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1. What is the value of \( \frac{4(-6) + 18}{4!} \)?
   1. \( \frac{1}{4} \)
   2. \( -\frac{1}{4} \)
   3. 12
   4. -12

2. The value of the expression \( 6! + \frac{5!(3!)}{4!} - 10 \) is
   1. 50
   2. 102
   3. 740
   4. 750

3. What is the value of the expression \( |−5x + 12| \) when \( x = 5 \)?
   1. -37
   2. -13
   3. 13
   4. 37

4. The value of the expression \( -|a - b| \) when \( a = 7 \) and \( b = -3 \) is
   1. -10
   2. 10
   3. -4
   4. 4

5. If \( x = -3 \), what is the value of \( |x - 4| - x^2 \)?
   1. -8
   2. -2
   3. 7
   4. 16

6. What is the value of the expression \( -3x^2 y + 4x \) when \( x = -4 \) and \( y = 2 \)?
   1. -112
   2. -80
   3. 80
   4. 272

7. What is the value of the expression \( (a^3 + b^0)^2 \) when \( a = -2 \) and \( b = 4 \)?
   1. 64
   2. 49
   3. -49
   4. -64

8. Which property is illustrated by the equation \( ax + ay = a(x + y) \)?
   1. associative
   2. commutative
   3. distributive
   4. identity

9. The statement \( 2 + 0 = 2 \) is an example of the use of which property of real numbers?
   1. associative
   2. additive identity
   3. additive inverse
   4. distributive

10. The equation \( 3(4x) = (4x)3 \) illustrates which property?
    1. commutative
    2. associative
    3. distributive
    4. multiplicative inverse
11 A method for solving $5(x - 2) - 2(x - 5) = 9$ is shown below. Identify the property used to obtain each of the two indicated steps.

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<td>$5x - 10 - 2x + 10 + 9$</td>
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<td>(2)</td>
<td>$3x + 9$</td>
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<td>$x + 3$</td>
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**A.N.1: PROPERTIES OF REALS**

12 What is the additive inverse of the expression $a - b$?
1. $a + b$
2. $a - b$
3. $-a + b$
4. $-a - b$

13 Which statement illustrates the additive identity property?
1. $6 + 0 = 6$
2. $-6 + 6 = 0$
3. $4(6 + 3) = 4(6) + 4(3)$
4. $(4 + 6) + 3 = 4 + (6 + 3)$

14 Which equation illustrates the associative property?
1. $x + y + z = x + y + z$
2. $x(y + z) = xy + xz$
3. $x + y + z = z + y + x$
4. $(x + y) + z = x + (y + z)$

15 Which equation is an example of the use of the associative property of addition?
1. $x + 7 = 7 + x$
2. $3(x + y) = 3x + 3y$
3. $(x + y) + 3 = x + (y + 3)$
4. $3 + (x + y) = (x + y) + 3$

16 Perform the indicated operation: $-6(a - 7)$
State the name of the property used.

**A.A.29: SET THEORY**

17 Which interval notation represents the set of all numbers from 2 through 7, inclusive?
1. $(2, 7]$
2. $(2, 7)$
3. $[2, 7)$
4. $[2, 7]$

18 Which interval notation represents the set of all numbers greater than or equal to 5 and less than 12?
1. $[5, 12)$
2. $(5, 12)$
3. $(5, 12]$
4. $[5, 12]$

19 Which interval notation represents the set of all real numbers greater than 2 and less than or equal to 20?
1. $(2, 20)$
2. $(2, 20]$
3. $[2, 20)$
4. $[2, 20]$

20 In interval notation, the set of all real numbers greater than $-6$ and less than or equal to 14 is represented by
1. $(-6, 14)$
2. $[-6, 14)$
3. $(-6, 14]$  
4. $[-6, 14]$

21 Which interval notation describes the set $S = \{x | 1 \leq x < 10\}$?
1. $[1, 10)$
2. $(1, 10]$
3. $[1, 10)$
4. $(1, 10)$
22. Which interval notation represents \(-3 \leq x \leq 3\)?
   1. \([-3, 3]\)
   2. \((-3, 3]\)
   3. \([-3, 3)
   4. \((-3, 3)

23. The inequality \(-2 \leq x \leq 3\) can be written as
   1. \((-2, 3]\)
   2. \([-2, 3]\)
   3. \((-2, 3)
   4. \([-2, 3]

24. The set \{1, 2, 3, 4\} is equivalent to
   1. \(\{x|1 < x < 4, \text{ where } x \text{ is a whole number}\}
   2. \(\{x|0 < x < 4, \text{ where } x \text{ is a whole number}\}
   3. \(\{x|0 < x \leq 4, \text{ where } x \text{ is a whole number}\}
   4. \(\{x|1 < x \leq 4, \text{ where } x \text{ is a whole number}\}

25. The set \{11, 12\} is equivalent to
   1. \(\{x|11 < x < 12, \text{ where } x \text{ is an integer}\}
   2. \(\{x|11 < x \leq 12, \text{ where } x \text{ is an integer}\}
   3. \(\{x|10 \leq x < 12, \text{ where } x \text{ is an integer}\}
   4. \(\{x|10 < x \leq 12, \text{ where } x \text{ is an integer}\}

26. Which set-builder notation describes \(-3, -2, -1, 0, 1, 2\)?
   1. \(\{x|-3 \leq x < 2, \text{ where } x \text{ is an integer}\}
   2. \(\{x|-3 < x \leq 2, \text{ where } x \text{ is an integer}\}
   3. \(\{x|-3 < x < 2, \text{ where } x \text{ is an integer}\}
   4. \(\{x|-3 \leq x \leq 2, \text{ where } x \text{ is an integer}\}

27. Which notation describes \(\{1, 2, 3\}\)?
   1. \(\{x|1 \leq x < 3, \text{ where } x \text{ is an integer}\}
   2. \(\{x|0 < x \leq 3, \text{ where } x \text{ is an integer}\}
   3. \(\{x|1 < x < 3, \text{ where } x \text{ is an integer}\}
   4. \(\{x|0 \leq x \leq 3, \text{ where } x \text{ is an integer}\}

28. Which set-builder notation describes \([-2, -1, 0, 1, 2]\)?
   1. \(\{x|-3 \leq x \leq 3, \text{ where } x \text{ is an integer}\}
   2. \(\{x|-3 < x \leq 4, \text{ where } x \text{ is an integer}\}
   3. \(\{x|-2 < x < 3, \text{ where } x \text{ is an integer}\}
   4. \(\{x|-2 \leq x < 4, \text{ where } x \text{ is an integer}\}

29. Written in set-builder notation, \(S = \{1, 3, 5, 7, 9\}\) is
   1. \(\{x|1 < x < 9, \text{ where } x \text{ is a prime number}\}
   2. \(\{x|1 \leq x \leq 9, \text{ where } x \text{ is a prime number}\}
   3. \(\{x|1 < x < 9, \text{ where } x \text{ is an odd integer}\}
   4. \(\{x|1 \leq x \leq 9, \text{ where } x \text{ is an odd integer}\}

A.A.30: SET THEORY

    \(B = \{A, I, O\}\)
    If \(B\) is a subset of \(S\), what is the complement of \(B\)?
    1. \(\{O, P, S\}\)
    2. \(\{I, P, S\}\)
    3. \(\{A, H, P\}\)
    4. \(\{H, P, S\}\)

31. Given: \(U = \{1, 2, 3, 4, 5, 6, 7, 8\}\)
    \(B = \{2, 3, 5, 6\}\)
    Set \(B\) is a subset of \(U\). What is the complement of \(B\)?
    1. \(\{\}\)
    2. \(\{2, 3, 5, 6\}\)
    3. \(\{1, 4, 7, 8\}\)
    4. \(\{1, 2, 3, 4, 5, 6, 7, 8\}\)

32. If the universal set is \{pennies, nickels, dimes, quarters\}, what is the complement of the set \{nickels\}?
   1. \(\{\}\)
   2. \{pennies, quarters\}
   3. \{pennies, dimes, quarters\}
   4. \{pennies, nickels, dimes, quarters\}
33 Consider the set of integers greater than \(-2\) and less than 6. A subset of this set is the positive factors of 5. What is the complement of this subset?
1  \{0,2,3,4\}
2  \{-1,0,2,3,4\}
3  \{-2,-1,0,2,3,4,6\}
4  \{-2,-1,0,1,2,3,4,5,6\}

34 Given:
\[ A = \{\text{All even integers from 2 to 20, inclusive}\} \]
\[ B = \{10,12,14,16,18\} \]
What is the complement of set \( B \) within the universe of set \( A \)?
1  \{4,6,8\}
2  \{2,4,6,8\}
3  \{4,6,8,20\}
4  \{2,4,6,8,20\}

35 Given:
\[ A = \{\text{perfect square integers from 4-100, inclusive}\} \]
\[ B = \{16,36,49,64\} \]
The complement of set \( B \) in the universal set \( A \) is
1  \{9,25,81\}
2  \{4,9,25,81,100\}
3  \{1,4,9,25,81,100\}
4  \{4,16,36,49,64,100\}

36 Given:
\[ A = \{\text{all odd integers from 1 through 19, inclusive}\} \]
\[ B = \{9,11,13,15,17\} \]
What is the complement of set \( B \) within set \( A \)?
1  \{3,5,7\}
2  \{3,5,7,19\}
3  \{1,3,5,7\}
4  \{1,3,5,7,19\}

37 Twelve players make up a high school basketball team. The team jerseys are numbered 1 through 12. The players wearing the jerseys numbered 3, 6, 7, 8, and 11 are the only players who start a game. Using set notation, list the complement of this subset.
41 Given:
Set $A = \{(-2,-1),(-1,0),(1,8)\}$
Set $B = \{(-3,-4),(-2,-1),(-1,2),(1,8)\}$.
What is the intersection of sets $A$ and $B$?
1  $\{(1,8)\}$
2  $\{(-2,-1)\}$
3  $\{(-2,-1),(1,8)\}$
4  $\{(-3,-4),(-2,-1),(-1,2),(-1,0),(1,8)\}$

42 Given: $Q = \{0,2,4,6\}$
$W = \{0,1,2,3\}$
$Z = \{1,2,3,4\}$
What is the intersection of sets $Q$, $W$, and $Z$?
1  $\{2\}$
2  $\{0,2\}$
3  $\{1,2,3\}$
4  $\{0,1,2,3,4,6\}$

43 Given: $X = \{1,2,3,4\}$
$Y = \{2,3,4,5\}$
$Z = \{3,4,5,6\}$
What is the intersection of sets $X$, $Y$, and $Z$?
1  $\{3,4\}$
2  $\{2,3,4\}$
3  $\{3,4,5\}$
4  $\{1,2,3,4,5,6\}$

44 If $A = \{0,1,3,4,6,7\}$, $B = \{0,2,3,5,6\}$, and $C = \{0,1,4,6,7\}$, then $A \cap B \cap C$ is
1  $\{0,1,2,3,4,5,6,7\}$
2  $\{0,3,6\}$
3  $\{0,6\}$
4  $\{0\}$

45 Given: $R = \{1,2,3,4\}$
$A = \{0,2,4,6\}$
$P = \{1,3,5,7\}$
What is $R \cap P$?
1  $\{0,1,2,3,4,5,6,7\}$
2  $\{1,2,3,4,5,7\}$
3  $\{1,3\}$
4  $\{2,4\}$

46 Given: $A = \{1,3,5,7,9\}$
$B = \{2,4,6,8,10\}$
$C = \{2,3,5,7\}$
$D = \{1,2,3,4,5,6,7,8,9,10\}$
What statement is false?
1  $A \cup B \cup C = D$
2  $A \cap B \cap C = \{\}$
3  $A \cup C = \{1,2,3,5,7\}$
4  $A \cap C = \{3,5,7\}$

47 Maureen tracks the range of outdoor temperatures over three days. She records the following information.

Express the intersection of the three sets as an inequality in terms of temperature, $t$. 

\begin{align*}
\text{Day 1:} & \quad -20^\circ F < t < 40^\circ F \\
\text{Day 2:} & \quad 0^\circ F < t < 50^\circ F \\
\text{Day 3:} & \quad -25^\circ F < t < 45^\circ F
\end{align*}
48 Ms. Hopkins recorded her students’ final exam scores in the frequency table below.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>61–70</td>
<td>⬰     </td>
<td>5</td>
</tr>
<tr>
<td>71–80</td>
<td>⬰     </td>
<td>4</td>
</tr>
<tr>
<td>81–90</td>
<td>⬰     </td>
<td>9</td>
</tr>
<tr>
<td>91–100</td>
<td>⬰     </td>
<td>6</td>
</tr>
</tbody>
</table>

On the grid below, construct a frequency histogram based on the table.

49 The Fahrenheit temperature readings on 30 April mornings in Stormville, New York, are shown below.

41°, 58°, 61°, 54°, 49°, 46°, 52°, 58°, 67°, 43°, 47°, 60°, 52°, 58°, 48°, 44°, 59°, 66°, 62°, 55°, 44°, 49°, 62°, 61°, 59°, 54°, 57°, 58°, 63°, 60°

Using the data, complete the frequency table below.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>40–44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45–49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50–54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55–59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60–64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65–69</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the grid below, construct and label a frequency histogram based on the table.
50 The test scores for 18 students in Ms. Mosher’s class are listed below:
86, 81, 79, 71, 58, 87, 52, 71, 87, 87, 93, 64, 94, 81, 76, 98, 94, 68
Complete the frequency table below.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>51–60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61–70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71–80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>81–90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>91–100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Draw and label a frequency histogram on the grid below.

51 Twenty students were surveyed about the number of days they played outside in one week. The results of this survey are shown below.
{6,5,4,3,0,7,1,5,4,4,3,2,2,3,2,4,3,4,0,7}
Complete the frequency table below for these data.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete the cumulative frequency table below using these data.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Cumulative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td></td>
</tr>
<tr>
<td>0–3</td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td></td>
</tr>
<tr>
<td>0–7</td>
<td></td>
</tr>
</tbody>
</table>

On the grid below, create a cumulative frequency histogram based on the table you made.
A.S.9: FREQUENCY HISTOGRAMS, BAR
GRAPHS AND TABLES

52 The table below shows a cumulative frequency
distribution of runners' ages.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–29</td>
<td>8</td>
</tr>
<tr>
<td>20–39</td>
<td>18</td>
</tr>
<tr>
<td>20–49</td>
<td>25</td>
</tr>
<tr>
<td>20–59</td>
<td>31</td>
</tr>
<tr>
<td>20–69</td>
<td>35</td>
</tr>
</tbody>
</table>

According to the table, how many runners are in
their forties?
1 25
2 10
3 7
4 6

53 The cumulative frequency table below shows the
length of time that 30 students spent text messaging
on a weekend.

<table>
<thead>
<tr>
<th>Minutes Used</th>
<th>Cumulative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>31–40</td>
<td>2</td>
</tr>
<tr>
<td>31–50</td>
<td>5</td>
</tr>
<tr>
<td>31–60</td>
<td>10</td>
</tr>
<tr>
<td>31–70</td>
<td>19</td>
</tr>
<tr>
<td>31–80</td>
<td>30</td>
</tr>
</tbody>
</table>

Which 10-minute interval contains the first
quartile?
1 31–40
2 41–50
3 51–60
4 61–70

54 The diagram below shows a cumulative frequency
histogram of the students' test scores in Ms.
Wedow's algebra class.

Determine the total number of students in the class.
Determine how many students scored higher than
70. State which ten-point interval contains the
median. State which two ten-point intervals
contain the same frequency.
55 The following cumulative frequency histogram shows the distances swimmers completed in a recent swim test.

Based on the cumulative frequency histogram, determine the number of swimmers who swam between 200 and 249 yards. Determine the number of swimmers who swam between 150 and 199 yards. Determine the number of swimmers who took the swim test.

A.S.5: BOX-AND-WHISKER PLOTS

56 The data set 5, 6, 7, 8, 9, 9, 10, 12, 14, 17, 17, 18, 19, 19 represents the number of hours spent on the Internet in a week by students in a mathematics class. Which box-and-whisker plot represents the data?

1

2

3

4

57 The test scores from Mrs. Gray’s math class are shown below.
72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92
Construct a box-and-whisker plot to display these data.

58 The number of songs fifteen students have on their MP3 players is:
120, 124, 132, 145, 200, 255, 260, 292, 308, 314, 342, 407, 421, 435, 452
State the values of the minimum, 1st quartile, median, 3rd quartile, and maximum. Using these values, construct a box-and-whisker plot using an appropriate scale on the line below.
59 Using the line provided, construct a box-and-whisker plot for the 12 scores below.
26, 32, 19, 65, 57, 16, 28, 42, 40, 21, 38, 10

Determine the number of scores that lie above the 75th percentile.

A.S.6: BOX-AND-WHISKER PLOTS

60 What is the range of the data represented in the box-and-whisker plot shown below?

61 The box-and-whisker plot below represents the results of tests scores in a math class.

What do the scores 65, 85, and 100 represent?
1 $Q_1$, median, $Q_3$
2 $Q_1$, $Q_3$, maximum
3 median, $Q_1$, maximum
4 minimum, median, maximum

62 What is the value of the third quartile shown on the box-and-whisker plot below?

63 The box-and-whisker plot below represents students’ scores on a recent English test.

What is the value of the upper quartile?
1 68
2 76
3 84
4 94

64 The box-and-whisker plot below represents the math test scores of 20 students.

What percentage of the test scores are less than 72?
1 25
2 50
3 75
4 100
65 The box-and-whisker plot below represents the ages of 12 people.

What percentage of these people are age 15 or older?
1 25
2 35
3 75
4 85

66 The box-and-whisker plot below represents a set of grades in a college statistics class.

Which interval contains exactly 50% of the grades?
1 63-88
2 63-95
3 75-81
4 75-88

67 A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.

Which conclusion can be made using this plot?
1 The second quartile is 600.
2 The mean of the attendance is 400.
3 The range of the attendance is 300 to 600.
4 Twenty-five percent of the attendance is between 300 and 400.

68 Based on the box-and-whisker plot below, which statement is false?

1 The median is 7.
2 The range is 12.
3 The first quartile is 4.
4 The third quartile is 11.

69 The freshman class held a canned food drive for 12 weeks. The results are summarized in the table below.

Which number represents the second quartile of the number of cans of food collected?
1 29.5
2 30.5
3 40
4 60

70 Brianna's score on a national math assessment exceeded the scores of 95,000 of the 125,000 students who took the assessment. What was her percentile rank?
1 6
2 24
3 31
4 76
A.S.7: SCATTER PLOTS

71 For 10 days, Romero kept a record of the number of hours he spent listening to music. The information is shown in the table below.

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Which scatter plot shows Romero’s data graphically?

1  
2  
3  
4

72 The school store did a study comparing the cost of a sweatshirt with the number of sweatshirts sold. The price was changed several times and the numbers of sweatshirts sold were recorded. The data are shown in the table below.

<table>
<thead>
<tr>
<th>Cost of Sweatshirt</th>
<th>$10</th>
<th>$25</th>
<th>$15</th>
<th>$20</th>
<th>$5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Sold</td>
<td>9</td>
<td>6</td>
<td>15</td>
<td>11</td>
<td>14</td>
</tr>
</tbody>
</table>

Which scatter plot represents the data?

1  
2  
3  
4
73. The maximum height and speed of various roller coasters in North America are shown in the table below.

<table>
<thead>
<tr>
<th>Maximum Speed, in mph, (x)</th>
<th>45</th>
<th>50</th>
<th>54</th>
<th>60</th>
<th>65</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Height, in feet, (y)</td>
<td>63</td>
<td>80</td>
<td>105</td>
<td>118</td>
<td>141</td>
<td>107</td>
</tr>
</tbody>
</table>

Which graph represents a correct scatter plot of the data?

A.S.8: SCATTER PLOTS

74. Which equation most closely represents the line of best fit for the scatter plot below?

1. $y = x$
2. $y = \frac{2}{3} x + 1$
3. $y = \frac{3}{2} x + 4$
4. $y = \frac{3}{2} x + 1$
75 A scatter plot was constructed on the graph below and a line of best fit was drawn.

What is the equation of this line of best fit?
1 \( y = x + 5 \)
2 \( y = x + 25 \)
3 \( y = 5x + 5 \)
4 \( y = 5x + 25 \)

76 The table below shows the number of prom tickets sold over a ten-day period.

<table>
<thead>
<tr>
<th>Day (x)</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>7</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Prom Tickets Sold (y)</td>
<td>30</td>
<td>35</td>
<td>55</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

Plot these data points on the coordinate grid below. Use a consistent and appropriate scale. Draw a reasonable line of best fit and write its equation.
A.S.12: SCATTER PLOTS

77 There is a negative correlation between the number of hours a student watches television and his or her social studies test score. Which scatter plot below displays this correlation?

