Worksheets
Answer Section

195 ANS: I, only

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

196 ANS: \( f(x) = -4x - 2 \)

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

197 ANS: 5b

PTS: 2 REF: 081712ai TOP: Modeling Expressions

198 ANS:
\[
\begin{align*}
\frac{1}{2} x + 3 &= |x| - \frac{1}{2} x - 3 = x \\
\frac{1}{2} x + 3 &= x \quad \Rightarrow \quad -x - 6 = 2x \\
x + 6 &= 2x \quad \Rightarrow \quad -6 = 3x \\
6 &= x
\end{align*}
\]

PTS: 2 REF: 011617ai TOP: Other Systems

199 ANS: \((7x - 6)(7x + 6)\)

PTS: 2 REF: 081703ai TOP: Factoring the Difference of Perfect Squares KEY: quadratic

200 ANS: 0 and 9

\[
f(x) = x^3 - 9x^2 = x^2(x - 9) = 0
\]

\[
x = 0, 9
\]

PTS: 2 REF: 012009ai TOP: Zeros of Polynomials

201 ANS: \(x^2 - 8(x - 1) = 17\)

PTS: 2 REF: 081723ai TOP: Modeling Quadratics

202 ANS: \(2lw\)

PTS: 2 REF: 061702ai TOP: Dependent and Independent Variables
203 ANS: 2 and $a$

PTS: 2  
KEY: factoring

REF: 011702ai  TOP: Solving Quadratics

204 ANS: $y \geq 2x - 3$

PTS: 2  
REF: 011605ai  TOP: Graphing Linear Inequalities

205 ANS: $2x + 3.50 = 14.50$

PTS: 2  
REF: 081614ai  TOP: Modeling Linear Equations

206 ANS: $-2$

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

207 ANS: $16$

$a_n = 3n + 1$

$a_5 = 3(5) + 1 = 16$

PTS: 2  
REF: 061613ai  TOP: Sequences  KEY: explicit

208 ANS: $3$

$m = \frac{3 - (-7)}{2 - 4} = -5  
3 = (-5)(2) + b  
y = -5x + 13$ represents the line passing through the points $(2, 3)$ and $(4, -7)$. The fourth equation may be rewritten as $y = 5x - 13$, so is a different line.

PTS: 2  
KEY: other forms

REF: 081720ai  TOP: Writing Linear Equations

209 ANS: $A = 1000(1 + 0.013)^2$

PTS: 2  
REF: 011712ai  TOP: Modeling Exponential Functions

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

$3(x^2 + 4x + 4) - 12 + 11$

$3(x + 2)^2 - 1$

PTS: 2  
REF: 081621ai  TOP: Vertex Form of a Quadratic

211 ANS: positive integers

PTS: 2  
REF: 011615ai  TOP: Domain and Range
212 ANS:
\[ \begin{align*}
x & \geq 11 \\
3x + 2 & \leq 5x - 20 \\
22 & \leq 2x \\
11 & \leq x
\end{align*} \]

PTS: 2 REF: 061609ai TOP: Solving Linear Inequalities

213 ANS:
I and III
\[ t(m) = 2(3)^{2m+1} = 2(3)^{2m}(3)^1 = 6(3)^{2m} = 6(3^2)^m = 6(9)^m \]

PTS: 2 REF: 012019ai TOP: Modeling Exponential Functions

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

PTS: 2 REF: 011705ai TOP: Frequency Tables

KEY: two-way

215 ANS:
\[ f(x) = 3^x \]

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

216 ANS:
\[ -18.825 \]
\[ 6 \left( \frac{5}{6} \left( \frac{3}{8} - x \right) \right) = 16 \]
\[ 8 \left( \frac{5}{8} \left( \frac{3}{8} - x \right) \right) = 96 \]
\[ 15 - 40x = 768 \]
\[ -40x = 753 \]
\[ x = -18.825 \]

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

KEY: fractional expressions

217 ANS:
\[ \frac{P_1V_1}{V_2} \]

PTS: 2 REF: 011704ai TOP: Transforming Formulas
218 ANS: 
{2, −8, 42, −208,...} 
\(f(1) = 2; \ f(2) = −5(2) + 2 = −8; \ f(3) = −5(−8) + 2 = 42; \ f(4) = −5(42) + 2 = −208\)