78 Which scatter plot shows the relationship between $x$ and $y$ if $x$ represents a student score on a test and $y$ represents the number of incorrect answers a student received on the same test?
79 What is the relationship between the independent and dependent variables in the scatter plot shown below?

1 undefined correlation
2 negative correlation
3 positive correlation
4 no correlation

80 The scatter plot shown below represents a relationship between \( x \) and \( y \).

This type of relationship is
1 a positive correlation
2 a negative correlation
3 a zero correlation
4 not able to be determined

81 A set of data is graphed on the scatter plot below.

This scatter plot shows
1 no correlation
2 positive correlation
3 negative correlation
4 undefined correlation
82 The number of hours spent on math homework during one week and the math exam grades for eleven students in Ms. Smith’s algebra class are plotted below.

Based on the plotted data, what is the correlation between the time spent on homework and the exam grade?
1. positive
2. negative
3. no correlation
4. cannot be determined

83 The scatter plot below represents the relationship between the number of peanuts a student eats and the student's bowling score.

Which conclusion about the scatter plot is valid?
1. There is almost no relationship between eating peanuts and bowling score.
2. Students who eat more peanuts have higher bowling scores.
3. Students who eat more peanuts have lower bowling scores.
4. No bowlers eat peanuts.

84 Which situation describes a negative correlation?
1. the amount of gas left in a car's tank and the amount of gas used from it
2. the number of gallons of gas purchased and the amount paid for the gas
3. the size of a car's gas tank and the number of gallons it holds
4. the number of miles driven and the amount of gas used
A.S.17: SCATTER PLOTS

85 The number of hours spent on math homework each week and the final exam grades for twelve students in Mr. Dylan's algebra class are plotted below.

Based on a line of best fit, which exam grade is the best prediction for a student who spends about 4 hours on math homework each week?
1 62
2 72
3 82
4 92

86 The scatter plot below shows the profit, by month, for a new company for the first year of operation. Kate drew a line of best fit, as shown in the diagram.

Using this line, what is the best estimate for profit in the 18th month?
1 $35,000
2 $37,750
3 $42,500
4 $45,000

87 Based on the line of best fit drawn below, which value could be expected for the data in June 2015?

1 230
2 310
3 480
4 540
88 Megan and Bryce opened a new store called the Donut Pit. Their goal is to reach a profit of $20,000 in their 18th month of business. The table and scatter plot below represent the profit, $P$, in thousands of dollars, that they made during the first 12 months.

<table>
<thead>
<tr>
<th>t (months)</th>
<th>P (profit, in thousands of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.0</td>
</tr>
<tr>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>4.0</td>
</tr>
<tr>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>5</td>
<td>6.5</td>
</tr>
<tr>
<td>6</td>
<td>5.5</td>
</tr>
<tr>
<td>7</td>
<td>7.0</td>
</tr>
<tr>
<td>8</td>
<td>6.0</td>
</tr>
<tr>
<td>9</td>
<td>7.5</td>
</tr>
<tr>
<td>10</td>
<td>7.0</td>
</tr>
<tr>
<td>11</td>
<td>9.0</td>
</tr>
<tr>
<td>12</td>
<td>9.5</td>
</tr>
</tbody>
</table>

Draw a reasonable line of best fit. Using the line of best fit, predict whether Megan and Bryce will reach their goal in the 18th month of their business. Justify your answer.

A.S.4: CENTRAL TENDENCY

89 Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?
1 mean = mode
2 mean > mode
3 mean = median
4 mean < median

90 Sam’s grades on eleven chemistry tests were 90, 85, 76, 63, 94, 89, 81, 76, 78, 69, and 97. Which statement is true about the measures of central tendency?
1 mean > mode
2 mean < median
3 mode > median
4 median = mean

91 Which statement is true about the data set 4, 5, 6, 6, 7, 9, 12?
1 mean = mode
2 mode = median
3 mean < median
4 mode > mean

92 Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?
1 median < mode < mean
2 mean < mode < median
3 mode < median < mean
4 mean < median < mode
93 The values of 11 houses on Washington St. are shown in the table below.

<table>
<thead>
<tr>
<th>Value per House</th>
<th>Number of Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100,000</td>
<td>1</td>
</tr>
<tr>
<td>$175,000</td>
<td>5</td>
</tr>
<tr>
<td>$200,000</td>
<td>4</td>
</tr>
<tr>
<td>$700,000</td>
<td>1</td>
</tr>
</tbody>
</table>

Find the mean value of these houses in dollars.
Find the median value of these houses in dollars.
State which measure of central tendency, the mean or the median, best represents the values of these 11 houses. Justify your answer.

94 The prices of seven race cars sold last week are listed in the table below.

<table>
<thead>
<tr>
<th>Price per Race Car</th>
<th>Number of Race Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>$126,000</td>
<td>1</td>
</tr>
<tr>
<td>$140,000</td>
<td>2</td>
</tr>
<tr>
<td>$180,000</td>
<td>1</td>
</tr>
<tr>
<td>$400,000</td>
<td>2</td>
</tr>
<tr>
<td>$819,000</td>
<td>1</td>
</tr>
</tbody>
</table>

What is the mean value of these race cars, in dollars? What is the median value of these race cars, in dollars? State which of these measures of central tendency best represents the value of the seven race cars. Justify your answer.

95 Mr. Taylor raised all his students’ scores on a recent test by five points. How were the mean and the range of the scores affected?

1. The mean increased by five and the range increased by five.
2. The mean increased by five and the range remained the same.
3. The mean remained the same and the range increased by five.
4. The mean remained the same and the range remained the same.

96 Ms. Mosher recorded the math test scores of six students in the table below.

<table>
<thead>
<tr>
<th>Student</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andrew</td>
<td>72</td>
</tr>
<tr>
<td>John</td>
<td>80</td>
</tr>
<tr>
<td>George</td>
<td>85</td>
</tr>
<tr>
<td>Amber</td>
<td>93</td>
</tr>
<tr>
<td>Betty</td>
<td>78</td>
</tr>
<tr>
<td>Roberto</td>
<td>80</td>
</tr>
</tbody>
</table>

Determine the mean of the student scores, to the nearest tenth. Determine the median of the student scores. Describe the effect on the mean and the median if Ms. Mosher adds 5 bonus points to each of the six students’ scores.

97 Given the following list of students' scores on a quiz:

5, 12, 7, 15, 20, 14, 7

Determine the median of these scores. Determine the mode of these scores. The teacher decides to adjust these scores by adding three points to each score. Explain the effect, if any, that this will have on the median and mode of these scores.
A.S.16: AVERAGE KNOWN WITH MISSING DATA

98 This year, John played in 10 baseball games. In these games he had hit the ball 2, 3, 0, 1, 3, 2, 4, 0, 2, and 3 times. In the first 10 games he plays next year, John wants to increase his average (mean) hits per game by 0.5. What is the total number of hits John needs over the first 10 games next year to achieve his goal?
1 5
2 2
3 20
4 25

A.S.1: ANALYSIS OF DATA

99 Which data set describes a situation that could be classified as qualitative?
1 the elevations of the five highest mountains in the world
2 the ages of presidents at the time of their inauguration
3 the opinions of students regarding school lunches
4 the shoe sizes of players on the basketball team

100 Which data set describes a situation that could be classified as quantitative?
1 the ages of the students in Ms. Marshall’s Spanish class
2 the test scores of the students in Ms. Fitzgerald’s class
3 the favorite ice cream flavor of each of Mr. Hayden’s students
4 the heights of the players on the East High School basketball team

101 Which set of data can be classified as qualitative?
1 scores of students in an algebra class
2 ages of students in a biology class
3 numbers of students in history classes
4 eye colors of students in an economics class

102 Which set of data describes a situation that could be classified as qualitative?
1 the colors of the birds at the city zoo
2 the shoe size of the zookeepers at the city zoo
3 the heights of the giraffes at the city zoo
4 the weights of the monkeys at the city zoo

103 Which data set describes a situation that could be classified as quantitative?
1 the phone numbers in a telephone book
2 the addresses for students at Hopkins High School
3 the zip codes of residents in the city of Buffalo, New York
4 the time it takes each of Mr. Harper’s students to complete a test

104 Which set of data can be classified as quantitative?
1 first names of students in a chess club
2 ages of students in a government class
3 hair colors of students in a debate club
4 favorite sports of students in a gym class

105 An art studio has a list of information posted with each sculpture that is for sale. Each entry in the list could be classified as quantitative except for the
1 cost
2 height
3 artist
4 weight

106 Craig sees an advertisement for a car in a newspaper. Which information would not be classified as quantitative?
1 the cost of the car
2 the car’s mileage
3 the model of the car
4 the weight of the car
A.S.2: ANALYSIS OF DATA

107 Which situation should be analyzed using bivariate data?
1 Ms. Saleem keeps a list of the amount of time her daughter spends on her social studies homework.
2 Mr. Benjamin tries to see if his students’ shoe sizes are directly related to their heights.
3 Mr. DeStefan records his customers’ best video game scores during the summer.
4 Mr. Chan keeps track of his daughter’s algebra grades for the quarter.

108 Which situation is an example of bivariate data?
1 the number of pizzas Tanya eats during her years in high school
2 the number of times Ezra puts air in his bicycle tires during the summer
3 the number of home runs Elias hits per game and the number of hours he practices baseball
4 the number of hours Nellie studies for her mathematics tests during the first half of the school year

109 Which data table represents univariate data?

<table>
<thead>
<tr>
<th>Side Length of a Square</th>
<th>Area of Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hours Worked</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>$160</td>
</tr>
<tr>
<td>25</td>
<td>$200</td>
</tr>
<tr>
<td>30</td>
<td>$240</td>
</tr>
<tr>
<td>35</td>
<td>$280</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–29</td>
<td>9</td>
</tr>
<tr>
<td>30–39</td>
<td>7</td>
</tr>
<tr>
<td>40–49</td>
<td>10</td>
</tr>
<tr>
<td>50–59</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People</th>
<th>Number of Fingers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>
110 Which table does *not* show bivariate data?

1. Height (inches) | Weight (pounds)
   | 39 | 50
   | 48 | 70
   | 60 | 90

2. Gallons | Miles Driven
   | 15 | 300
   | 20 | 400
   | 25 | 500

3. Quiz Average | Frequency
   | 70 | 12
   | 80 | 15
   | 90 | 6

4. Speed (mph) | Distance (miles)
   | 40 | 80
   | 50 | 120
   | 55 | 150

111 Which table shows bivariate data?

1. Age (yr)  | Frequency
   | 14 | 12
   | 15 | 21
   | 16 | 14
   | 17 | 19
   | 18 | 15

2. Type of Car | Average Gas Mileage (mpg)
   | van | 25
   | SUV | 23
   | luxury | 26
   | compact | 28
   | pickup | 22

3. Time Spent Studying (hr) | Test Grade (%)
   | 1 | 65
   | 2 | 72
   | 3 | 83
   | 4 | 85
   | 5 | 92

4. Day | Temperature (degrees F)
   | Monday | 63
   | Tuesday | 58
   | Wednesday | 72
   | Thursday | 74
   | Friday | 78

A.S.3: ANALYSIS OF DATA

112 A school wants to add a coed soccer program. To determine student interest in the program, a survey will be taken. In order to get an unbiased sample, which group should the school survey?
1. every third student entering the building
2. every member of the varsity football team
3. every member in Ms. Zimmer’s drama classes
4. every student having a second-period French class
113 A survey is being conducted to determine if a cable company should add another sports channel to their schedule. Which random survey would be the least biased?
1. surveying 30 men at a gym
2. surveying 45 people at a mall
3. surveying 50 fans at a football game
4. surveying 20 members of a high school soccer team

114 A school newspaper will survey students about the quality of the school’s lunch program. Which method will create the least biased results?
1. Twenty-five vegetarians are randomly surveyed.
2. Twenty-five students are randomly chosen from each grade level.
3. Students who dislike the school’s lunch program are chosen to complete the survey.
4. A booth is set up in the cafeteria for the students to voluntarily complete the survey.

115 A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?
1. surveying 10 people who work in a sporting goods store
2. surveying the first 25 people who enter a grocery store
3. randomly surveying 50 people during the day in a mall
4. randomly surveying 75 people during the day in a clothing store

116 Erica is conducting a survey about the proposed increase in the sports budget in the Hometown School District. Which survey method would likely contain the most bias?
1. Erica asks every third person entering the Hometown Grocery Store.
2. Erica asks every third person leaving the Hometown Shopping Mall this weekend.
3. Erica asks every fifth student entering Hometown High School on Monday morning.
4. Erica asks every fifth person leaving Saturday’s Hometown High School football game.

117 A survey is being conducted to determine which school board candidate would best serve the Yonkers community. Which group, when randomly surveyed, would likely produce the most bias?
1. 15 employees of the Yonkers school district
2. 25 people driving past Yonkers High School
3. 75 people who enter a Yonkers grocery store
4. 100 people who visit the local Yonkers shopping mall
118 Four hundred licensed drivers participated in the math club's survey on driving habits. The table below shows the number of drivers surveyed in each age group.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-25</td>
<td>150</td>
</tr>
<tr>
<td>26-35</td>
<td>129</td>
</tr>
<tr>
<td>36-45</td>
<td>33</td>
</tr>
<tr>
<td>46-55</td>
<td>57</td>
</tr>
<tr>
<td>56-65</td>
<td>31</td>
</tr>
</tbody>
</table>

Which statement best describes a conclusion based on the data in the table?
1. It may be biased because no one younger than 16 was surveyed.
2. It would be fair because many different age groups were surveyed.
3. It would be fair because the survey was conducted by the math club students.
4. It may be biased because the majority of drivers surveyed were in the younger age intervals.

A.S.13: ANALYSIS OF DATA

119 Which relationship can best be described as causal?
1. height and intelligence
2. shoe size and running speed
3. number of correct answers on a test and test score
4. number of students in a class and number of students with brown hair

A.S.14: ANALYSIS OF DATA

121 Which situation describes a correlation that is not a causal relationship?
1. The rooster crows, and the Sun rises.
2. The more miles driven, the more gasoline needed
3. The more powerful the microwave, the faster the food cooks.
4. The faster the pace of a runner, the quicker the runner finishes.

122 Which situation describes a correlation that is not a causal relationship?
1. The length of the edge of a cube and the volume of the cube
2. The distance traveled and the time spent driving
3. The age of a child and the number of siblings the child has
4. The number of classes taught in a school and the number of teachers employed

123 Which phrase best describes the relationship between the number of miles driven and the amount of gasoline used?
1. causal, but not correlated
2. correlated, but not causal
3. both correlated and causal
4. neither correlated nor causal

124 A study showed that a decrease in the cost of carrots led to an increase in the number of carrots sold. Which statement best describes this relationship?
1. positive correlation and a causal relationship
2. negative correlation and a causal relationship
3. positive correlation and not a causal relationship
4. negative correlation and not a causal relationship
A.M.3: ERROR

125 The groundskeeper is replacing the turf on a football field. His measurements of the field are 130 yards by 60 yards. The actual measurements are 120 yards by 54 yards. Which expression represents the relative error in the measurement?

1. \( \frac{(130)(60) - (120)(54)}{(120)(54)} \)
2. \( \frac{(130)(60) - (120)(54)}{(130)(60)} \)
3. \( \frac{(130)(60) - (120)(54)}{(120)(54)} \)
4. \( \frac{(130)(60) - (120)(54)}{(130)(60) - (120)(54)} \)

126 Carrie bought new carpet for her living room. She calculated the area of the living room to be 174.2 square feet. The actual area was 149.6 square feet. What is the relative error of the area to the nearest ten-thousandth?

1. 0.1412
2. 0.1644
3. 1.8588
4. 2.1644

127 Corinne calculated the area of a paper plate to be 50.27 square inches. If the actual area of the plate is 55.42 square inches, what is the relative error in calculating the area, to the nearest thousandth?

1. 0.092
2. 0.093
3. 0.102
4. 0.103

128 The dimensions of a rectangle are measured to be 12.2 inches by 11.8 inches. The actual dimensions are 12.3 inches by 11.9 inches. What is the relative error, to the nearest ten-thousandth, in calculating the area of the rectangle?

1. 0.0168
2. 0.0167
3. 0.0165
4. 0.0164

129 Jack wants to replace the flooring in his rectangular kitchen. He calculates the area of the floor to be 12.8 square meters. The actual area of the floor is 13.5 square meters. What is the relative error in calculating the area of the floor, to the nearest thousandth?

1. 0.051
2. 0.052
3. 0.054
4. 0.055

130 The actual dimensions of a rectangle are 2.6 cm by 6.9 cm. Andy measures the sides as 2.5 cm by 6.8 cm. In calculating the area, what is the relative error, to the nearest thousandth?

1. 0.055
2. 0.052
3. 0.022
4. 0.021

131 Sophie measured a piece of paper to be 21.7 cm by 28.5 cm. The piece of paper is actually 21.6 cm by 28.4 cm. Determine the number of square centimeters in the area of the piece of paper using Sophie’s measurements. Determine the number of square centimeters in the actual area of the piece of paper. Determine the relative error in calculating the area. Express your answer as a decimal to the nearest thousandth. Sophie does not think there is a significant amount of error. Do you agree or disagree? Justify your answer.

132 Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches and 42.5 inches. Using the measurements that Sarah took, determine the number of square inches in the area of the window. Determine the number of square inches in the actual area of the window. Determine the relative error in calculating the area. Express your answer as a decimal to the nearest thousandth.
133  Students calculated the area of a playing field to be 8,100 square feet. The actual area of the field is 7,678.5 square feet. Find the relative error in the area, to the nearest thousandth.

134  Wendy measures the floor in her rectangular bedroom for new carpeting. Her measurements are 24 feet by 14 feet. The actual measurements are 24.2 feet by 14.1 feet. Determine the relative error in calculating the area of her bedroom. Express your answer as a decimal to the nearest thousandth.

135  Janis measures the dimensions of the floor in her rectangular classroom for a rug. Her measurements are 10.50 feet by 12.25 feet. The actual measurements of the floor are 10.75 feet by 12.50 feet. Determine the relative error in calculating the area, to the nearest thousandth.

136  Ryan estimates the measurement of the volume of a popcorn container to be 282 cubic inches. The actual volume of the popcorn container is 289 cubic inches. What is the relative error of Ryan's measurement to the nearest thousandth?

1 0.024
2 0.025
3 0.096
4 1.025

137  To calculate the volume of a small wooden cube, Ezra measured an edge of the cube as 2 cm. The actual length of the edge of Ezra’s cube is 2.1 cm. What is the relative error in his volume calculation to the nearest hundredth?

1 0.13
2 0.14
3 0.15
4 0.16

138  Using his ruler, Howell measured the sides of a rectangular prism to be 5 cm by 8 cm by 4 cm. The actual measurements are 5.3 cm by 8.2 cm by 4.1 cm. Find Howell’s relative error in calculating the volume of the prism, to the nearest thousandth.

139  Alexis calculates the surface area of a gift box as 600 square inches. The actual surface area of the gift box is 592 square inches. Find the relative error of Alexis' calculation expressed as a decimal to the nearest thousandth.

140  An oil company distributes oil in a metal can shaped like a cylinder that has an actual radius of 5.1 cm and a height of 15.1 cm. A worker incorrectly measured the radius as 5 cm and the height as 15 cm. Determine the relative error in calculating the surface area, to the nearest thousandth.

141  Ashley measured the dimensions of a rectangular prism to be 6 cm by 10 cm by 1.5 cm. The actual dimensions are 5.9 cm by 10.3 cm by 1.7 cm. Determine the relative error, to the nearest thousandth, in calculating the volume of the prism.

PROBABILITY
A.S.19: SAMPLE SPACE

142  A cube, with faces numbered 1 to 6, is rolled, and a penny is tossed at the same time. How many elements in the sample space consist of an even number and a tail?

1 12
2 2
3 3
4 4

143  Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.
144 Mr. Laub has three children: two girls (Sue and Karen) and one boy (David). After each meal, one child is chosen at random to wash dishes. If the same child can be chosen for both lunch and dinner, construct a tree diagram or list a sample space of all the possible outcomes of who will wash dishes after lunch and dinner on Saturday. Determine the probability that one boy and one girl will wash dishes after lunch and dinner on Saturday.

145 A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

<table>
<thead>
<tr>
<th>Main Course</th>
<th>Side Dish</th>
<th>Drink</th>
</tr>
</thead>
<tbody>
<tr>
<td>hamburger</td>
<td>French fries</td>
<td>milk</td>
</tr>
<tr>
<td>chicken nuggets</td>
<td>applesauce</td>
<td>juice</td>
</tr>
<tr>
<td>turkey sandwich</td>
<td></td>
<td>soda</td>
</tr>
</tbody>
</table>

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order? Jose does not drink juice. Determine the number of different kids' meals that do not include juice. Jose's sister will eat only chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.

146 An outfit Jennifer wears to school consists of a top, a bottom, and shoes. Possible choices are listed below.

- Tops: T-shirt, blouse, sweater
- Bottoms: jeans, skirt, capris
- Shoes: flip-flops, sneakers

List the sample space or draw a tree diagram to represent all possible outfits consisting of one type of top, one type of bottom, and one pair of shoes. Determine how many different outfits contain jeans and flip-flops. Determine how many different outfits do not include a sweater.

147 A sandwich consists of one type of bread, one type of meat, and one type of cheese. The possible choices are listed below.

- Bread: white, rye
- Meat: ham, turkey, beef
- Cheese: American, Swiss

Draw a tree diagram or list a sample space of all the possible different sandwiches consisting of one type of bread, one type of meat, and one type of cheese. Determine the number of sandwiches that will not include turkey. Determine the number of sandwiches that will include rye bread and Swiss cheese.

148 A company is running a contest and offering a first, second, and third prize. First prize is a choice of a car or $15,000 cash. Second prize is a choice of a motorbike, a trip to New York City, or $2,000 cash. Third prize is a choice of a television or $500 cash. If each prize is equally likely to be selected, list the sample space or draw a tree diagram of all possible different outcomes of first, second, and third prizes. Determine the number of ways that all three prizes selected could be cash. Determine the number of ways that none of the three prizes selected could be cash.

149 In a game, a player must spin each spinner shown in the diagram below once.

Draw a tree diagram or list a sample space showing all possible outcomes. Determine the number of outcomes that consist of a prime number and a letter in the word “CAT.”
A.S.21: EXPERIMENTAL PROBABILITY

150 Students in Ms. Nazzeer's mathematics class tossed a six-sided number cube whose faces are numbered 1 to 6. The results are recorded in the table below.

<table>
<thead>
<tr>
<th>Result</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>

Based on these data, what is the empirical probability of tossing a 4?

1. \( \frac{8}{30} \)
2. \( \frac{6}{30} \)
3. \( \frac{5}{30} \)
4. \( \frac{1}{30} \)

151 Three high school juniors, Reese, Matthew, and Chris, are running for student council president. A survey is taken a week before the election asking 40 students which candidate they will vote for in the election. The results are shown in the table below.

<table>
<thead>
<tr>
<th>Candidate's Name</th>
<th>Number of Students Supporting Candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reese</td>
<td>15</td>
</tr>
<tr>
<td>Matthew</td>
<td>13</td>
</tr>
<tr>
<td>Chris</td>
<td>12</td>
</tr>
</tbody>
</table>

Based on the table, what is the probability that a student will vote for Reese?

1. \( \frac{1}{5} \)
2. \( \frac{3}{5} \)
3. \( \frac{3}{8} \)
4. \( \frac{5}{8} \)
A spinner that is equally divided into eight numbered sectors is spun 20 times. The table below shows the number of times the arrow landed in each numbered sector.

<table>
<thead>
<tr>
<th>Spinner Sector</th>
<th>Number of Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

Based on the table, what is the empirical probability that the spinner will land on a prime number on the next spin?

1 \( \frac{9}{20} \)
2 \( \frac{11}{20} \)
3 \( \frac{12}{20} \)
4 \( \frac{14}{20} \)

Casey purchased a pack of assorted flower seeds and planted them in her garden. When the first 25 flowers bloomed, 11 were white, 5 were red, 3 were blue, and the rest were yellow. Find the empirical probability that a flower that blooms will be yellow.

A.S.20: THEORETICAL PROBABILITY

A bag contains eight green marbles, five white marbles, and two red marbles. What is the probability of drawing a red marble from the bag?

1 \( \frac{1}{15} \)
2 \( \frac{2}{15} \)
3 \( \frac{2}{13} \)
4 \( \frac{13}{15} \)

A.S.22: THEORETICAL PROBABILITY

Which event is certain to happen?

1 Everyone walking into a room will have red hair.
2 All babies born in June will be males.
3 The Yankees baseball team will win the World Series.
4 The Sun will rise in the east.

Maria has a set of 10 index cards labeled with the digits 0 through 9. She puts them in a bag and selects one at random. The outcome that is most likely to occur is selecting

1 an odd number
2 a prime number
3 a number that is at most 5
4 a number that is divisible by 3

The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is least likely to occur?

1 rolling an odd number
2 rolling an even number
3 rolling a number less than 6
4 rolling a number greater than 4
158 A cube with faces numbered 1 through 6 is rolled 75 times, and the results are given in the table below.

<table>
<thead>
<tr>
<th>Number</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Based on these results, which statement is true?
1. \( P(\text{odd}) < P(\text{even}) \)
2. \( P(3 \text{ or less}) < P(\text{odd}) \)
3. \( P(\text{even}) < P(2 \text{ or 4}) \)
4. \( P(2 \text{ or 4}) < P(3 \text{ or less}) \)

159 Jon is buying tickets for himself for two concerts. For the jazz concert, 4 tickets are available in the front row, and 32 tickets are available in the other rows. For the orchestra concert, 3 tickets are available in the front row, and 23 tickets are available in the other rows. Jon is randomly assigned one ticket for each concert. Determine the concert for which he is more likely to get a front-row ticket. Justify your answer.

160 Each of the hats shown below has colored marbles placed inside. Hat \( A \) contains five green marbles and four red marbles. Hat \( B \) contains six blue marbles and five red marbles. Hat \( C \) contains five green marbles and five blue marbles.

If a student were to randomly pick one marble from each of these three hats, determine from which hat the student would most likely pick a green marble. Justify your answer. Determine the fewest number of marbles, if any, and the color of these marbles that could be added to each hat so that the probability of picking a green marble will be one-half in each of the three hats.

161 Three storage bins contain colored blocks. Bin 1 contains 15 red and 14 blue blocks. Bin 2 contains 16 white and 15 blue blocks. Bin 3 contains 15 red and 15 white blocks. All of the blocks from the three bins are placed into one box. If one block is randomly selected from the box, which color block would most likely be picked? Justify your answer.

A.S.23: THEORETICAL PROBABILITY

162 Throughout history, many people have contributed to the development of mathematics. These mathematicians include Pythagoras, Euclid, Hypatia, Euler, Einstein, Agnesi, Fibonacci, and Pascal. What is the probability that a mathematician’s name selected at random from those listed will start with either the letter \( E \) or the letter \( A \)?

1. \( \frac{2}{8} \)
2. \( \frac{3}{8} \)
3. \( \frac{4}{8} \)
4. \( \frac{6}{8} \)
163 The faces of a cube are numbered from 1 to 6. If the cube is tossed once, what is the probability that a prime number or a number divisible by 2 is obtained?

1 \[ \frac{6}{6} \]

2 \[ \frac{5}{6} \]

3 \[ \frac{4}{6} \]

4 \[ \frac{1}{6} \]

164 The probability that it will snow on Sunday is \( \frac{3}{5} \). The probability that it will snow on both Sunday and Monday is \( \frac{3}{10} \). What is the probability that it will snow on Monday, if it snowed on Sunday?

1 \[ \frac{9}{50} \]

2 \[ \frac{2}{5} \]

3 \[ \frac{1}{2} \]

4 \[ \frac{9}{10} \]

165 Three fair coins are tossed. What is the probability that two heads and one tail appear?

1 \[ \frac{1}{8} \]

2 \[ \frac{3}{8} \]

3 \[ \frac{3}{6} \]

4 \[ \frac{2}{3} \]

166 The probability it will rain tomorrow is \( \frac{1}{2} \). The probability that our team will win tomorrow’s basketball game is \( \frac{3}{5} \). Which expression represents the probability that it will rain and that our team will not win the game?

1 \[ \frac{1}{2} + \frac{3}{5} \]

2 \[ \frac{1}{2} \times \frac{3}{5} \]

3 \[ \frac{1}{2} \times \frac{2}{5} \]

4 \[ \frac{1}{2} \times \frac{2}{5} \]

167 Vince buys a box of candy that consists of six chocolate pieces, four fruit-flavored pieces, and two mint pieces. He selects three pieces of candy at random, without replacement. Calculate the probability that the first piece selected will be fruit flavored and the other two will be mint. Calculate the probability that all three pieces selected will be the same type of candy.

168 A jar contains five red marbles and three green marbles. A marble is drawn at random and not replaced. A second marble is then drawn from the jar. Find the probability that the first marble is red and the second marble is green. Find the probability that both marbles are red. Find the probability that both marbles are the same color.

169 A bottle contains 12 red marbles and 8 blue marbles. A marble is chosen at random and not replaced. Then, a second marble is chosen at random. Determine the probability that the two marbles are not the same color. Determine the probability that at least one of the marbles is red.
170 The spinner below is divided into eight equal regions and is spun once. What is the probability of not getting red?

1. \(\frac{3}{5}\)
2. \(\frac{3}{8}\)
3. \(\frac{5}{8}\)
4. \(\frac{7}{8}\)

171 The bull's-eye of a dartboard has a radius of 2 inches and the entire board has a radius of 9 inches, as shown in the diagram below.

If a dart is thrown and hits the board, what is the probability that the dart will land in the bull's-eye?

1. \(\frac{2}{9}\)
2. \(\frac{7}{9}\)
3. \(\frac{4}{81}\)
4. \(\frac{49}{81}\)
172 The square dart board shown below has a side that measures 40 inches. The shaded portion in the center is a square whose side is 15 inches. A dart thrown at the board is equally likely to land on any point on the dartboard.

Find the probability that a dart hitting the board will not land in the shaded area.

A.S.22: GEOMETRIC PROBABILITY

173 A spinner is divided into eight equal regions as shown in the diagram below.

Which event is most likely to occur in one spin?
1. The arrow will land in a green or white area.
2. The arrow will land in a green or black area.
3. The arrow will land in a yellow or black area.
4. The arrow will land in a yellow or green area.

174 The spinner shown in the diagram below is divided into six equal sections.

Which outcome is least likely to occur on a single spin?
1. an odd number
2. a prime number
3. a perfect square
4. a number divisible by 2
A.S.23: GEOMETRIC PROBABILITY

175 Keisha is playing a game using a wheel divided into eight equal sectors, as shown in the diagram below. Each time the spinner lands on orange, she will win a prize.

If Keisha spins this wheel twice, what is the probability she will win a prize on both spins?

1 \( \frac{1}{64} \)
2 \( \frac{1}{56} \)
3 \( \frac{1}{16} \)
4 \( \frac{1}{4} \)

176 Brianna is using the two spinners shown below to play her new board game. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She uses the second spinner to determine whether her move from the first spinner will be forward or backward.

Find the probability that Brianna will move fewer than four spaces and backward.

A.S.18: CONDITIONAL PROBABILITY

177 A bag contains five green gumdrops and six red gumdrops. If Kim pulls a green gumdrop out of the bag and eats it, what is the probability that the next gumdrop she pulls out will be red?

1 \( \frac{5}{11} \)
2 \( \frac{5}{10} \)
3 \( \frac{6}{11} \)
4 \( \frac{6}{10} \)

178 Gabriella has 20 quarters, 15 dimes, 7 nickels, and 8 pennies in a jar. After taking 6 quarters out of the jar, what will be the probability of Gabriella randomly selecting a quarter from the coins left in the jar?

1 \( \frac{14}{44} \)
2 \( \frac{30}{44} \)
3 \( \frac{14}{50} \)
4 \( \frac{20}{50} \)
179 Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

A.N.7: MULTIPLICATION COUNTING PRINCIPLE

180 The local ice cream stand offers three flavors of soft-serve ice cream: vanilla, chocolate, and strawberry; two types of cone: sugar and wafer; and three toppings: sprinkles, nuts, and cookie crumbs. If Dawn does not order vanilla ice cream, how many different choices can she make that have one flavor of ice cream, one type of cone, and one topping?

1 7
2 8
3 12
4 18

181 How many different sandwiches consisting of one type of cheese, one condiment, and one bread choice can be prepared from five types of cheese, two condiments, and three bread choices?

1 10
2 13
3 15
4 30

182 The bowling team at Lincoln High School must choose a president, vice president, and secretary. If the team has 10 members, which expression could be used to determine the number of ways the officers could be chosen?

1 \(_3P_{10}\)
2 \(_7P_3\)
3 \(_{10}P_3\)
4 \(_{10}P_7\)

A.N.8: PERMUTATIONS

183 John is going to line up his four golf trophies on a shelf in his bedroom. How many different possible arrangements can he make?

1 24
2 16
3 10
4 4

184 How many different ways can five books be arranged on a shelf?

1 5
2 15
3 25
4 120

185 There are 18 students in a class. Each day, the teacher randomly selects three students to assist in a game: a leader, a recorder, and a timekeeper. In how many possible ways can the jobs be assigned?

1 306
2 816
3 4896
4 5832

186 How many different three-letter arrangements can be formed using the letters in the word ABSOLUTE if each letter is used only once?

1 56
2 112
3 168
4 336

187 How many different four-letter arrangements are possible with the letters G, A, R, D, E, N if each letter may be used only once?

1 15
2 24
3 360
4 720

188 Determine how many three-letter arrangements are possible with the letters A, N, G, L, and E if no letter may be repeated.
189 A password consists of three digits, 0 through 9, followed by three letters from an alphabet having 26 letters. If repetition of digits is allowed, but repetition of letters is not allowed, determine the number of different passwords that can be made. If repetition is not allowed for digits or letters, determine how many fewer different passwords can be made.

190 The menu for the high school cafeteria is shown below.

<table>
<thead>
<tr>
<th>Main Course</th>
<th>Vegetable</th>
<th>Dessert</th>
<th>Beverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>veggie burger</td>
<td>corn</td>
<td>gelatin</td>
<td>milk</td>
</tr>
<tr>
<td>pizza</td>
<td>green beans</td>
<td>fruit salad</td>
<td>juice</td>
</tr>
<tr>
<td>tuna sandwich</td>
<td>carrots</td>
<td>yogurt</td>
<td>bottled water</td>
</tr>
<tr>
<td>frankfurter</td>
<td>cookie</td>
<td></td>
<td></td>
</tr>
<tr>
<td>chicken tenders</td>
<td>ice cream cup</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Determine the number of possible meals consisting of a main course, a vegetable, a dessert, and a beverage that can be selected from the menu. Determine how many of these meals will include chicken tenders. If a student chooses pizza, corn or carrots, a dessert, and a beverage from the menu, determine the number of possible meals that can be selected.

191 A large company must chose between two types of passwords to log on to a computer. The first type is a four-letter password using any of the 26 letters of the alphabet, without repetition of letters. The second type is a six-digit password using the digits 0 through 9, with repetition of digits allowed. Determine the number of possible four-letter passwords. Determine the number of possible six-digit passwords. The company has 500,000 employees and needs a different password for each employee. State which type of password the company should choose. Explain your answer.

**EXPRESSIONS AND EQUATIONS**

**A.A.1: EXPRESSIONS**

192 Mr. Turner bought \(x\) boxes of pencils. Each box holds 25 pencils. He left 3 boxes of pencils at home and took the rest to school. Which expression represents the total number of pencils he took to school?

1. \(22x\)
2. \(25x - 3\)
3. \(25 - 3x\)
4. \(25x - 75\)

193 The length of a rectangular room is 7 less than three times the width, \(w\), of the room. Which expression represents the area of the room?

1. \(3w - 4\)
2. \(3w - 7\)
3. \(3w^2 - 4w\)
4. \(3w^2 - 7w\)

194 Marie currently has a collection of 58 stamps. If she buys \(s\) stamps each week for \(w\) weeks, which expression represents the total number of stamps she will have?

1. \(58sw\)
2. \(58 + sw\)
3. \(58s + w\)
4. \(58 + s + w\)

195 What is the perimeter of a regular pentagon with a side whose length is \(x + 4\)?

1. \(x^2 + 16\)
2. \(4x + 16\)
3. \(5x + 4\)
4. \(5x + 20\)
196 Tim ate four more cookies than Alice. Bob ate twice as many cookies as Tim. If \( x \) represents the number of cookies Alice ate, which expression represents the number of cookies Bob ate?

1. \( 2 + (x + 4) \)
2. \( 2x + 4 \)
3. \( 2(x + 4) \)
4. \( 4(x + 2) \)

197 Which algebraic expression represents 15 less than \( x \) divided by 9?

1. \( \frac{x}{9} - 15 \)
2. \( 9x - 15 \)
3. \( 15 - \frac{x}{9} \)
4. \( 15 - 9x \)

198 Timmy bought a skateboard and two helmets for a total of \( d \) dollars. If each helmet cost \( h \) dollars, the cost of the skateboard could be represented by

1. \( 2dh \)
2. \( \frac{dh}{2} \)
3. \( d - 2h \)
4. \( d - \frac{h}{2} \)

199 Marcy determined that her father's age is four less than three times her age. If \( x \) represents Marcy's age, which expression represents her father's age?

1. \( 3x - 4 \)
2. \( 3(x - 4) \)
3. \( 4x - 3 \)
4. \( 4 - 3x \)

200 A correct translation of “six less than twice the value of \( x \)” is

1. \( 2x < 6 \)
2. \( 2x - 6 \)
3. \( 6 < 2x \)
4. \( 6 - 2x \)

201 If Angelina’s weekly allowance is \( d \) dollars, which expression represents her allowance, in dollars, for \( x \) weeks?

1. \( dx \)
2. \( 7dx \)
3. \( x + 7d \)
4. \( \frac{d}{x} \)

202 Which expression represents “5 less than twice \( x \)”?

1. \( 2x - 5 \)
2. \( 5 - 2x \)
3. \( 2(5 - x) \)
4. \( 2(x - 5) \)

203 Which expression represents the number of hours in \( w \) weeks and \( d \) days?

1. \( 7w + 12d \)
2. \( 84w + 24d \)
3. \( 168w + 24d \)
4. \( 168w + 60d \)

204 Marie currently has a collection of 58 stamps. If she buys \( s \) stamps each week for \( w \) weeks, which expression represents the total number of stamps she will have?

1. \( 58sw \)
2. \( 58 + sw \)
3. \( 58s + w \)
4. \( 58 + s + w \)

A.A.2: EXPRESSIONS

205 Which verbal expression represents \( 2(n - 6) \)?

1. two times \( n \) minus six
2. two times six minus \( n \)
3. two times the quantity \( n \) less than six
4. two times the quantity six less than \( n \)

206 Which verbal expression is represented by \( \frac{1}{2} (n - 3) \)?

1. one-half \( n \) decreased by 3
2. one-half \( n \) subtracted from 3
3. the difference of one-half \( n \) and 3
4. one-half the difference of \( n \) and 3
207 Which verbal expression can be represented by $2(x - 5)$?
1 5 less than 2 times $x$
2 2 multiplied by $x$ less than 5
3 twice the difference of $x$ and 5
4 the product of 2 and $x$, decreased by 5

208 Which verbal expression is represented by $2(x + 4)$?
1 twice the sum of a number and four
2 the sum of two times a number and four
3 two times the difference of a number and four
4 twice the product of a number and four

A.A.3: EXPRESSIONS

209 An example of an algebraic expression is
1 $\frac{2x + 3}{7} = \frac{13}{x}$
2 $(2x + 1)(x - 7)$
3 $4x - 1 = 4$
4 $x = 2$

210 An example of an algebraic expression is
1 $x + 2$
2 $y = x + 2$
3 $y < x + 2$
4 $y = x^2 + 2x$

211 An example of an algebraic expression is
1 $y = mx + b$
2 $3x + 4y - 7$
3 $2x + 3y \leq 18$
4 $(x + y)(x - y) = 25$

212 Mr. Stanton asked his students to write an algebraic expression on a piece of paper. He chose four students to go to the board and write their expression.
Robert wrote: $4(2x + 5) \geq 17$
Meredith wrote: $3y - 7 + 11z$
Steven wrote: $9w + 2 = 20$
Cynthia wrote: $8 + 10 - 4 = 14$
Which student wrote an algebraic expression?
1 Robert
2 Meredith
3 Steven
4 Cynthia

213 Chad complained to his friend that he had five equations to solve for homework. Are all of the homework problems equations? Justify your answer.