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

219 ANS:  
2% growth

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

220 ANS:  
(6.0, 5.4)

\[m = \frac{5 - 4.6}{4 - 2} = \frac{4}{2} = 0.2 \quad 4(0.2x + 4.2) + 2x = 33.6 \quad y = 0.2(6) + 4.2 = 5.4\]

\[5 = 2(4) + b \quad 0.8x + 16.8 + 2x = 33.6\]

\[4.2 = b \quad 2.8x = 16.8\]

\[y = 0.2(x + 4.2) \quad x = 6\]

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

221 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

222 ANS:  

PTS: 2  REF: 011620ai  TOP: Transformations with Functions  KEY: bimodalgraph
223 ANS:
\[ f(1) = 3, \quad f(n + 1) = 2f(n) + 1 \]

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

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

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

225 ANS:
\[ a_n = 4n + 8 \]
\[ a_{35} = 4(35) + 8 = 148 \]

PTS: 2  REF: 012008ai  TOP: Sequences  KEY: explicit

226 ANS:
distributive property of multiplication over subtraction

PTS: 2  REF: 081701ai  TOP: Identifying Properties

227 ANS:
\[ h < 14 \]
\[ 2h + 8 > 3h - 6 \]
\[ 14 > h \]
\[ h < 14 \]

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

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

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

229 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
230 ANS:  
no solution  
\[3(-2x + 2x + 8) = 12\]  
\[24 \neq 12\]  

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

231 ANS:  
Lynn, only  
\[f(3) = -2(3)^2 + 32 = -18 + 32 = 14\]  

PTS: 2  REF: 061705ai  TOP: Functional Notation

232 ANS:  
\[y = 64(1 - .5)^3\]  

PTS: 2  REF: 012002ai  TOP: Modeling Exponential Functions  
KEY: AI

233 ANS:  
\[a_1 = 49; \ a_n = a_{n-1} + 21\]  

PTS: 2  REF: 011708ai  TOP: Sequences  
KEY: recursive

234 ANS:  
28  
1, 3, 6, 10, 15, 21, 28, ...

PTS: 2  REF: 081715ai  TOP: Sequences  
KEY: recursive

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

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

236 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

237 ANS:  
\[150(0.85)^m\]  

PTS: 2  REF: 081617ai  TOP: Modeling Exponential Functions
238 ANS:
−1 and 6
\[ f(x) = x^2 - 5x - 6 = (x + 1)(x - 6) = 0 \]
\[ x = -1, 6 \]

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

239 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

240 ANS:
17.06
\[ 119.67(0.61)^5 - 119.67(0.61)^3 \approx 17.06 \]

PTS: 2 
REF: 011603ai 
TOP: Evaluating Functions

241 ANS:
−1 and −7
\[ (x + 4)^2 = 9 \]
\[ x + 4 = \pm 3 \]
\[ x = -1, -7 \]

PTS: 2 
REF: 012015ai 
TOP: Solving Quadratics

242 ANS:
2 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

243 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: taking square roots

KEY: multiplication
244 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

245 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
KEY: subtraction

246 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

247 ANS:
nonnegative rational numbers

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

248 ANS:
9

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

249 ANS:
\[ \frac{138}{192} \approx 72\% \]

PTS: 2  REF: 012010ai  TOP: Frequency Tables
KEY: two-way
250 ANS:
\[ m + g \leq 40 \]
\[ 12m + 14g \geq 250 \]

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

251 ANS:
\[ \text{Graph of inequalities} \]

PTS: 2 REF: 061703ai TOP: Graphing Root Functions
KEY: bimodalgraph

252 ANS:
{0, 1, 4}

PTS: 2 REF: 081710ai TOP: Domain and Range
KEY: limited domain

253 ANS:
\[ \frac{l}{P_t} \]

PTS: 2 REF: 011606ai TOP: Transforming Formulas

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

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

255 ANS:
0.2083 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
256 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

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

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

258 ANS:
\[ y > 0 \]

PTS: 2  REF: 011619ai  TOP: Domain and Range

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

PTS: 2  REF: 061615ai  TOP: Frequency Tables

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

PTS: 2  REF: 081707ai  TOP: Graphing Polynomial Functions

261 ANS:
It decreases 22% per year.

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

262 ANS:
\[ a_2 = 2(5) - 7 = 3 \quad a_3 = 2(3) - 7 = -1 \quad a_4 = 2(-1) - 7 = -9 \]

PTS: 2  REF: 012023ai  TOP: Sequences  KEY: recursive

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

PTS: 2  REF: 081714ai  TOP: Families of Functions
264 ANS: linear
PTS: 2 REF: 081717ai TOP: Families of Functions