A.A.22: SOLVING EQUATIONS

214 Which value of $p$ is the solution of $5p - 1 = 2p + 20$?
1 $\frac{19}{7}$
2 $\frac{19}{3}$
3 3
4 7
215 What is the value of \( x \) in the equation 
\( 2(x - 4) = 4(2x + 1) \)?

\[
\begin{array}{l}
1 \quad -2 \\
2 \quad 2 \\
3 \quad \frac{-1}{2} \\
4 \quad \frac{1}{2}
\end{array}
\]

216 The solution of the equation \( 5 - 2x = -4x - 7 \) is

\[
\begin{array}{l}
1 \quad 1 \\
2 \quad 2 \\
3 \quad -2 \\
4 \quad -6
\end{array}
\]

217 Debbie solved the linear equation \( 3(x + 4) - 2 = 16 \) as follows:

\[
\begin{align*}
\text{[Line 1]} & \quad 3(x + 4) - 2 = 16 \\
\text{[Line 2]} & \quad 3(x + 4) = 18 \\
\text{[Line 3]} & \quad 3x + 4 = 18 \\
\text{[Line 4]} & \quad 3x = 14 \\
\text{[Line 5]} & \quad x = 4 \frac{2}{3}
\end{align*}
\]

She made an error between lines

\[
\begin{array}{l}
1 \quad 1 \text{ and } 2 \\
2 \quad 2 \text{ and } 3 \\
3 \quad 3 \text{ and } 4 \\
4 \quad 4 \text{ and } 5
\end{array}
\]

218 Solve for \( g \): \( 3 + 2g = 5g - 9 \)

219 Solve algebraically for \( x \):
\( 3(x + 1) - 5x = 12 - (6x - 7) \)

A.A.25: SOLVING EQUATIONS WITH FRACTIONAL EXPRESSIONS

220 Which value of \( x \) is the solution of
\( \frac{2x}{5} + \frac{1}{3} = \frac{7x - 2}{15} \)?

\[
\begin{array}{l}
1 \quad \frac{3}{5} \\
2 \quad \frac{31}{26} \\
3 \quad 3 \\
4 \quad 7
\end{array}
\]

221 Which value of \( x \) is the solution of the equation
\( \frac{2x}{3} + \frac{x}{6} = 5 \)?

\[
\begin{array}{l}
1 \quad 6 \\
2 \quad 10 \\
3 \quad 15 \\
4 \quad 30
\end{array}
\]

222 Solve for \( x \): \( \frac{3}{5} (x + 2) = x - 4 \)

\[
\begin{array}{l}
1 \quad 8 \\
2 \quad 13 \\
3 \quad 15 \\
4 \quad 23
\end{array}
\]

223 Which value of \( x \) is the solution of \( \frac{x}{3} + \frac{x + 1}{2} = x \)?

\[
\begin{array}{l}
1 \quad 1 \\
2 \quad -1 \\
3 \quad 3 \\
4 \quad -3
\end{array}
\]

224 Which value of \( x \) is the solution of the equation
\( \frac{2}{3} x + \frac{1}{2} = \frac{5}{6} \)?

\[
\begin{array}{l}
1 \quad \frac{1}{2} \\
2 \quad 2 \\
3 \quad \frac{2}{3} \\
4 \quad \frac{3}{2}
\end{array}
\]
225 Which value of \( x \) is the solution of the equation
\[
\frac{1}{7} + \frac{2x}{3} = \frac{15x - 3}{21}
\]
1 \( 6 \)
2 \( 0 \)
3 \( \frac{4}{13} \)
4 \( \frac{6}{29} \)

226 Solve for \( m \):
\[
\frac{m}{5} + \frac{3(m-1)}{2} = 2(m-3)
\]

A.A.25: SOLVING EQUATIONS WITH DECIMALS

227 The value of \( y \) in the equation
\[
0.06y + 200 = 0.03y + 350
\]
is
1 \( 500 \)
2 \( 1,666.6 \)
3 \( 5,000 \)
4 \( 18,333.3 \)

A.A.4: MODELING EQUATIONS

228 If \( h \) represents a number, which equation is a correct translation of "Sixty more than 9 times a number is 375"?
1 \( 9h = 375 \)
2 \( 9h + 60 = 375 \)
3 \( 9h - 60 = 375 \)
4 \( 60h + 9 = 375 \)

A.A.5: MODELING EQUATIONS

229 The length of a rectangular window is 5 feet more than its width, \( w \). The area of the window is 36 square feet. Which equation could be used to find the dimensions of the window?
1 \( w^2 + 5w + 36 = 0 \)
2 \( w^2 - 5w - 36 = 0 \)
3 \( w^2 - 5w + 36 = 0 \)
4 \( w^2 + 5w - 36 = 0 \)

230 Rhonda has $1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine \( x \), the number of nickels she has?
1 \( 0.05(x + 6) + 0.10x = 1.35 \)
2 \( 0.05x + 0.10(x + 6) = 1.35 \)
3 \( 0.05 + 0.10(6x) = 1.35 \)
4 \( 0.15(x + 6) = 1.35 \)

231 The width of a rectangle is 3 less than twice the length, \( x \). If the area of the rectangle is 43 square feet, which equation can be used to find the length in feet?
1 \( 2x(x - 3) = 43 \)
2 \( x(3 - 2x) = 43 \)
3 \( 2x + 2(2x - 3) = 43 \)
4 \( x(2x - 3) = 43 \)

232 If \( n \) is an odd integer, which equation can be used to find three consecutive odd integers whose sum is -3?
1 \( n + (n + 1) + (n + 3) = -3 \)
2 \( n + (n + 1) + (n + 2) = -3 \)
3 \( n + (n + 2) + (n + 4) = -3 \)
4 \( n + (n + 2) + (n + 3) = -3 \)

A.A.6: MODELING EQUATIONS

233 The ages of three brothers are consecutive even integers. Three times the age of the youngest brother exceeds the oldest brother's age by 48 years. What is the age of the youngest brother?
1 \( 14 \)
2 \( 18 \)
3 \( 22 \)
4 \( 26 \)

234 The sum of three consecutive odd integers is 18 less than five times the middle number. Find the three integers. [Only an algebraic solution can receive full credit.]
A.A.6: VENN DIAGRAMS

235 Monique has three sons who play football, two sons who play baseball, and one son who plays both sports. If all of her sons play baseball or football, how many sons does she have?
1 5
2 6
3 3
4 4

A.A.23: TRANSFORMING FORMULAS

236 If $3ax + b = c$, then $x$ equals
1 $c - b + 3a$
2 $c + b - 3a$
3 $\frac{c - b}{3a}$
4 $\frac{b - c}{3a}$

237 If the formula for the perimeter of a rectangle is $P = 2l + 2w$, then $w$ can be expressed as
1 $w = \frac{2l - P}{2}$
2 $w = \frac{P - 2l}{2}$
3 $w = \frac{P - l}{2}$
4 $w = \frac{P - 2w}{2l}$

238 If $a + ar = b + r$, the value of $a$ in terms of $b$ and $r$ can be expressed as
1 $\frac{b}{r} + 1$
2 $\frac{1 + b}{r}$
3 $\frac{b + r}{1 + r}$
4 $\frac{1 + b}{r + b}$

239 The members of the senior class are planning a dance. They use the equation $r = pn$ to determine the total receipts. What is $n$ expressed in terms of $r$ and $p$?
1 $n = r + p$
2 $n = r - p$
3 $n = \frac{p}{r}$
4 $n = \frac{r}{p}$

240 A formula used for calculating velocity is $v = \frac{1}{2}at^2$. What is $a$ expressed in terms of $v$ and $t$?
1 $a = \frac{2v}{t}$
2 $a = \frac{2v}{t^2}$
3 $a = \frac{v}{t}$
4 $a = \frac{v}{2t^2}$

241 If $\frac{ey}{n} + k = t$, what is $y$ in terms of $e$, $n$, $k$, and $t$?
1 $y = \frac{tn + k}{e}$
2 $y = \frac{tn - k}{e}$
3 $y = \frac{n(t + k)}{e}$
4 $y = \frac{n(t - k)}{e}$

242 If $s = \frac{2x + t}{r}$, then $x$ equals
1 $\frac{rs - t}{2}$
2 $\frac{rs + 1}{2}$
3 $2rs - t$
4 $rs - 2t$
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic

243 If \( k = am + 3mx \), the value of \( m \) in terms of \( a \), \( k \), and \( x \) can be expressed as

1. \( \frac{k}{a + 3x} \)
2. \( \frac{k - 3mx}{a} \)
3. \( \frac{k - am}{3x} \)
4. \( \frac{k - a}{3x} \)

244 The formula for the volume of a pyramid is

\[ V = \frac{1}{3} Bh. \]  
What is \( h \) expressed in terms of \( B \) and \( V \)?

1. \( h = \frac{1}{3} VB \)
2. \( h = \frac{V}{3B} \)
3. \( h = \frac{3V}{B} \)
4. \( h = 3VB \)

245 If \( rx - st = r \), which expression represents \( x \)?

1. \( \frac{r + st}{r} \)
2. \( \frac{r}{r + st} \)
3. \( \frac{r}{r - st} \)
4. \( \frac{r - st}{r} \)

246 If \( 2y + 2w = x \), then \( w \), in terms of \( x \) and \( y \), is equal to

1. \( x - y \)
2. \( \frac{x - 2y}{2} \)
3. \( \frac{x + y}{2} \)
4. \( \frac{x + 2y}{2} \)

247 Solve for \( c \) in terms of \( a \) and \( b \): \( bc + ac = ab \)
A.M.1: SPEED

253 What is the speed, in meters per second, of a paper airplane that flies 24 meters in 6 seconds?
   1 144
   2 30
   3 18
   4 4

254 It takes Tammy 45 minutes to ride her bike 5 miles. At this rate, how long will it take her to ride 8 miles?
   1 0.89 hour
   2 1.125 hours
   3 48 minutes
   4 72 minutes

255 Steve ran a distance of 150 meters in 1 \( \frac{1}{2} \) minutes. What is his speed in meters per hour?
   1 6
   2 60
   3 100
   4 6,000

256 A hiker walked 12.8 miles from 9:00 a.m. to noon. He walked an additional 17.2 miles from 1:00 p.m. to 6:00 p.m. What is his average rate for the entire walk, in miles per hour?
   1 3.75
   2 3.86
   3 4.27
   4 7.71

257 In a baseball game, the ball traveled 350.7 feet in 4.2 seconds. What was the average speed of the ball, in feet per second?
   1 83.5
   2 177.5
   3 354.9
   4 1,472.9

258 In a game of ice hockey, the hockey puck took 0.8 second to travel 89 feet to the goal line. Determine the average speed of the puck in feet per second.

259 The chart below compares two runners.

<table>
<thead>
<tr>
<th>Runner</th>
<th>Distance, in miles</th>
<th>Time, in hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greg</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Dave</td>
<td>16</td>
<td>3</td>
</tr>
</tbody>
</table>

Based on the information in this chart, state which runner has the faster rate. Justify your answer.

260 The distance from Earth to Mars is 136,000,000 miles. A spaceship travels at 31,000 miles per hour. Determine, to the nearest day, how long it will take the spaceship to reach Mars.

261 A turtle and a rabbit are in a race to see who is first to reach a point 100 feet away. The turtle travels at a constant speed of 20 feet per minute for the entire 100 feet. The rabbit travels at a constant speed of 40 feet per minute for the first 50 feet, stops for 3 minutes, and then continues at a constant speed of 40 feet per minute for the last 50 feet. Determine which animal won the race and by how much time.

262 Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin’s house and the same distance back home. It took her 1.2 hours to get halfway to her cousin’s house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip? Hannah’s average speed for the remainder of the trip to her cousin’s house was 40 miles per hour. How long, in hours, did it take her to drive the remaining distance? Traveling home along the same route, Hannah drove at an average rate of 55 miles per hour. After 2 hours her car broke down. How many miles was she from home?
263 On a certain day in Toronto, Canada, the temperature was 15° Celsius (C). Using the formula \( F = \frac{9}{5} C + 32 \), Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents 15°C in degrees Fahrenheit?

1. 9
2. 35
3. 59
4. 85

264 Which expression can be used to change 75 kilometers per hour to meters per minute?

1. \( \frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1 \text{ km}}{1,000 \text{ m}} \times \frac{1 \text{ hr}}{60 \text{ min}} \)
2. \( \frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1 \text{ km}}{1,000 \text{ m}} \times \frac{60 \text{ min}}{1 \text{ hr}} \)
3. \( \frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1,000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hr}}{60 \text{ min}} \)
4. \( \frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1,000 \text{ m}}{1 \text{ km}} \times \frac{60 \text{ min}}{1 \text{ hr}} \)

265 Elizabeth is baking chocolate chip cookies. A single batch uses \( \frac{3}{4} \) teaspoon of vanilla. If Elizabeth is mixing the ingredients for five batches at the same time, how many tablespoons of vanilla will she use?

1. \( \frac{3}{4} \) teaspoons = 1 tablespoon
2. 1 1/4
3. 1 3/4
4. 3 3/4
5. 5 3/4

266 Peter walked 8,900 feet from home to school.

How far, to the nearest tenth of a mile, did he walk?

1. 0.5
2. 0.6
3. 1.6
4. 1.7

267 If the speed of sound is 344 meters per second, what is the approximate speed of sound, in meters per hour?

1. 20,640
2. 41,280
3. 123,840
4. 1,238,400

268 A soda container holds 5 1/2 gallons of soda. How many ounces of soda does this container hold?

1. 44
2. 176
3. 640
4. 704

269 Mrs. Chen owns two pieces of property. The areas of the properties are 77,120 square feet and 33,500 square feet.

Find the total number of acres Mrs. Chen owns, to the nearest hundredth of an acre.
270 A jogger ran at a rate of 5.4 miles per hour. Find the jogger's exact rate, in feet per minute.

\[
1 \text{ mile} = 5.280 \text{ feet}
\]

271 Angela wants to purchase carpeting for her living room. The dimensions of her living room are 12 feet by 12 feet. If carpeting is sold by the square yard, determine how many square yards of carpeting she must purchase.

\[
3 \text{ feet} = 1 \text{ yard}
\]
\[
9 \text{ square feet} = 1 \text{ square yard}
\]

272 Roberta needs ribbon for a craft project. The ribbon sells for $3.75 per yard. Find the cost, in dollars, for 48 inches of the ribbon.

A.N.5: PERCENTS

273 In a recent town election, 1,860 people voted for either candidate A or candidate B for the position of supervisor. If candidate A received 55% of the votes, how many votes did candidate B receive?

\[
\begin{array}{r|c}
1 & 186 \\
2 & 837 \\
3 & 1,023 \\
4 & 1,805 \\
\end{array}
\]

274 The Hudson Record Store is having a going-out-of-business sale. CDs normally sell for $18.00. During the first week of the sale, all CDs will sell for $15.00. Written as a fraction, what is the rate of discount? What is this rate expressed as a percent? Round your answer to the nearest hundredth of a percent. During the second week of the sale, the same CDs will be on sale for 25% off the original price. What is the price of a CD during the second week of the sale?

275 At the end of week one, a stock had increased in value from $5.75 a share to $7.50 a share. Find the percent of increase at the end of week one to the nearest tenth of a percent. At the end of week two, the same stock had decreased in value from $7.50 to $5.75. Is the percent of decrease at the end of week two the same as the percent of increase at the end of week one? Justify your answer.

276 Shana wants to buy a new bicycle that has a retail price of $259.99. She knows that it will be on sale next week for 30% off the retail price. If the tax rate is 7%, find the total amount, to the nearest cent, that she will save by waiting until next week.

277 Miller's Department Store is having a sale with a 25% discount on mattresses. If the sales tax rate is 8%, how much change will Frank receive from $800 if he purchases a mattress regularly priced at $895 during this sale?

A.N.5: DIRECT VARIATION

278 The number of calories burned while jogging varies directly with the number of minutes spent jogging. If George burns 150 calories by jogging for 20 minutes, how many calories does he burn by jogging for 30 minutes?

\[
\begin{array}{r|c}
1 & 100 \\
2 & 180 \\
3 & 200 \\
4 & 225 \\
\end{array}
\]
279  The table below represents the number of hours a student worked and the amount of money the student earned.

<table>
<thead>
<tr>
<th>Number of Hours (h)</th>
<th>Dollars Earned (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>$50.00</td>
</tr>
<tr>
<td>15</td>
<td>$93.75</td>
</tr>
<tr>
<td>19</td>
<td>$118.75</td>
</tr>
<tr>
<td>30</td>
<td>$187.50</td>
</tr>
</tbody>
</table>

Write an equation that represents the number of dollars, \(d\), earned in terms of the number of hours, \(h\), worked. Using this equation, determine the number of dollars the student would earn for working 40 hours.

280  In a linear equation, the independent variable increases at a constant rate while the dependent variable decreases at a constant rate. The slope of this line is

1. zero
2. negative
3. positive
4. undefined

281  In a given linear equation, the value of the independent variable decreases at a constant rate while the value of the dependent variable increases at a constant rate. The slope of this line is

1. positive
2. negative
3. zero
4. undefined

282  The data in the table below are graphed, and the slope is examined.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>9.0</td>
</tr>
<tr>
<td>1</td>
<td>8.75</td>
</tr>
<tr>
<td>1.5</td>
<td>8.5</td>
</tr>
<tr>
<td>2</td>
<td>8.25</td>
</tr>
<tr>
<td>2.5</td>
<td>8.0</td>
</tr>
</tbody>
</table>

The rate of change represented in this table can be described as

1. negative
2. positive
3. undefined
4. zero

A.A.33: SLOPE

283  What is the slope of the line containing the points (3, 4) and (−6, 10)?

1. \(\frac{1}{2}\)
2. 2
3. \(\frac{2}{3}\)
4. \(\frac{3}{2}\)

284  What is the slope of the line that passes through the points (−6, 1) and (4, −4)?

1. \(-2\)
2. \(2\)
3. \(-\frac{1}{2}\)
4. \(\frac{1}{2}\)
285 What is the slope of the line that passes through the points (2, 5) and (7, 3)?
1  5/2
2  2/5
3  8/9
4  9/8

286 What is the slope of the line that passes through the points (–5, 4) and (15, –4)?
1  –1/2
2  0
3  –5/2
4  undefined

287 What is the slope of the line that passes through the points (3, 5) and (–2, 2)?
1  1/5
2  3/5
3  5/3
4  5

288 What is the slope of the line passing through the points (–2, 4) and (3, 6)?
1  –5/2
2  –2/5
3  2/5
4  5/2

289 What is the slope of the line that passes through the points (2, –3) and (5, 1)?
1  –2/3
2  2/3
3  –4/3
4  4/3

290 What is the slope of the line that passes through the points (4, –7) and (9, 1)?
1  5/8
2  8/5
3  –6/12
4  –13/6

291 In the diagram below, what is the slope of the line passing through points A and B?

1  –2
2  2
3  –1/2
4  1/2
292 What is the slope of the line passing through the points \( A \) and \( B \), as shown on the graph below?

A.A.37: SLOPE

293 What is the slope of the line whose equation is \( 3x - 7y = 9 \)?

294 What is the slope of the line represented by the equation \( 4x + 3y = 12 \)?

295 The line represented by the equation \( 2y - 3x = 4 \) has a slope of

1. \( -\frac{3}{2} \)
2. \( 2 \)
3. \( 3 \)
4. \( \frac{3}{2} \)
A.G.4: GRAPHING LINEAR FUNCTIONS

296 The gas tank in a car holds a total of 16 gallons of gas. The car travels 75 miles on 4 gallons of gas. If the gas tank is full at the beginning of a trip, which graph represents the rate of change in the amount of gas in the tank?

A.A.34: WRITING LINEAR EQUATIONS

297 What is an equation of the line that passes through the point (4, −6) and has a slope of −3?
1. \( y = -3x + 6 \)
2. \( y = -3x - 6 \)
3. \( y = -3x + 10 \)
4. \( y = -3x + 14 \)

298 What is an equation of the line that passes through the point (3, −1) and has a slope of 2?
1. \( y = 2x + 5 \)
2. \( y = 2x - 1 \)
3. \( y = 2x - 4 \)
4. \( y = 2x - 7 \)

299 Which equation represents the line that passes through the point (1, 5) and has a slope of −2?
1. \( y = -2x + 7 \)
2. \( y = -2x + 11 \)
3. \( y = 2x - 9 \)
4. \( y = 2x + 3 \)

300 Which equation represents a line that has a slope of \( \frac{3}{4} \) and passes through the point (2, 1)?
1. \( 3y = 4x - 5 \)
2. \( 3y = 4x + 2 \)
3. \( 4y = 3x - 2 \)
4. \( 4y = 3x + 5 \)

301 A line having a slope of \( \frac{3}{4} \) passes through the point (−8, 4). Write the equation of this line in slope-intercept form.
A.A.35: WRITING LINEAR EQUATIONS

302 What is an equation for the line that passes through the coordinates (2, 0) and (0, 3)?
1 \( y = \frac{3}{2} x + 3 \)
2 \( y = \frac{3}{2} x - 3 \)
3 \( y = -\frac{2}{3} x + 2 \)
4 \( y = -\frac{2}{3} x - 2 \)

303 What is an equation of the line that passes through the points (3, -3) and (-3, -3)?
1 \( y = 3 \)
2 \( x = -3 \)
3 \( y = -3 \)
4 \( x = y \)

304 Which equation represents the line that passes through the points (-3, 7) and (3, 3)?
1 \( y = \frac{2}{3} x + 1 \)
2 \( y = \frac{2}{3} x + 9 \)
3 \( y = -\frac{2}{3} x + 5 \)
4 \( y = -\frac{2}{3} x + 9 \)

305 What is an equation of the line that passes through the points (1, 3) and (8, 5)?
1 \( y + 1 = \frac{2}{7} (x + 3) \)
2 \( y - 5 = \frac{2}{7} (x - 8) \)
3 \( y - 1 = \frac{2}{7} (x + 3) \)
4 \( y + 5 = \frac{2}{7} (x - 8) \)

306 Write an equation that represents the line that passes through the points (5, 4) and (-5, 0).

A.A.39: IDENTIFYING POINTS ON A LINE

307 Which point is on the line \( 4y - 2x = 0 \)?
1 \(-2, -1\)
2 \(-2, 1\)
3 \(-1, -2\)
4 \(1, 2\)

308 Which point lies on the line whose equation is \( 2x - 3y = 9 \)?
1 \((-1, -3)\)
2 \((-1, 3)\)
3 \((0, 3)\)
4 \((0, -3)\)

309 Which point lies on the graph represented by the equation \( 3y + 2x = 8 \)?
1 \((-2, 7)\)
2 \((0, 4)\)
3 \((2, 4)\)
4 \((7, -2)\)

310 Which set of coordinates is a solution of the equation \( 2x - y = 11 \)?
1 \((-6, 1)\)
2 \((-1, 9)\)
3 \((0, 11)\)
4 \((2, -7)\)

311 If the point \((5, k)\) lies on the line represented by the equation \( 2x + y = 9 \), the value of \( k \) is
1 \(1\)
2 \(2\)
3 \(-1\)
4 \(-2\)

312 Which linear equation represents a line containing the point \((1, 3)\)?
1 \(x + 2y = 5\)
2 \(x - 2y = 5\)
3 \(2x + y = 5\)
4 \(2x - y = 5\)
313 Which equation represents a line parallel to the x-axis?
1  x = 5  
2  y = 10  
3  x = \frac{1}{3} y  
4  y = 5x + 17

314 Which equation represents a line parallel to the x-axis?
1  y = -5  
2  y = -5x  
3  x = 3  
4  x = 3y

315 Which equation represents a line parallel to the y-axis?
1  x = y  
2  x = 4  
3  y = 4  
4  y = x + 4

316 Which equation represents a line parallel to the y-axis?
1  y = x  
2  y = 3  
3  x = -y  
4  x = -4

317 Which equation represents the line that passes through the point (3,4) and is parallel to the x-axis?
1  x = 4  
2  x = -3  
3  y = 4  
4  y = -3

318 Which equation represents a line that is parallel to the y-axis and passes through the point (4,3)?
1  x = 3  
2  x = 4  
3  y = 3  
4  y = 4

319 Which equation represents a line that is parallel to the line \( y = -4x + 5 \)?
1  y = -4x + 3  
2  y = -\frac{1}{4} x + 5  
3  y = \frac{1}{4} x + 3  
4  y = 4x + 5

320 Which equation represents a line that is parallel to the line \( y = 3 - 2x \)?
1  4x + 2y = 5  
2  2x + 4y = 1  
3  y = 3 - 4x  
4  y = 4x - 2

321 Which equation represents a line parallel to the graph of \( 2x - 4y = 16 \)?
1  y = \frac{1}{2} x - 5  
2  y = -\frac{1}{2} x + 4  
3  y = -2x + 6  
4  y = 2x + 8

322 Which equation represents a line that is parallel to the line whose equation is \( 2x - 3y = 9 \)?
1  y = \frac{2}{3} x - 4  
2  y = -\frac{2}{3} x + 4  
3  y = \frac{3}{2} x - 4  
4  y = -\frac{3}{2} x + 4
323 Which equation represents a line that is parallel to the line whose equation is \( y = -3x - 7 \)?

1. \( y = -3x + 4 \)
2. \( y = -\frac{1}{3}x - 7 \)
3. \( y = \frac{1}{3}x + 5 \)
4. \( y = 3x - 2 \)

324 The graphs of the equations \( y = 2x - 7 \) and \( y - kx = 7 \) are parallel when \( k \) equals

1. \(-2\)
2. \(2\)
3. \(-7\)
4. \(7\)

### INEQUALITIES

**A.A.24: SOLVING INEQUALITIES**

325 What is the solution of \( 3(2m - 1) \leq 4m + 7 \)?

1. \( m \leq 5 \)
2. \( m \geq 5 \)
3. \( m \leq 4 \)
4. \( m \geq 4 \)

326 What is the solution of the inequality \(-6x - 17 \geq 8x + 25\)?

1. \( x \geq 3 \)
2. \( x \leq 3 \)
3. \( x \geq -3 \)
4. \( x \leq -3 \)

327 Solve algebraically for \( x \): \( 2(x - 4) \geq \frac{1}{2} (5 - 3x) \)

328 Solve the inequality \(-5(x - 7) < 15\) algebraically for \( x \).

### A.A.21: INTERPRETING SOLUTIONS

329 Which value of \( x \) is in the solution set of the inequality \(-2x + 5 > 17\)?

1. \(-8\)
2. \(-6\)
3. \(-4\)
4. \(12\)

330 Which value of \( x \) is in the solution set of the inequality \(-4x + 2 > 10\)?

1. \(-2\)
2. \(2\)
3. \(3\)
4. \(-4\)

331 Which value of \( x \) is in the solution set of \( \frac{4}{3}x + 5 < 17\)?

1. \(8\)
2. \(9\)
3. \(12\)
4. \(16\)

332 Which value of \( x \) is in the solution set of the inequality \(-2(x - 5) < 4\)?

1. \(0\)
2. \(2\)
3. \(3\)
4. \(5\)

333 Which value of \( x \) is in the solution set of \(-3x + 8 \geq 14\)?

1. \(-3\)
2. \(-1\)
3. \(0\)
4. \(3\)

334 The statement \(|-15| < x < |-20|\) is true when \( x \) is equal to

1. \(-16\)
2. \(-14\)
3. \(17\)
4. \(21\)
335 Given: \( A = \{18, 6, -3, -12\} \)
Determine all elements of set \( A \) that are in the solution of the inequality \( \frac{2}{3} x + 3 < -2x - 7 \).

A.A.4: MODELING INEQUALITIES

336 Mrs. Smith wrote "Eight less than three times a number is greater than fifteen" on the board. If \( x \) represents the number, which inequality is a correct translation of this statement?
1 \( 3x - 8 > 15 \)
2 \( 3x - 8 < 15 \)
3 \( 8 - 3x > 15 \)
4 \( 8 - 3x < 15 \)

337 The sign shown below is posted in front of a roller coaster ride at the Wadsworth County Fairgrounds.

If \( h \) represents the height of a rider in inches, what is a correct translation of the statement on this sign?
1 \( h < 48 \)
2 \( h > 48 \)
3 \( h \leq 48 \)
4 \( h \geq 48 \)

A.A.5: MODELING INEQUALITIES

338 An electronics store sells DVD players and cordless telephones. The store makes a $75 profit on the sale of each DVD player \( (d) \) and a $30 profit on the sale of each cordless telephone \( (c) \). The store wants to make a profit of at least $255.00 from its sales of DVD players and cordless phones. Which inequality describes this situation?
1 \( 75d + 30c < 255 \)
2 \( 75d + 30c \leq 255 \)
3 \( 75d + 30c > 255 \)
4 \( 75d + 30c \geq 255 \)

339 Students in a ninth grade class measured their heights, \( h \), in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?
1 \( 155 < h < 190 \)
2 \( 155 \leq h \leq 190 \)
3 \( h \geq 155 \) or \( h \leq 190 \)
4 \( h > 155 \) or \( h < 190 \)

340 Roger is having a picnic for 78 guests. He plans to serve each guest at least one hot dog. If each package, \( p \), contains eight hot dogs, which inequality could be used to determine how many packages of hot dogs Roger will need to buy?
1 \( p \geq 78 \)
2 \( 8p \geq 78 \)
3 \( 8 + p \geq 78 \)
4 \( 78 - p \geq 8 \)

341 The ninth grade class at a local high school needs to purchase a park permit for $250.00 for their upcoming class picnic. Each ninth grader attending the picnic pays $0.75. Each guest pays $1.25. If 200 ninth graders attend the picnic, which inequality can be used to determine the number of guests, \( x \), needed to cover the cost of the permit?
1 \( 0.75x - (1.25)(200) \geq 250.00 \)
2 \( 0.75x + (1.25)(200) \geq 250.00 \)
3 \( (0.75)(200) - 1.25x \geq 250.00 \)
4 \( (0.75)(200) + 1.25x \geq 250.00 \)
342 The length of a rectangle is 15 and its width is \( w \). The perimeter of the rectangle is, at most, 50. Which inequality can be used to find the longest possible width?

1. \( 30 + 2w < 50 \)
2. \( 30 + 2w \leq 50 \)
3. \( 30 + 2w > 50 \)
4. \( 30 + 2w \geq 50 \)

343 Carol plans to sell twice as many magazine subscriptions as Jennifer. If Carol and Jennifer need to sell at least 90 subscriptions in all, which inequality could be used to determine how many subscriptions, \( x \), Jennifer needs to sell?

1. \( x \geq 45 \)
2. \( 2x \geq 90 \)
3. \( 2x - x \geq 90 \)
4. \( 2x + x \geq 90 \)

A.A.6: MODELING INEQUALITIES

344 Tamara has a cell phone plan that charges $0.07 per minute plus a monthly fee of $19.00. She budgets $29.50 per month for total cell phone expenses without taxes. What is the maximum number of minutes Tamara could use her phone each month in order to stay within her budget?

1. 150
2. 271
3. 421
4. 692

345 An online music club has a one-time registration fee of $13.95 and charges $0.49 to buy each song. If Emma has $50.00 to join the club and buy songs, what is the maximum number of songs she can buy?

1. 73
2. 74
3. 130
4. 131

346 If five times a number is less than 55, what is the greatest possible integer value of the number?

1. 12
2. 11
3. 10
4. 9

347 Jason’s part-time job pays him $155 a week. If he has already saved $375, what is the minimum number of weeks he needs to work in order to have enough money to buy a dirt bike for $900?

1. 8
2. 9
3. 3
4. 4

348 A prom ticket at Smith High School is $120. Tom is going to save money for the ticket by walking his neighbor’s dog for $15 per week. If Tom already has saved $22, what is the minimum number of weeks Tom must walk the dog to earn enough to pay for the prom ticket?

349 Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day. Write an inequality that can be used to determine how many days, \( d \), it takes Peter to be able to spell at least 75 words. Use this inequality to determine the minimum number of whole days it will take for him to be able to spell at least 75 words.

350 Chelsea has $45 to spend at the fair. She spends $20 on admission and $15 on snacks. She wants to play a game that costs $0.65 per game. Write an inequality to find the maximum number of times, \( x \), Chelsea can play the game. Using this inequality, determine the maximum number of times she can play the game.
A.G.6: LINEAR INEQUALITIES

351 Which quadrant will be completely shaded in the graph of the inequality \( y \leq 2x \)?
1. Quadrant I
2. Quadrant II
3. Quadrant III
4. Quadrant IV

352 Which inequality is represented by the graph below?

\[ y < 2x + 1 \]
\[ y < -2x + 1 \]
\[ y < \frac{1}{2} x + 1 \]
\[ y < -\frac{1}{2} x + 1 \]

353 The diagram below shows the graph of which inequality?

\[ y > x - 1 \]
\[ y \geq x - 1 \]
\[ y < x - 1 \]
\[ y \leq x - 1 \]
354 Which graph represents the inequality $y > 3$?

355 Which graph represents the solution of $3y - 9 \leq 6x$?
356 Which graph represents the inequality \( y \geq x + 3 \)?

357 Graph the solution set for the inequality \( 4x - 3y > 9 \) on the set of axes below. Determine if the point \((1, -3)\) is in the solution set. Justify your answer.
ABSOLUTE VALUE
A.G.4: GRAPHING ABSOLUTE VALUE FUNCTIONS

358 Which is the graph of \( y = |x| + 2 \)?

1

2

3

4

359 On the set of axes below, graph \( y = 2|x + 3| \).
Include the interval \(-7 \leq x \leq 1\).
A.G.5: GRAPHING ABSOLUTE VALUE FUNCTIONS

360 The diagram below shows the graph of \( y = |x - 3| \).

Which diagram shows the graph of \( y = -|x - 3| \)?

1
2
3
4

361 The graph of the equation \( y = |x| \) is shown in the diagram below.

Which diagram could represent a graph of the equation \( y = a|x| \) when \(-1 < a < 0\)?
362 The graph of \( y = |x + 2| \) is shown below.

Which graph represents \( y = -|x + 2| \) ?

1

2

3

4

363 Graph and label the following equations on the set of axes below.

\[
\begin{align*}
y &= |x| \\
y &= \left| \frac{1}{2} x \right|
\end{align*}
\]

Explain how decreasing the coefficient of \( x \) affects the graph of the equation \( y = |x| \).
364 On the set of axes below, graph and label the equations \( y = |x| \) and \( y = 3|x| \) for the interval \(-3 \leq x \leq 3\).

Explain how changing the coefficient of the absolute value from 1 to 3 affects the graph.

QUADRATICS

A.A.20: FACTORING POLYNOMIALS

365 What are the factors of the expression \( x^2 + x - 20 \)?
1. \((x + 5)\) and \((x + 4)\)
2. \((x + 5)\) and \((x - 4)\)
3. \((x - 5)\) and \((x + 4)\)
4. \((x - 5)\) and \((x - 4)\)

366 Factored completely, the expression \( 2x^2 + 10x - 12 \) is equivalent to
1. \(2(x - 6)(x + 1)\)
2. \(2(x + 6)(x - 1)\)
3. \(2(x + 2)(x + 3)\)
4. \(2(x - 2)(x - 3)\)

367 Factored completely, the expression \( 3x^2 - 3x - 18 \) is equivalent to
1. \(3(x^2 - x - 6)\)
2. \(3(x - 3)(x + 2)\)
3. \((3x - 9)(x + 2)\)
4. \((3x + 6)(x - 3)\)

368 Factored completely, the expression \( 3x^3 - 33x^2 + 90x \) is equivalent to
1. \(3x(x^2 - 11x + 30)\)
2. \(3(x + 5)(x + 6)\)
3. \(3(x - 5)(x - 6)\)

369 Factor completely: \( 5x^3 - 20x^2 - 60x \)

A.A.19: FACTORING THE DIFFERENCE OF PERFECT SQUARES

370 If Ann correctly factors an expression that is the difference of two perfect squares, her factors could be
1. \((2x + y)(x - 2y)\)
2. \((2x + 3y)(2x - 3y)\)
3. \((x - 4)(x + 4)\)
4. \((2y - 5)(y - 5)\)

371 The expression \( x^2 - 16 \) is equivalent to
1. \((x + 2)(x - 8)\)
2. \((x - 2)(x + 8)\)
3. \((x + 4)(x - 4)\)
4. \((x + 8)(x - 8)\)

372 The expression \( 100n^2 - 1 \) is equivalent to
1. \((10n + 1)(10n - 1)\)
2. \((10n - 1)(10n - 1)\)
3. \((50n + 1)(50n - 1)\)
4. \((50n - 1)(50n - 1)\)
373 Which expression is equivalent to $64 - x^2$?
1. $(8 - x)(8 + x)$
2. $(x - 8)(x + 8)$
3. $(x - 8)(x - 8)$
4. $(x - 8)(x + 8)$

374 Which expression is equivalent to $121 - x^2$?
1. $(x - 11)(x - 11)$
2. $(x + 11)(x - 11)$
3. $(11 - x)(11 + x)$
4. $(11 - x)(11 - x)$

375 Factored, the expression $16x^2 - 25y^2$ is equivalent to
1. $(4x - 5y)(4x + 5y)$
2. $(4x - 5y)(4x - 5y)$
3. $(8x - 5y)(8x + 5y)$
4. $(8x - 5y)(8x - 5y)$

376 The expression $9x^2 - 100$ is equivalent to
1. $(9x - 10)(x + 10)$
2. $(9x - 10)(3x + 10)$
3. $(3x - 100)(3x - 1)$
4. $(9x - 100)(x + 1)$

377 Which expression is equivalent to $9x^2 - 16$?
1. $(3x + 4)(3x - 4)$
2. $(3x - 4)(3x + 4)$
3. $(3x + 8)(3x - 8)$
4. $(3x - 8)(3x - 8)$

378 The expression $x^2 - 36y^2$ is equivalent to
1. $(x - 6y)(x - 6y)$
2. $(x - 18y)(x - 18y)$
3. $(x + 6y)(x - 6y)$
4. $(x + 18y)(x - 18y)$

379 Which expression represents $36x^2 - 100y^6$ factored completely?
1. $2(9x + 25y^3)(9x - 25y^3)$
2. $4(3x + 5y^3)(3x - 5y^3)$
3. $(6x + 10y^3)(6x - 10y^3)$
4. $(18x + 50y^3)(18x - 50y^3)$

380 The expression $9a^2 - 64b^2$ is equivalent to
1. $(9a - 8b)(a + 8b)$
2. $(9a - 8b)(a - 8b)$
3. $(3a - 8b)(3a + 8b)$
4. $(3a - 8b)(3a - 8b)$

381 When $a^3 - 4a$ is factored completely, the result is
1. $(a - 2)(a + 2)$
2. $a(a - 2)(a + 2)$
3. $a^2(a - 4)$
4. $a(a - 2)^2$

382 Factor completely: $4x^3 - 36x$

A.A.27: SOLVING QUADRATICS BY FACTORING

383 The solutions of $x^2 = 16x - 28$ are
1. $-2$ and $-14$
2. $2$ and $14$
3. $-4$ and $-7$
4. $4$ and $7$

384 The solution to the equation $x^2 - 6x = 0$ is
1. $0$, only
2. $6$, only
3. $0$ and $6$
4. $\pm\sqrt{6}$
A.A.28: ROOTS OF QUADRATICS

385 What are the roots of the equation $x^2 - 10x + 21 = 0$?
1 1 and 21
2 $-5$ and $-5$
3 3 and 7
4 $-3$ and $-7$

386 What are the roots of the equation $x^2 - 7x + 6 = 0$?
1 1 and 7
2 $-1$ and 7
3 $-1$ and $-6$
4 1 and 6

387 Which equation has roots of $-3$ and 5?
1 $x^2 + 2x - 15 = 0$
2 $x^2 - 2x - 15 = 0$
3 $x^2 + 2x + 15 = 0$
4 $x^2 - 2x + 15 = 0$

388 What are the roots of the equation $x^2 - 5x + 6 = 0$?
1 1 and $-6$
2 2 and 3
3 $-1$ and 6
4 $-2$ and $-3$

389 The roots of the equation $3x^2 - 27x = 0$ are
1 0 and 9
2 0 and $-9$
3 0 and 3
4 0 and $-3$

390 The roots of the equation $x^2 - 14x + 48 = 0$ are
1 $-6$ and $-8$
2 $-6$ and 8
3 6 and $-8$
4 6 and 8

391 If the roots of a quadratic equation are $-2$ and 3, the equation can be written as
1 $(x - 2)(x + 3) = 0$
2 $(x + 2)(x - 3) = 0$
3 $(x + 2)(x + 3) = 0$
4 $(x - 2)(x - 3) = 0$

392 Find the roots of the equation $x^2 - x = 6$ algebraically.

393 Find the roots of the equation $x^2 = 30 - 13x$ algebraically.

A.G.5: GRAPHING QUADRATIC FUNCTIONS

394 Consider the graph of the equation $y = ax^2 + bx + c$, when $a \neq 0$. If $a$ is multiplied by 3, what is true of the graph of the resulting parabola?
1 The vertex is 3 units above the vertex of the original parabola.
2 The new parabola is 3 units to the right of the original parabola.
3 The new parabola is wider than the original parabola.
4 The new parabola is narrower than the original parabola.