265 ANS: I, II, and III
PTS: 2 REF: 081709ai TOP: Modeling Linear Functions

266 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

267 ANS: whole numbers greater than or equal to one
PTS: 2 REF: 081620ai TOP: Domain and Range

268 ANS: 
$$a + c = 150$$
$$10.25a + 7.75c = 1470$$

PTS: 2 REF: 061605ai TOP: Modeling Linear Systems

269 ANS: 
$$3 \text{ and } -1$$
$$2x^2 - 4x - 6 = 0$$
$$2(x^2 - 2x - 3) = 0$$
$$2(x - 3)(x + 1) = 0$$
$$x = 3, -1$$

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

270 ANS: 
$$2$$
$$|x + 2| = 3x - 2$$
$$x + 2 = 3x - 2$$
$$4 = 2x$$
$$x = 2$$

PTS: 2 REF: 081702ai TOP: Other Systems
271 ANS: 
20° Celsius 
\[ C(68) = \frac{5}{9}(68 - 32) = 20 \]

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

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

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

273 ANS: 
2

PTS: 2 REF: 011601ai TOP: Vertex Form of a Quadratic

274 ANS: 
speed of the car

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

275 ANS: 
6 
\[ \frac{x - 3}{4} + \frac{8}{12} = \frac{17}{12} \]
\[ \frac{x - 3}{4} = \frac{9}{12} \]
\[ \frac{x - 3}{4} = \frac{3}{4} \]
\[ x - 3 = 3 \]
\[ x = 6 \]

PTS: 2 REF: 012005ai TOP: Solving Linear Equations KEY: fractional expressions

276 ANS: 
\[ 4(3x + 5)(3x - 5) \]
\[ 36x^2 - 100 = 4(9x^2 - 25) = 4(3x + 5)(3x - 5) \]

PTS: 2 REF: 081608ai TOP: Factoring the Difference of Perfect Squares KEY: quadratic

277 ANS: 
whole numbers

PTS: 2 REF: 011719ai TOP: Domain and Range
278 ANS: quadratic

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

279 ANS: $280 - 30(w - 1)$

PTS: 2 REF: 011718ai TOP: Modeling Expressions

280 ANS: $f(x)$

PTS: 2 REF: 061606ai TOP: Families of Functions

281 ANS: $(x + 3)(x - 2)(x - 4)$

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

282 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

283 ANS: 19

$f(2) = 2(3^2) + 1 = 19$

PTS: 2 REF: 012001ai TOP: Functional Notation

284 ANS: $[-5, \infty)$

PTS: 2 REF: 012018ai TOP: Domain and Range
KEY: real domain, absolute value

285 ANS: 27

$f(8) = \frac{1}{2} (8)^2 - \left\{ \frac{1}{4} (8) + 3 \right\} = 32 - 5 = 27$

PTS: 2 REF: 081704ai TOP: Functional Notation
286 ANS:
0 ≤ t ≤ 14

PTS: 2  REF: 012021ai  TOP: Domain and Range

287 ANS:

\[ j(x) = (x - 6)^2 - 29, \quad (6, -29) \]

\[ j(x) = x^2 - 12x + 36 + 7 - 36 \]

\[ = (x - 6)^2 - 29 \]

PTS: 2  REF: 061616ai  TOP: Vertex Form of a Quadratic

288 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

289 ANS:

\[ \frac{2}{3} \text{ and } -4 \]

\[ 3x^2 + 10x - 8 = 0 \]

\[ (3x - 2)(x + 4) = 0 \]

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

PTS: 2  REF: 081619ai  TOP: Solving Quadratics

KEY: factoring

290 ANS:

I and III, only

PTS: 2  REF: 081718ai  TOP: Comparing Functions
291 ANS:
II, only
I. \(-\frac{5}{8} + \frac{3}{5}\) \(-\frac{1}{40}\); III. \((\sqrt{5}) \cdot (\sqrt{5}) = \frac{5}{1}\); IV. \(3 \cdot (\sqrt{49}) = \frac{21}{1}\)

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

292 ANS:
-2

PTS: 2  REF: 012007ai  TOP: Graphing Polynomial Functions

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

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