395 Melissa graphed the equation $y = x^2$ and Dave graphed the equation $y = -3x^2$ on the same coordinate grid. What is the relationship between the graphs that Melissa and Dave drew?
1 Dave's graph is wider and opens in the opposite direction from Melissa's graph.
2 Dave's graph is narrower and opens in the opposite direction from Melissa's graph.
3 Dave's graph is wider and is three units below Melissa's graph.
4 Dave's graph is narrower and is three units to the left of Melissa's graph.
396 The graph of a parabola is represented by the equation \( y = ax^2 \) where \( a \) is a positive integer. If \( a \) is multiplied by 2, the new parabola will become
1. narrower and open downward
2. narrower and open upward
3. wider and open downward
4. wider and open upward

397 How is the graph of \( y = x^2 + 4x + 3 \) affected when the coefficient of \( x^2 \) is changed to a smaller positive number?
1. The graph becomes wider, and the \( y \)-intercept changes.
2. The graph becomes wider, and the \( y \)-intercept stays the same.
3. The graph becomes narrower, and the \( y \)-intercept changes.
4. The graph becomes narrower, and the \( y \)-intercept stays the same.

398 The diagram below shows the graph of \( y = -x^2 - c \).

Which diagram shows the graph of \( y = x^2 - c \)?

1. 
2. 
3. 
4.
A.G.8: SOLVING QUADRATICS BY GRAPHING

399 The equation $y = x^2 + 3x - 18$ is graphed on the set of axes below.

Based on this graph, what are the roots of the equation $x^2 + 3x - 18 = 0$?

1. $-3$ and $6$
2. $0$ and $-18$
3. $3$ and $-6$
4. $3$ and $-18$

400 The equation $y = -x^2 - 2x + 8$ is graphed on the set of axes below.

Based on this graph, what are the roots of the equation $-x^2 - 2x + 8 = 0$?

1. $8$ and $0$
2. $2$ and $-4$
3. $9$ and $-1$
4. $4$ and $-2$

401 A student correctly graphed the parabola shown below to solve a given quadratic equation.

What are the roots of the quadratic equation associated with this graph?

1. $-6$ and $3$
2. $-6$ and $0$
3. $-3$ and $2$
4. $-2$ and $3
402 The roots of a quadratic equation can be found using the graph below.

What are the roots of this equation?
1  -4, only
2  -4 and -1
3  -1 and 4
4  -4, -1, and 4

403 On the set of axes below, graph the equation $y = x^2 + 2x - 8$. Using the graph, determine and state the roots of the equation $x^2 + 2x - 8 = 0$.

A.A.8: WRITING QUADRATICS

404 Graph the equation $y = x^2 - 2x - 3$ on the accompanying set of axes. Using the graph, determine the roots of the equation $x^2 - 2x - 3 = 0$.

405 When 36 is subtracted from the square of a number, the result is five times the number. What is the positive solution?
1  9
2  6
3  3
4  4

406 Byron is 3 years older than Doug. The product of their ages is 40. How old is Doug?
1  10
2  8
3  5
4  4

407 Noj is 5 years older than Jacob. The product of their ages is 84. How old is Noj?
1  6
2  7
3  12
4  14
408 Find three consecutive positive even integers such that the product of the second and third integers is twenty more than ten times the first integer. [Only an algebraic solution can receive full credit.]

A.A.8: GEOMETRIC APPLICATIONS OF QUADRATICS

409 A rectangle has an area of 24 square units. The width is 5 units less than the length. What is the length, in units, of the rectangle?

1 6
2 8
3 3
4 19

410 The length of a rectangle is 3 inches more than its width. The area of the rectangle is 40 square inches. What is the length, in inches, of the rectangle?

1 5
2 8
3 8.5
4 11.5

411 A contractor needs 54 square feet of brick to construct a rectangular walkway. The length of the walkway is 15 feet more than the width. Write an equation that could be used to determine the dimensions of the walkway. Solve this equation to find the length and width, in feet, of the walkway.

A.G.10: IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN GRAPH

412 What are the vertex and the axis of symmetry of the parabola shown in the diagram below?

1 The vertex is (−2, −3), and the axis of symmetry is x = −2.
2 The vertex is (−2, −3), and the axis of symmetry is y = −2.
3 The vertex is (−3, −2), and the axis of symmetry is y = −2.
4 The vertex is (−3, −2), and the axis of symmetry is x = −2.
413 A swim team member performs a dive from a 14-foot-high springboard. The parabola below shows the path of her dive.

Which equation represents the axis of symmetry?
1  \(x = 3\)
2  \(y = 3\)
3  \(x = 23\)
4  \(y = 23\)

414 Which equation represents the axis of symmetry of the graph of the parabola below?
1  \(y = -3\)
2  \(x = -3\)
3  \(y = -25\)
4  \(x = -25\)

415 What is the equation of the axis of symmetry of the parabola shown in the diagram below?
1  \(x = -0.5\)
2  \(x = 2\)
3  \(x = 4.5\)
4  \(x = 13\)

416 What are the vertex and axis of symmetry of the parabola shown in the diagram below?
1  vertex: \((1, -4)\); axis of symmetry: \(x = 1\)
2  vertex: \((1, -4)\); axis of symmetry: \(x = -4\)
3  vertex: \((-4, 1)\); axis of symmetry: \(x = 1\)
4  vertex: \((-4, 1)\); axis of symmetry: \(x = -4\)
417 What are the vertex and the axis of symmetry of the parabola shown in the graph below?

1. vertex: (1, 6); axis of symmetry: $y = 1$
2. vertex: (1, 6); axis of symmetry: $x = 1$
3. vertex: (6, 1); axis of symmetry: $y = 1$
4. vertex: (6, 1); axis of symmetry: $x = 1$

418 What are the coordinates of the vertex and the equation of the axis of symmetry of the parabola shown in the graph below?

1. $(0, 2)$ and $y = 2$
2. $(0, 2)$ and $x = 2$
3. $(-2, 6)$ and $y = -2$
4. $(-2, 6)$ and $x = -2$

419 Which is the equation of a parabola that has the same vertex as the parabola represented by $y = x^2$, but is wider?

1. $y = x^2 + 2$
2. $y = x^2 - 2$
3. $y = 2x^2$
4. $y = \frac{1}{2} x^2$
420 State the equation of the axis of symmetry and the coordinates of the vertex of the parabola graphed below.

421 What are the vertex and axis of symmetry of the parabola $y = x^2 - 16x + 63$?
1 vertex: (8, -1); axis of symmetry: $x = 8$
2 vertex: (8, 1); axis of symmetry: $x = 8$
3 vertex: (-8, -1); axis of symmetry: $x = -8$
4 vertex: (-8, 1); axis of symmetry: $x = -8$

422 The height, $y$, of a ball tossed into the air can be represented by the equation $y = -x^2 + 10x + 3$, where $x$ is the elapsed time. What is the equation of the axis of symmetry of this parabola?
1 $y = 5$
2 $y = -5$
3 $x = 5$
4 $x = -5$

423 What is an equation of the axis of symmetry of the parabola represented by $y = -x^2 + 6x - 4$?
1 $x = 3$
2 $y = 3$
3 $x = 6$
4 $y = 6$

424 The equation of the axis of symmetry of the graph of $y = 2x^2 - 3x + 7$ is
1 $x = \frac{3}{4}$
2 $y = \frac{3}{4}$
3 $x = \frac{3}{2}$
4 $y = \frac{3}{2}$

425 What is the vertex of the parabola represented by the equation $y = -2x^2 + 24x - 100$?
1 $x = -6$
2 $x = 6$
3 (6, -28)
4 (6, -316)

426 The vertex of the parabola $y = x^2 + 8x + 10$ lies in Quadrant
1 I
2 II
3 III
4 IV

427 Find algebraically the equation of the axis of symmetry and the coordinates of the vertex of the parabola whose equation is $y = -2x^2 - 8x + 3$. 

A.A.41: IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN EQUATION
SYSTEMS
A.A.10: SOLVING LINEAR SYSTEMS

428 The equations $5x + 2y = 48$ and $3x + 2y = 32$ represent the money collected from school concert ticket sales during two class periods. If $x$ represents the cost for each adult ticket and $y$ represents the cost for each student ticket, what is the cost for each adult ticket?

1 $20
2 $10
3 $8
4 $4

429 What is the value of the $y$-coordinate of the solution to the system of equations $x + 2y = 9$ and $x - y = 3$?

1 6
2 2
3 3
4 5

430 What is the value of the $y$-coordinate of the solution to the system of equations $x - 2y = 1$ and $x + 4y = 7$?

1 1
2 -1
3 3
4 4

431 What is the solution of the system of equations $c + 3d = 8$ and $c = 4d - 6$?

1 $c = -14, d = -2$
2 $c = -2, d = 2$
3 $c = 2, d = 2$
4 $c = 14, d = -2$

432 What is the value of the $y$-coordinate of the solution to the system of equations $2x + y = 8$ and $x - 3y = -3$?

1 -2
2 2
3 3
4 -3

433 What is the solution of the system of equations $2x - 5y = 11$ and $-2x + 3y = -9$?

1 $(-3, -1)$
2 $(-1, 3)$
3 $(3, -1)$
4 $(3, 1)$

434 Using the substitution method, Ken solves the following system of equations algebraically.

$$
2x - y = 5 \\
3x + 2y = -3
$$

Which equivalent equation could Ken use?

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

435 Solve the following system of equations algebraically:

$$
3x + 2y = 4 \\
4x + 3y = 7
$$

[Only an algebraic solution can receive full credit.]

436 Solve the following system of equations algebraically for $y$:

$$
2x + 2y = 9 \\
2x - y = 3
$$
A.G.7: SOLVING LINEAR SYSTEMS

437 A system of equations is graphed on the set of axes below.

The solution of this system is
1 (0, 4)
2 (2, 4)
3 (4, 2)
4 (8, 0)

438 What is the solution of the system of equations shown in the graph below?

1 (1, 0) and (−3, 0)
2 (0, −3) and (0, −1)
3 (−1, −2)
4 (−2, −1)

439 On the grid below, solve the system of equations graphically for x and y.

\[ 4x - 2y = 10 \]
\[ y = -2x - 1 \]
On the set of axes below, solve the following system of equations graphically. State the coordinates of the solution.

\[
\begin{align*}
y &= 4x - 1 \\
2x + y &= 5
\end{align*}
\]

The sum of two numbers is 47, and their difference is 15. What is the larger number?

1. 16
2. 31
3. 32
4. 36

Jack bought 3 slices of cheese pizza and 4 slices of mushroom pizza for a total cost of $12.50. Grace bought 3 slices of cheese pizza and 2 slices of mushroom pizza for a total cost of $8.50. What is the cost of one slice of mushroom pizza?

1. $1.50
2. $2.00
3. $3.00
4. $3.50

Pam is playing with red and black marbles. The number of red marbles she has is three more than twice the number of black marbles she has. She has 42 marbles in all. How many red marbles does Pam have?

1. 13
2. 15
3. 29
4. 33

Sam and Odel have been selling frozen pizzas for a class fundraiser. Sam has sold half as many pizzas as Odel. Together they have sold a total of 126 pizzas. How many pizzas did Sam sell?

1. 21
2. 42
3. 63
4. 84

At Genesee High School, the sophomore class has 60 more students than the freshman class. The junior class has 50 fewer students than twice the students in the freshman class. The senior class is three times as large as the freshman class. If there are a total of 1,424 students at Genesee High School, how many students are in the freshman class?

1. 202
2. 205
3. 235
4. 236

Julia went to the movies and bought one jumbo popcorn and two chocolate chip cookies for $5.00. Marvin went to the same movie and bought one jumbo popcorn and four chocolate chip cookies for $6.00. How much does one chocolate chip cookie cost?

1. $0.50
2. $0.75
3. $1.00
4. $2.00
447 Josh and Mae work at a concession stand. They each earn $8 per hour. Josh worked three hours more than Mae. If Josh and Mae earned a total of $120, how many hours did Josh work?
1 6
2 9
3 12
4 15

448 Michael is 25 years younger than his father. The sum of their ages is 53. What is Michael’s age?
1 14
2 25
3 28
4 39

449 Ben has four more than twice as many CDs as Jake. If they have a total of 31 CDs, how many CDs does Jake have?
1 9
2 13
3 14
4 22

450 The total score in a football game was 72 points. The winning team scored 12 points more than the losing team. How many points did the winning team score?
1 30
2 42
3 54
4 60

451 The cost of 3 markers and 2 pencils is $1.80. The cost of 4 markers and 6 pencils is $2.90. What is the cost of each item? Include appropriate units in your answer.

452 The cost of three notebooks and four pencils is $8.50. The cost of five notebooks and eight pencils is $14.50. Determine the cost of one notebook and the cost of one pencil. [Only an algebraic solution can receive full credit.]
455 Which ordered pair is in the solution set of the system of inequalities shown in the graph below?

1. $(-2, -1)$
2. $(-2, 2)$
3. $(-2, -4)$
4. $(2, -2)$

456 Which ordered pair is in the solution set of the following system of inequalities?

\[
\begin{align*}
y &< \frac{1}{2}x + 4 \\
y &\geq -x + 1
\end{align*}
\]

1. $(-5, 3)$
2. $(0, 4)$
3. $(3, -5)$
4. $(4, 0)$

457 Which ordered pair is in the solution set of the following system of linear inequalities?

\[
\begin{align*}
y &< 2x + 2 \\
y &\geq -x - 1
\end{align*}
\]

1. $(0, 3)$
2. $(2, 0)$
3. $(-1, 0)$
4. $(-1, -4)$

458 Which coordinates represent a point in the solution set of the system of inequalities shown below?

\[
\begin{align*}
y &\leq \frac{1}{2}x + 13 \\
4x + 2y &> 3
\end{align*}
\]

1. $(-4, 1)$
2. $(-2, 2)$
3. $(1, -4)$
4. $(2, -2)$

459 Which ordered pair is in the solution set of the system of inequalities $y \leq 3x + 1$ and $x - y > 1$?

1. $(-1, -2)$
2. $(2, -1)$
3. $(1, 2)$
4. $(-1, 2)$

A.G.7: SYSTEMS OF LINEAR INEQUALITIES

460 On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

\[
\begin{align*}
2x - y &\geq 6 \\
x &> 2
\end{align*}
\]
461 On the set of axes below, solve the following system of inequalities graphically.

\[ y < 2x + 1 \]
\[ y \geq -\frac{1}{3}x + 4 \]

State the coordinates of a point in the solution set.

462 Graph the following systems of inequalities on the set of axes shown below and label the solution set \( S \):

\[ y > -x + 2 \]
\[ y \leq \frac{2}{3}x + 5 \]
463  Solve the following system of inequalities graphically on the set of axes below.

\[ 3x + y < 7 \]
\[ y \geq \frac{2}{3} x - 4 \]

State the coordinates of a point in the solution set.

464  On the set of axes below, graph the following system of inequalities.

\[ y + x \geq 3 \]
\[ 5x - 2y > 10 \]

State the coordinates of *one* point that satisfies \( y + x \geq 3 \), but does not satisfy \( 5x - 2y > 10 \).

A.A.11: QUADRATIC-LINEAR SYSTEMS

465  Which ordered pair is a solution to the system of equations \( y = x \) and \( y = x^2 - 2 \)?

1. \((-2, -2)\)
2. \((-1, 1)\)
3. \((0, 0)\)
4. \((2, 2)\)

466  Which ordered pair is in the solution set of the system of equations \( y = -x + 1 \) and \( y = x^2 + 5x + 6 \)?

1. \((-5, -1)\)
2. \((-5, 6)\)
3. \((5, -4)\)
4. \((5, 2)\)
467 Which ordered pair is a solution of the system of equations \( y = x^2 - x - 20 \) and \( y = 3x - 15 \)?
1 \((-5, -30)\)
2 \((-1, -18)\)
3 \((0, 5)\)
4 \((5, -1)\)

468 Which ordered pair is a solution to the system of equations \( y = x + 3 \) and \( y = x^2 - x \)?
1 \((6, 9)\)
2 \((3, 6)\)
3 \((3, -1)\)
4 \((2, 5)\)

469 What is the solution set of the system of equations \( x + y = 5 \) and \( y = x^2 - 25 \)?
1 \){(0, 5), (11, -6)}\)
2 \){(5, 0), (-6, 11)}\)
3 \){(-5, 0), (6, 11)}\)
4 \){(-5, 10), (6, -1)}\)

470 Solve the following system of equations algebraically for all values of \( x \) and \( y \).
\[ y = x^2 + 2x - 8 \]
\[ y = 2x + 1 \]
1 \((-3, 1)\)
2 \((-3, 5)\)
3 \((0, -1)\)
4 \((0, -4)\)
472 Two equations were graphed on the set of axes below.

Which point is a solution of the system of equations shown on the graph?
1 \((8,9)\)
2 \((5,0)\)
3 \((0,3)\)
4 \((2,−3)\)

473 Which graph can be used to find the solution of the following system of equations?

\[
\begin{align*}
y &= x^2 + 2x + 3 \\
2y - 2x &= 10
\end{align*}
\]
474 Which graph could be used to find the solution of the system of equations \( y = 2x + 6 \) and 
\( y = x^2 + 4x + 3 \)?

475 How many solutions are there for the following system of equations?
\[
\begin{align*}
y &= x^2 - 5x + 3 \\
y &= x - 6
\end{align*}
\]

\[
\begin{array}{cccc}
1 & 1 \\
2 & 2 \\
3 & 3 \\
4 & 0 \\
\end{array}
\]

476 Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.
\[
\begin{align*}
y &= x^2 - 6x + 5 \\
2x + y &= 5
\end{align*}
\]
477 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

\[ y = x^2 + 4x - 5 \]
\[ y = x - 1 \]

478 On the set of axes below, solve the following system of equations graphically for all values of \( x \) and \( y \).

\[ y = x^2 - 6x + 1 \]
\[ y + 2x = 6 \]
479 On the set of axes below, solve the following system of equations graphically for all values of $x$ and $y$.

\[ y = -x^2 - 4x + 12 \]
\[ y = -2x + 4 \]

480 On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

\[ y = -x^2 + 6x - 3 \]
\[ x + y = 7 \]
481 On the set of axes below, graph the following system of equations.

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

\[ y - x = 4 \]

Using the graph, determine and state the coordinates of all points in the solution set for the system of equations.

482 On the set of axes below, graph the following system of equations. Using the graph, determine and state all solutions of the system of equations.

\[ y = -x^2 - 2x + 3 \]

\[ y + 1 = -2x \]

A.A.13: ADDITION AND SUBTRACTION OF MONOMIALS

483 Which expression is equivalent to 
\[-3x(x - 4) - 2x(x + 3)\]?

1. \(-x^2 - 1\)
2. \(-x^2 + 18x\)
3. \(-5x^2 - 6x\)
4. \(-5x^2 + 6x\)
A.A.13: ADDITION AND SUBTRACTION OF POLYNOMIALS

484 When \(3g^2 - 4g + 2\) is subtracted from \(7g^2 + 5g - 1\), the difference is
1 \(-4g^2 - 9g + 3\)
2 \(4g^2 + g + 1\)
3 \(4g^2 + 9g - 3\)
4 \(10g^2 + g + 1\)

485 When \(4x^2 + 7x - 5\) is subtracted from \(9x^2 - 2x + 3\), the result is
1 \(5x^2 + 5x - 2\)
2 \(5x^2 - 9x + 8\)
3 \(-5x^2 + 5x - 2\)
4 \(-5x^2 + 9x - 8\)

486 The sum of \(4x^3 + 6x^2 + 2x - 3\) and \(3x^3 + 3x^2 - 5x - 5\) is
1 \(7x^3 + 3x^2 - 3x - 8\)
2 \(7x^3 + 3x^2 + 7x + 2\)
3 \(7x^3 + 9x^2 - 3x - 8\)
4 \(7x^6 + 9x^4 - 3x^3 - 8\)

487 What is the result when \(2x^2 + 3xy - 6\) is subtracted from \(x^2 - 7xy + 2\)?
1 \(-x^2 - 10xy + 8\)
2 \(x^2 + 10xy - 8\)
3 \(-x^2 - 4xy - 4\)
4 \(x^2 - 4xy - 4\)

488 When \(5x + 4y\) is subtracted from \(5x - 4y\), the difference is
1 \(0\)
2 \(10x\)
3 \(8y\)
4 \(-8y\)

489 What is the sum of \(-3x^2 - 7x + 9\) and \(-5x^2 + 6x - 4\)?
1 \(-8x^2 - x + 5\)
2 \(-8x^2 - x + 5\)
3 \(-8x - 13x + 13\)
4 \(-8x^2 - 13x^2 + 13\)

490 When \(8x^2 + 3x + 2\) is subtracted from \(9x^2 - 3x - 4\), the result is
1 \(x^2 - 2\)
2 \(17x^2 - 2\)
3 \(-x^2 + 6x + 6\)
4 \(x^2 - 6x - 6\)

491 The sum of \(3x^2 + 5x - 6\) and \(-x^2 + 3x + 9\) is
1 \(2x^2 + 8x - 15\)
2 \(2x^2 + 8x + 3\)
3 \(2x^4 + 8x^3 + 3\)
4 \(4x^2 + 2x - 15\)

492 When \(2x^2 + 3x + 2\) is subtracted from \(4x^2 - 5x + 2\), the result is
1 \(2x^2 - 2x\)
2 \(-2x^2 + 2x\)
3 \(-2x^2 - 8x + 4\)
4 \(2x^2 - 8x + 4\)

493 The sum of \(8n^2 - 3n + 10\) and \(-3n^2 - 6n - 7\) is
1 \(5n^2 - 9n + 3\)
2 \(5n^2 - 3n - 17\)
3 \(-1n^2 - 9n - 17\)
4 \(-1n^2 - 3n + 3\)
A.A.13: MULTIPLICATION OF POLYNOMIALS

494 What is the product of \(-3x^2y\) and \((5xy^2 + xy)\)?
1 \(-15x^3y^3 - 3x^3y^2\)
2 \(-15x^3y^3 - 3x^3y\)
3 \(-15x^2y^2 - 3x^2y\)
4 \(-15x^3y^3 + xy\)

495 What is the product of \((3x + 2)\) and \((x - 7)\)?
1 \(3x^2 - 14\)
2 \(3x^2 - 5x - 14\)
3 \(3x^2 - 19x - 14\)
4 \(3x^2 - 23x - 14\)

A.A.14: DIVISION OF POLYNOMIALS

496 Which expression represents \(\frac{12x^3 - 6x^2 + 2x}{2x}\) in simplest form?
1 \(6x^2 - 3x\)
2 \(10x^2 - 4x\)
3 \(6x^2 - 3x + 1\)
4 \(10x^2 - 4x + 1\)

497 The quotient of \(\frac{8x^5 - 2x^4 + 4x^3 - 6x^2}{2x^2}\) is
1 \(16x^7 - 4x^6 + 8x^5 - 12x^4\)
2 \(4x^7 - x^6 + 2x^5 - 3x^4\)
3 \(4x^3 - x^2 + 2x - 3\)
4 \(4x^3 - x^2 + 2x - 3\)

498 What is \(24x^2y^6 - 16x^4y^2 + 4xy^2\) divided by \(4xy^2\)?
1 \(6xy^4 - 4x^5\)
2 \(6xy^4 - 4x^5 + 1\)
3 \(6x^2y^3 - 4x^6y\)
4 \(6x^2y^3 - 4x^6y + 1\)

499 Express in simplest form: \(\frac{45a^4b^3 - 90a^3b}{15a^2b}\)

A.A.12: MULTIPLICATION OF POWERS

500 Which expression is equivalent to \(3^3 \cdot 3^4\)?
1 \(9^{12}\)
2 \(9^7\)
3 \(3^{12}\)
4 \(3^7\)

501 Which expression represents \((3x^2y^4)(4xy^2)\) in simplest form?
1 \(12x^2y^6\)
2 \(12x^2y^6\)
3 \(12x^3y^8\)
4 \(12x^3y^6\)

A.A.12: DIVISION OF POWERS

502 What is half of \(2^6\)?
1 \(1^3\)
2 \(1^6\)
3 \(2^3\)
4 \(2^5\)

503 What is one-third of \(3^6\)?
1 \(1^2\)
2 \(3^2\)
3 \(3^5\)
4 \(9^6\)
504 Which expression represents $\frac{27x^{18}y^{5}}{9x^{6}y}$ in simplest form?
1. $3x^{12}y^{4}$
2. $3x^{3}y^{5}$
3. $18x^{12}y^{4}$
4. $18x^{3}y^{5}$

505 Which expression represents $\frac{-14a^{2}c^{8}}{7a^{3}c^{2}}$ in simplest form?
1. $-2ac^{4}$
2. $-2ac^{6}$
3. $\frac{-2c^{4}}{a}$
4. $\frac{-2c^{6}}{a}$

506 The expression $\frac{12w^{9}y^{3}}{-3w^{3}y^{3}}$ is equivalent to
1. $-4w^{6}$
2. $-4w^{3}y$
3. $9w^{6}$
4. $9w^{3}y$

507 Which expression represents $\frac{(2x^{3})(8x^{3})}{4x^{6}}$ in simplest form?
1. $x^{2}$
2. $x^{9}$
3. $4x^{2}$
4. $4x^{9}$

508 The product of $\frac{4x^{2}}{7y^{2}}$ and $\frac{21y^{3}}{20x^{4}}$, expressed in simplest form, is
1. $0.6x^{2}y$
2. $\frac{3y}{5x^{5}}$
3. $\frac{12x^{2}y^{3}}{20x^{4}y^{2}}$
4. $\frac{84x^{2}y^{3}}{140x^{4}y^{2}}$

509 Simplify: $\frac{27k^{5}m^{8}}{(4k^{3})(9m^{2})}$

A.A.12: POWERS OF POWERS

510 Which expression is equivalent to $(3x^{2})^{3}$?
1. $9x^{5}$
2. $9x^{6}$
3. $27x^{5}$
4. $27x^{6}$

511 The expression $\frac{(10w^{3})^{2}}{5w}$ is equivalent to
1. $2w^{5}$
2. $2w^{8}$
3. $20w^{5}$
4. $20w^{8}$

512 The expression $\frac{(4x^{3})^{2}}{2x}$ is equivalent to
1. $4x^{4}$
2. $4x^{5}$
3. $8x^{4}$
4. $8x^{5}$
513 If the expression \((2y^a)^4\) is equivalent to \(16y^8\), what is the value of \(a\)?

1. 12
2. 2
3. 32
4. 4

514 Which equation is true?

1. \(\frac{c^5}{d^2} + \frac{d^3}{c} = \frac{c^4}{d^4}\)
2. \((-2m^2)p^3 = -8m^6p^3\)
3. \(\left(\frac{s^3t^8}{s^4t^5}\right)^2 = \frac{t^5}{s^2}\)
4. \((-2a^2b^3)(3ab^2) = a^3b^5\)

515 What is the product of \((6 \times 10^3)\), \((4.6 \times 10^5)\), and \((2 \times 10^{-2})\) expressed in scientific notation?

1. 55.2 \times 10^6
2. 5.52 \times 10^7
3. 55.2 \times 10^7
4. 5.52 \times 10^{10}

516 What is the product of \(8.4 \times 10^8\) and \(4.2 \times 10^3\) written in scientific notation?

1. 2.0 \times 10^5
2. 12.6 \times 10^{11}
3. 35.28 \times 10^{11}
4. 3.528 \times 10^{12}

517 What is the product of 12 and \(4.2 \times 10^6\) expressed in scientific notation?

1. 50.4 \times 10^6
2. 50.4 \times 10^7
3. 5.04 \times 10^6
4. 5.04 \times 10^7

518 The quotient of \((9.2 \times 10^6)\) and \((2.3 \times 10^2)\) expressed in scientific notation is

1. 4,000
2. 40,000
3. 4 \times 10^3
4. 4 \times 10^4

519 What is the quotient of \(8.05 \times 10^6\) and \(3.5 \times 10^2\)?

1. 2.3 \times 10^3
2. 2.3 \times 10^4
3. 2.3 \times 10^8
4. 2.3 \times 10^{12}

520 The expression \(\frac{6 \times 10^{-7}}{3 \times 10^{-3}}\) is equivalent to

1. 2 \times 10^4
2. 2 \times 10^{10}
3. 2 \times 10^{-4}
4. 2 \times 10^{-10}

521 State the value of the expression \(\frac{(4.1 \times 10^5)(2.4 \times 10^7)}{(1.5 \times 10^7)}\) in scientific notation.

A.A.9: EXPONENTIAL FUNCTIONS

522 The current population of a town is 10,000. If the population, \(P\), increases by 20% each year, which equation could be used to find the population after \(t\) years?

1. \(P = 10,000(0.2)^t\)
2. \(P = 10,000(0.8)^t\)
3. \(P = 10,000(1.2)^t\)
4. \(P = 10,000(1.8)^t\)
523 Cassandra bought an antique dresser for $500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the nearest dollar?
1 $415
2 $590
3 $596
4 $770

524 The value, \( y \), of a $15,000 investment over \( x \) years is represented by the equation \( y = 15000(1.2)^{\frac{x}{3}} \). What is the profit (interest) on a 6-year investment?
1 $6,600
2 $10,799
3 $21,600
4 $25,799

525 The current student population of the Brentwood Student Center is 2,000. The enrollment at the center increases at a rate of 4% each year. To the nearest whole number, what will the student population be closest to in 3 years?
1 2,240
2 2,250
3 5,488
4 6,240

526 Mr. Smith invested $2,500 in a savings account that earns 3% interest compounded annually. He made no additional deposits or withdrawals. Which expression can be used to determine the number of dollars in this account at the end of 4 years?
1 \( 2500(1 + 0.03)^4 \)
2 \( 2500(1 + 0.3)^4 \)
3 \( 2500(1 + 0.04)^3 \)
4 \( 2500(1 + 0.4)^3 \)

527 A bank is advertising that new customers can open a savings account with a \( 3 \frac{3}{4} \% \) interest rate compounded annually. Robert invests $5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the nearest cent, after three years.

528 Adrianne invested $2,000 in an account at a 3.5% interest rate compounded annually. She made no deposits or withdrawals on the account for 4 years. Determine, to the nearest dollar, the balance in the account after the 4 years.

529 Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is $21,000. Which equation represents the value, \( v \), of the car after 3 years?
1 \( v = 21,000(0.14)^3 \)
2 \( v = 21,000(0.86)^3 \)
3 \( v = 21,000(1.14)^3 \)
4 \( v = 21,000(0.86)(3) \)

530 The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams, \( t \), that remained in the tournament after \( r \) rounds?
1 \( t = 64(r)^{0.5} \)
2 \( t = 64(-0.5)^r \)
3 \( t = 64(1.5)^r \)
4 \( t = 64(0.5)^r \)

531 A car depreciates (loses value) at a rate of 4.5% annually. Greg purchased a car for $12,500. Which equation can be used to determine the value of the car, \( V \), after 5 years?
1 \( V = 12,500(0.55)^5 \)
2 \( V = 12,500(0.955)^5 \)
3 \( V = 12,500(1.045)^5 \)
4 \( V = 12,500(1.45)^5 \)
532 Is the equation \( A = 21000(1 - 0.12)^t \) a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?
1 exponential growth and 12%
2 exponential growth and 88%
3 exponential decay and 12%
4 exponential decay and 88%

533 Daniel’s Print Shop purchased a new printer for $35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?
1 $33,250.00
2 $30,008.13
3 $28,507.72
4 $27,082.33

534 The value of a car purchased for $20,000 decreases at a rate of 12% per year. What will be the value of the car after 3 years?
1 $12,800.00
2 $13,629.44
3 $17,600.00
4 $28,098.56

535 In a science fiction novel, the main character found a mysterious rock that decreased in size each day. The table below shows the part of the rock that remained at noon on successive days.

<table>
<thead>
<tr>
<th>Day</th>
<th>Fractional Part of the Rock Remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>3</td>
<td>( \frac{1}{4} )</td>
</tr>
<tr>
<td>4</td>
<td>( \frac{1}{8} )</td>
</tr>
</tbody>
</table>

Which fractional part of the rock will remain at noon on day 7?
1 \( \frac{1}{128} \)
2 \( \frac{1}{64} \)
3 \( \frac{1}{14} \)
4 \( \frac{1}{12} \)

536 The Booster Club raised $30,000 for a sports fund. No more money will be placed into the fund. Each year the fund will decrease by 5%. Determine the amount of money, to the nearest cent, that will be left in the sports fund after 4 years.
537. On the set of axes below, draw the graph of \( y = 2^x \) over the interval \(-1 \leq x \leq 3\). Will this graph ever intersect the \( x \)-axis? Justify your answer.

![Graph of \( y = 2^x \)](image)

538. On the set of axes below, graph \( y = 3^x \) over the interval \(-1 \leq x \leq 2\).

![Graph of \( y = 3^x \)](image)

**RADICALS**

**A.N.2: SIMPLIFYING RADICALS**

539. What is \( \sqrt{72} \) expressed in simplest radical form?
   1. \( 2\sqrt{18} \)
   2. \( 3\sqrt{8} \)
   3. \( 6\sqrt{2} \)
   4. \( 8\sqrt{3} \)

540. What is \( \sqrt{32} \) expressed in simplest radical form?
   1. \( 16\sqrt{2} \)
   2. \( 4\sqrt{2} \)
   3. \( 4\sqrt{8} \)
   4. \( 2\sqrt{8} \)

541. When \( 5\sqrt{20} \) is written in simplest radical form, the result is \( k\sqrt{5} \). What is the value of \( k \)?
   1. \( 20 \)
   2. \( 10 \)
   3. \( 7 \)
   4. \( 4 \)

542. What is \( 3\sqrt{250} \) expressed in simplest radical form?
   1. \( 5\sqrt{10} \)
   2. \( 8\sqrt{10} \)
   3. \( 15\sqrt{10} \)
   4. \( 75\sqrt{10} \)

543. What is \( 2\sqrt{45} \) expressed in simplest radical form?
   1. \( 3\sqrt{5} \)
   2. \( 5\sqrt{5} \)
   3. \( 6\sqrt{5} \)
   4. \( 18\sqrt{5} \)
544 What is $\frac{\sqrt{32}}{4}$ expressed in simplest radical form?

1. $\sqrt{2}$
2. $4\sqrt{2}$
3. $\sqrt{8}$
4. $\frac{\sqrt{8}}{2}$

545 Express $5\sqrt{72}$ in simplest radical form.

546 Express $-3\sqrt{48}$ in simplest radical form.

547 Express $4\sqrt{75}$ in simplest radical form.

548 Express $2\sqrt{108}$ in simplest radical form.

A.N.3: OPERATIONS WITH RADICALS

549 The expression $6\sqrt{50} + 6\sqrt{2}$ written in simplest radical form is

1. $6\sqrt{52}$
2. $12\sqrt{52}$
3. $17\sqrt{2}$
4. $36\sqrt{2}$

550 The expression $\sqrt{72} - 3\sqrt{2}$ written in simplest radical form is

1. $5\sqrt{2}$
2. $3\sqrt{6}$
3. $3\sqrt{2}$
4. $\sqrt{6}$

551 What is $3\sqrt{2} + \sqrt{8}$ expressed in simplest radical form?

1. $3\sqrt{10}$
2. $3\sqrt{16}$
3. $5\sqrt{2}$
4. $7\sqrt{2}$

552 Express $\frac{3\sqrt{75} + \sqrt{27}}{3}$ in simplest radical form.

553 Express $\sqrt{25} - 2\sqrt{3} + \sqrt{27} + 2\sqrt{9}$ in simplest radical form.

554 Express the product of $3\sqrt{20}(2\sqrt{5} - 7)$ in simplest radical form.

555 Express $\frac{16\sqrt{21}}{2\sqrt{7}} - 5\sqrt{12}$ in simplest radical form.

RATIONALS

A.A.16: RATIONAL EXPRESSIONS

556 The expression $\frac{9x^4 - 27x^6}{3x^3}$ is equivalent to

1. $3x(1 - 3x)$
2. $3x(1 - 3x^2)$
3. $3x(1 - 9x^3)$
4. $9x^3(1 - x)$

557 Which expression represents $\frac{2x^2 - 12x}{x - 6}$ in simplest form?

1. $0$
2. $2x$
3. $4x$
4. $2x + 2$
558 Which expression represents \( \frac{25x - 125}{x^2 - 25} \) in simplest form?

- 1 \( \frac{5}{x} \)
- 2 \( \frac{-5}{x} \)
- 3 \( \frac{25}{x - 5} \)
- 4 \( \frac{25}{x + 5} \)

559 Which expression represents \( \frac{x^2 - 2x - 15}{x^2 + 3x} \) in simplest form?

- 1 \(-5\)
- 2 \(\frac{x - 5}{x}\)
- 3 \(\frac{-2x - 5}{x}\)
- 4 \(\frac{-2x - 15}{3x}\)

560 Which expression represents \( \frac{x^2 - x - 6}{x^2 - 5x + 6} \) in simplest form?

- 1 \(\frac{x + 2}{x - 2}\)
- 2 \(\frac{-x - 6}{-5x + 6}\)
- 3 \(\frac{1}{5}\)
- 4 \(-1\)

561 Which expression represents \( \frac{x^2 - 3x - 10}{x^2 - 25} \) in simplest form?

- 1 \(\frac{2}{5}\)
- 2 \(\frac{x + 2}{x + 5}\)
- 3 \(\frac{x - 2}{x - 5}\)
- 4 \(\frac{-3x - 10}{-25}\)

562 Which expression is equivalent to \( \frac{2x^6 - 18x^4 + 2x^2}{2x^2} \)?

- 1 \(x^3 - 9x^2\)
- 2 \(x^4 - 9x^2\)
- 3 \(x^3 - 9x^2 + 1\)
- 4 \(x^4 - 9x^2 + 1\)

563 The expression \( \frac{2x^2 + 10x - 28}{4x + 28} \) is equivalent to

- 1 \(\frac{x - 2}{2}\)
- 2 \(x - 1\)
- 3 \(\frac{x + 2}{2}\)
- 4 \(\frac{x + 5}{2}\)

564 If the area of a rectangle is represented by \(x^2 + 8x + 15\) and its length is represented by \(x + 5\), which expression represents the width of the rectangle?

- 1 \(x + 3\)
- 2 \(x - 3\)
- 3 \(x^2 + 6x + 5\)
- 4 \(x^2 + 7x + 10\)

565 The area of a rectangle is represented by \(x^2 - 5x - 24\). If the width of the rectangle is represented by \(x - 8\), express the length of the rectangle as a binomial.

566 Express in simplest form: \( \frac{x^2 - 1}{x^2 + 3x + 2} \)
A.A.15: UNDEFINED RATIONALS

567 Which value of $x$ makes the expression \( \frac{x+4}{x-3} \) undefined?
1. 4
2. 3
3. 1
4. 2

568 The expression \( \frac{x-3}{x+2} \) is undefined when the value of $x$ is
1. -3, only
2. 2 and 3
3. 3, only
4. -3 and 2

569 Which value of $n$ makes the expression \( \frac{5n}{2n-1} \) undefined?
1. 1
2. 0
3. \( \frac{1}{2} \)
4. \( \frac{1}{2} \)

570 For which value of $x$ is \( \frac{x-3}{x^2-4} \) undefined?
1. -2
2. 0
3. 3
4. 4

571 The function \( y = \frac{x}{x^2-9} \) is undefined when the value of $x$ is
1. 0 or 3
2. 3 or -3
3. 3, only
4. -3, only

572 The algebraic expression \( \frac{x-2}{x^2-9} \) is undefined when
1. $x$ is 1
2. 2
3. 3
4. 9

573 The expression \( \frac{14+x}{x^2-4} \) is undefined when $x$ is
1. -14, only
2. 2, only
3. -2 or 2
4. -14, -2, or 2

574 Which value of $x$ makes the expression \( \frac{x^2-9}{x^2+7x+10} \) undefined?
1. -5
2. 2
3. 3
4. -3

575 For which set of values of $x$ is the algebraic expression \( \frac{x^2-16}{x^2-4x-12} \) undefined?
1. \{ -6, 2 \}
2. \{ -4, 3 \}
3. \{ -4, 4 \}
4. \{ -2, 6 \}

576 For which values of $x$ is the fraction \( \frac{x^2+x-6}{x^2+5x-6} \) undefined?
1. 1 and -6
2. 2 and -3
3. 3 and -2
4. 6 and -1
577 A value of $x$ that makes the expression $\frac{x^2 + 4x - 12}{x^2 - 2x - 15}$ undefined is
1. -6
2. -2
3. 3
4. 5

A.A.18: MULTIPLICATION AND DIVISION OF RATIONALS

578 What is the product of $\frac{x^2 - 1}{x + 1}$ and $\frac{x + 3}{3x - 3}$ expressed in simplest form?
1. $x$
2. $\frac{x}{3}$
3. $x + 3$
4. $\frac{x + 3}{3}$

579 What is the product of $\frac{-4x}{x - 1}$ and $\frac{x^2 - 1}{3x + 3}$ expressed in simplest form?
1. $\frac{4x}{3}$
2. $\frac{4x^2}{3}$
3. $\frac{4x^2}{3(x + 1)}$
4. $\frac{4(x + 1)}{3}$

580 Express the product of $\frac{x + 2}{2}$ and $\frac{4x + 20}{x^2 + 6x + 8}$ in simplest form.

581 What is the quotient of $\frac{x}{x + 4}$ divided by $\frac{2x}{x^2 - 16}$?
1. $\frac{2}{x - 4}$
2. $\frac{2x^2}{x - 4}$
3. $\frac{2x^2}{x^2 - 16}$
4. $\frac{x - 4}{2}$

582 Express in simplest form:
$\frac{x^2 + 9x + 14}{x^2 - 49} + \frac{3x + 6}{x^2 + x - 56}$

583 Express in simplest form: $\frac{2x^2 - 8x - 42}{6x^2} + \frac{x^2 - 9}{x^2 - 3x}$

584 Perform the indicated operation and simplify:
$\frac{3x + 6}{4x + 12} + \frac{x^2 - 4}{x + 3}$

585 Express $\frac{3x^2 + 9x}{x^2 + 5x + 6} + \frac{x^2 - 9}{x^2 - x - 6}$ in simplest form.

A.A.17: ADDITION AND SUBTRACTION OF RATIONALS

586 What is the sum of $\frac{d}{2}$ and $\frac{2d}{3}$ expressed in simplest form?
1. $\frac{3d}{5}$
2. $\frac{3d}{6}$
3. $\frac{7d}{5}$
4. $\frac{7d}{6}$
587. What is the sum of \( \frac{3}{2x} \) and \( \frac{4}{3x} \) expressed in simplest form?
1. \( \frac{12}{6x^2} \)
2. \( \frac{17}{6x} \)
3. \( \frac{7}{5x} \)
4. \( \frac{17}{12x} \)

588. What is the sum of \( \frac{3}{2x} \) and \( \frac{7}{4x} \)?
1. \( \frac{21}{8x^2} \)
2. \( \frac{13}{4x} \)
3. \( \frac{10}{6x} \)
4. \( \frac{13}{8x} \)

589. What is \( \frac{2+x}{5x} - \frac{x-2}{5x} \) expressed in simplest form?
1. 0
2. \( \frac{2}{5} \)
3. \( \frac{4}{5x} \)
4. \( \frac{2x+4}{5x} \)

590. What is \( \frac{6}{5x} - \frac{2}{3x} \) in simplest form?
1. \( \frac{8}{15x^2} \)
2. \( \frac{8}{15x} \)
3. \( \frac{4}{15x} \)
4. \( \frac{4}{2x} \)

591. What is \( \frac{6}{4a} - \frac{2}{3a} \) expressed in simplest form?
1. \( \frac{4}{a} \)
2. \( \frac{5}{6a} \)
3. \( \frac{8}{7a} \)
4. \( \frac{10}{12a} \)

592. Which fraction is equivalent to \( \frac{4}{3a} - \frac{5}{2a} \)?
1. \( \frac{1}{a} \)
2. \( \frac{1}{5a} \)
3. \( \frac{7}{6a} \)
4. \( \frac{7}{6a^2} \)

593. What is \( \frac{7}{12x} - \frac{y}{6x^2} \) expressed in simplest form?
1. \( \frac{7-y}{6x} \)
2. \( \frac{7-y}{12x-6x^2} \)
3. \( \frac{7y}{12x^2} \)
4. \( \frac{7x-2y}{12x^3} \)
594 What is the sum of \(\frac{3x^2}{x-2}\) and \(\frac{x^2}{x-2}\)?

1 \(\frac{3x^4}{(x-2)^2}\)
2 \(\frac{3x^4}{x-2}\)
3 \(\frac{4x^2}{(x-2)^2}\)
4 \(\frac{4x^2}{x-2}\)

595 What is the sum of \(-\frac{x+7}{2x+4}\) and \(\frac{2x+5}{2x+4}\)?

1 \(\frac{x+12}{2x+4}\)
2 \(\frac{3x+12}{2x+4}\)
3 \(\frac{x+12}{4x+8}\)
4 \(\frac{3x+12}{4x+8}\)

596 What is the sum of \(\frac{2y}{y+5}\) and \(\frac{10}{y+5}\) expressed in simplest form?

1 1
2 2
3 \(\frac{12y}{y+5}\)
4 \(\frac{2y+10}{y+5}\)

597 The expression \(\frac{2x+13}{2x+6} - \frac{3x-6}{2x+6}\) is equivalent to

1 \(\frac{-x+19}{2(x+3)}\)
2 \(\frac{-x+7}{2(x+3)}\)
3 \(\frac{5x+19}{2(x+3)}\)
4 \(\frac{5x+7}{4x+12}\)

A.A.26: SOLVING RATIONALS

598 Which value of \(x\) is a solution of \(\frac{5}{x} = \frac{x+13}{6}\)?

1 \(-2\)
2 \(-3\)
3 \(-10\)
4 \(-15\)

599 What is the solution of \(\frac{k+4}{2} = \frac{k+9}{3}\)?

1 \(1\)
2 \(5\)
3 \(6\)
4 \(14\)

600 What is the value of \(x\) in the equation \(\frac{2}{x} - 3 = \frac{26}{x}\)?

1 \(-8\)
2 \(-\frac{1}{8}\)
3 \(\frac{1}{8}\)
4 \(8\)

601 What is the solution set of \(\frac{x+2}{x-2} = \frac{-3}{x}\)?

1 \(\{-2, 3\}\)
2 \(\{-3, -2\}\)
3 \(\{-1, 6\}\)
4 \(\{-6, 1\}\)

602 Which value of \(x\) is the solution of \(\frac{2x-3}{x-4} = \frac{2}{3}\)?

1 \(-\frac{1}{4}\)
2 \(\frac{1}{4}\)
3 \(-4\)
4 \(4\)
603 What is the solution of \( \frac{2}{x+1} = \frac{x+1}{2} \)?
1. \(-1\) and \(-3\)
2. \(-1\) and \(3\)
3. \(1\) and \(-3\)
4. \(1\) and \(3\)

604 What is the solution of the equation \( \frac{x+2}{2} = \frac{4}{x} \)?
1. \(1\) and \(-8\)
2. \(2\) and \(-4\)
3. \(-1\) and \(8\)
4. \(-2\) and \(4\)

605 Solve for \(x\): \( \frac{x+1}{x} = \frac{-7}{x-12} \)

606 Solve algebraically for \(x\): \( \frac{x+2}{6} = \frac{3}{x-1} \)

607 Solve algebraically for \(x\): \( \frac{3}{4} = \frac{-(x+11)}{4x} + \frac{1}{2x} \)

608 Solve algebraically: \( \frac{2}{3x} + \frac{4}{x} = \frac{7}{x+1} \)
[Only an algebraic solution can receive full credit.]

FUNCTIONS
A.G.4: FAMILIES OF FUNCTIONS

609 Which equation represents a quadratic function?
1. \(y = x + 2\)
2. \(y = |x + 2|\)
3. \(y = x^2\)
4. \(y = 2^x\)

610 Which type of graph is shown in the diagram below?
1. absolute value
2. exponential
3. linear
4. quadratic

611 Which type of function is represented by the graph shown below?
1. absolute value
2. exponential
3. linear
4. quadratic
612 Which type of function is graphed below?

1 linear  
2 quadratic  
3 exponential  
4 absolute value

613 Which graph represents a linear function?

1  
2  
3  
4
614 Which graph represents an exponential equation?

615 Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?
A.G.4: IDENTIFYING THE EQUATION OF A GRAPH

616 Which equation is represented by the graph below?

1. $2y + x = 10$
2. $y - 2x = -5$
3. $-2y = 10x - 4$
4. $2y = -4x - 10$

A.G.3: DEFINING FUNCTIONS

618 Which relation is not a function?
1. $\{(1, 5), (2, 6), (3, 6), (4, 7)\}$
2. $\{(4, 7), (2, 1), (-3, 6), (3, 4)\}$
3. $\{(-1, 6), (1, 3), (2, 5), (1, 7)\}$
4. $\{(-1, 2), (0, 5), (5, 0), (2, -1)\}$

619 Which relation represents a function?
1. $\{(0, 3), (2, 4), (0, 6)\}$
2. $\{(-7, 5), (-7, 1), (-10, 3), (-4, 3)\}$
3. $\{(2, 0), (6, 2), (6, -2)\}$
4. $\{(-6, 5), (-3, 2), (1, 2), (6, 5)\}$

620 Which relation is a function?
1. $\left\{ \left( \frac{3}{4}, 0 \right), (0, 1), \left( \frac{3}{4}, 2 \right) \right\}$
2. $\left\{ (-2, 2), \left( -\frac{1}{2}, 1 \right), (-2, 4) \right\}$
3. $\{(-1, 4), (0, 5), (0, 4)\}$
4. $\{(2, 1), (4, 3), (6, 5)\}$

621 Which set of ordered pairs represents a function?
1. $\{(0, 4), (2, 4), (2, 5)\}$
2. $\{(6, 0), (5, 0), (4, 0)\}$
3. $\{(4, 1), (6, 2), (6, 3), (5, 0)\}$
4. $\{(0, 4), (1, 4), (0, 5), (1, 5)\}$
622 Which graph represents a function?

623 Which graph represents a function?
624 Which graph represents a function?

625 Which graph does not represent a function?
626 Which graph represents a function?

627 Which graph represents a function?
628 Which graph does not represent the graph of a function?

1  

2

3

4

629 Which statement is true about the relation shown on the graph below?

1 It is a function because there exists one $x$-coordinate for each $y$-coordinate.
2 It is a function because there exists one $y$-coordinate for each $x$-coordinate.
3 It is not a function because there are multiple $y$-values for a given $x$-value.
4 It is not a function because there are multiple $x$-values for a given $y$-value.
TRIANGLES
A.A.45: PYTHAGOREAN THEOREM

630 Don placed a ladder against the side of his house as shown in the diagram below.

Which equation could be used to find the distance, \( x \), from the foot of the ladder to the base of the house?

1. \( x = 20 - 19.5 \)
2. \( x = 20^2 - 19.5^2 \)
3. \( x = \sqrt{20^2 - 19.5^2} \)
4. \( x = \sqrt{20^2 + 19.5^2} \)

631 Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.

What is the length of the diagonal, in yards, that Tanya runs?

1. 50
2. 60
3. 70
4. 80

632 What is the value of \( x \), in inches, in the right triangle below?

1. \( \sqrt{15} \)
2. 8
3. \( \sqrt{34} \)
4. 4
633 Nancy’s rectangular garden is represented in the diagram below.

If a diagonal walkway crosses her garden, what is its length, in feet?

1 17
2 22
3 \(\sqrt{161}\)
4 \(\sqrt{529}\)

634 The end of a dog's leash is attached to the top of a 5-foot-tall fence post, as shown in the diagram below. The dog is 7 feet away from the base of the fence post.

How long is the leash, to the nearest tenth of a foot?

1 4.9
2 8.6
3 9.0
4 12.0

635 The rectangle shown below has a diagonal of 18.4 cm and a width of 7 cm.

To the nearest centimeter, what is the length, \(x\), of the rectangle?

1 11
2 17
3 20
4 25

636 Campsite \(A\) and campsite \(B\) are located directly opposite each other on the shores of Lake Omega, as shown in the diagram below. The two campsites form a right triangle with Sam’s position, \(S\). The distance from campsite \(B\) to Sam’s position is 1,300 yards, and campsite \(A\) is 1,700 yards from his position.

What is the distance from campsite \(A\) to campsite \(B\), to the nearest yard?

1 1,095
2 1,096
3 2,140
4 2,141
637. The legs of an isosceles right triangle each measure 10 inches. What is the length of the hypotenuse of this triangle, to the nearest tenth of an inch?
1. 6.3
2. 7.1
3. 14.1
4. 17.1

638. The length of one side of a square is 13 feet. What is the length, to the nearest foot, of a diagonal of the square?
1. 13
2. 18
3. 19
4. 26

639. The length of the hypotenuse of a right triangle is 34 inches and the length of one of its legs is 16 inches. What is the length, in inches, of the other leg of this right triangle?
1. 16
2. 18
3. 25
4. 30

640. In triangle RST, angle R is a right angle. If TR = 6 and TS = 8, what is the length of RS?
1. 10
2. 2
3. $2\sqrt{7}$
4. $7\sqrt{2}$

641. In right triangle ABC, $m\angle C = 90^\circ$, AC = 7, and AB = 13. What is the length of BC?
1. 6
2. 20
3. $\sqrt{120}$
4. $\sqrt{218}$

TRIGONOMETRY
A.A.42: TRIGONOMETRIC RATIOS

642. The diagram below shows right triangle UPC.

Which ratio represents the sine of $\angle U$?
1. $\frac{15}{8}$
2. $\frac{15}{17}$
3. $\frac{8}{15}$
4. $\frac{8}{17}$

643. Right triangle $ABC$ has legs of 8 and 15 and a hypotenuse of 17, as shown in the diagram below.

The value of the tangent of $\angle B$ is
1. 0.4706
2. 0.5333
3. 0.8824
4. 1.8750
644. Which ratio represents \( \sin x \) in the right triangle shown below?

\[
\begin{align*}
1 & \quad \frac{28}{53} \\
2 & \quad \frac{28}{45} \\
3 & \quad \frac{45}{53} \\
4 & \quad \frac{53}{28}
\end{align*}
\]

645. The diagram below shows right triangle \( ABC \).

Which ratio represents the tangent of \( \angle ABC \)?

\[
\begin{align*}
1 & \quad \frac{5}{13} \\
2 & \quad \frac{5}{12} \\
3 & \quad \frac{12}{13} \\
4 & \quad \frac{12}{5}
\end{align*}
\]

646. The diagram below shows right triangle \( LMP \).

Which ratio represents the tangent of \( \angle PLM \)?

\[
\begin{align*}
1 & \quad \frac{3}{4} \\
2 & \quad \frac{3}{5} \\
3 & \quad \frac{4}{3} \\
4 & \quad \frac{5}{4}
\end{align*}
\]

647. In right triangle \( ABC \) shown below, what is the value of \( \cos A \)?

\[
\begin{align*}
1 & \quad \frac{12}{20} \\
2 & \quad \frac{16}{20} \\
3 & \quad \frac{20}{12} \\
4 & \quad \frac{20}{16}
\end{align*}
\]
648 Which ratio represents the cosine of angle $A$ in the right triangle below?

![Right Triangle]

1. $\frac{3}{5}$
2. $\frac{5}{3}$
3. $\frac{4}{3}$
4. $\frac{5}{3}$

649 Which equation shows a correct trigonometric ratio for angle $A$ in the right triangle below?

![Right Triangle]

1. $\sin A = \frac{15}{17}$
2. $\tan A = \frac{8}{17}$
3. $\cos A = \frac{15}{17}$
4. $\tan A = \frac{5}{8}$

650 In triangle $MCT$, the measure of $\angle T = 90^\circ$, $MC = 85$ cm, $CT = 84$ cm, and $TM = 13$ cm. Which ratio represents the sine of $\angle C$?

1. $\frac{13}{85}$
2. $\frac{84}{85}$
3. $\frac{13}{84}$
4. $\frac{84}{13}$

651 In $\triangle ABC$, the measure of $\angle B = 90^\circ$. $AC = 50$, $AB = 48$, and $BC = 14$. Which ratio represents the tangent of $\angle A$?

1. $\frac{14}{50}$
2. $\frac{14}{48}$
3. $\frac{48}{50}$
4. $\frac{48}{14}$

652 In $\triangle ABC$, $m\angle C = 90^\circ$. If $AB = 5$ and $AC = 4$, which statement is not true?

1. $\cos A = \frac{4}{5}$
2. $\tan A = \frac{3}{4}$
3. $\sin B = \frac{4}{5}$
4. $\tan B = \frac{5}{3}$
A.A.44: USING TRIGONOMETRY TO FIND A SIDE

653  In the right triangle shown in the diagram below, what is the value of $x$ to the nearest whole number?

1 12
2 14
3 21
4 28

654  A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.

If the angle of elevation from the tip of the shadow to the top of the tree is 32°, what is the height of the tree to the nearest tenth of a foot?

1 13.2
2 15.6
3 21.2
4 40.0

655  An 8-foot rope is tied from the top of a pole to a stake in the ground, as shown in the diagram below.

If the rope forms a 57° angle with the ground, what is the height of the pole, to the nearest tenth of a foot?

1 4.4
2 6.7
3 9.5
4 12.3

656  A right triangle contains a 38° angle whose adjacent side measures 10 centimeters. What is the length of the hypotenuse, to the nearest hundredth of a centimeter?

1 7.88
2 12.69
3 12.80
4 16.24
657 A metal pipe is used to hold up a 9-foot fence, as shown in the diagram below. The pipe makes an angle of 48° with the ground. Determine, to the nearest foot, how far the bottom of the pipe is from the base of the fence. Determine, to the nearest foot, the length of the metal pipe.

Determine the height, to the nearest foot, of the balloon directly above the ground. Determine the distance, to the nearest foot, on the ground between the two ropes.

658 A stake is to be driven into the ground away from the base of a 50-foot pole, as shown in the diagram below. A wire from the stake on the ground to the top of the pole is to be installed at an angle of elevation of 52°. How far away from the base of the pole should the stake be driven in, to the nearest foot? What will be the length of the wire from the stake to the top of the pole, to the nearest foot?

660 As shown in the diagram below, a ladder 5 feet long leans against a wall and makes an angle of 65° with the ground. Find, to the nearest tenth of a foot, the distance from the wall to the base of the ladder.
A.A.43: USING TRIGONOMETRY TO FIND AN ANGLE

661 Which equation could be used to find the measure of one acute angle in the right triangle shown below?

1. \( \sin A = \frac{4}{5} \)
2. \( \tan A = \frac{5}{4} \)
3. \( \cos B = \frac{5}{4} \)
4. \( \tan B = \frac{4}{5} \)

662 Which equation could be used to find the measure of angle \( D \) in the right triangle shown in the diagram below?

1. \( \cos D = \frac{12}{13} \)
2. \( \cos D = \frac{13}{12} \)
3. \( \sin D = \frac{5}{13} \)
4. \( \sin D = \frac{12}{13} \)

663 In right triangle \( ABC \) shown below, \( AB = 18.3 \) and \( BC = 11.2 \).

What is the measure of \( \angle A \), to the nearest tenth of a degree?
1. 31.5
2. 37.7
3. 52.3
4. 58.5

664 The center pole of a tent is 8 feet long, and a side of the tent is 12 feet long as shown in the diagram below.

If a right angle is formed where the center pole meets the ground, what is the measure of angle \( A \) to the nearest degree?
1. 34
2. 42
3. 48
4. 56
665 In the diagram of $\triangle ABC$ shown below, $BC = 10$ and $AB = 16$.

To the nearest tenth of a degree, what is the measure of the largest acute angle in the triangle?

1. 32.0
2. 38.7
3. 51.3
4. 90.0

666 A communications company is building a 30-foot antenna to carry cell phone transmissions. As shown in the diagram below, a 50-foot wire from the top of the antenna to the ground is used to stabilize the antenna.

Find, to the nearest degree, the measure of the angle that the wire makes with the ground.

667 In right triangle $ABC$ shown below, $AC = 29$ inches, $AB = 17$ inches, and $m\angle ABC = 90$. Find the number of degrees in the measure of angle $BAC$, to the nearest degree.

Find the length of $BC$ to the nearest inch.

668 A trapezoid is shown below.

Calculate the measure of angle $x$, to the nearest tenth of a degree.

669 In right triangle $ABC$, $AB = 20$, $AC = 12$, $BC = 16$, and $m\angle C = 90$. Find, to the nearest degree, the measure of $\angle A$.

670 A 28-foot ladder is leaning against a house. The bottom of the ladder is 6 feet from the base of the house. Find the measure of the angle formed by the ladder and the ground, to the nearest degree.

671 A man standing on level ground is 1000 feet away from the base of a 350-foot-tall building. Find, to the nearest degree, the measure of the angle of elevation to the top of the building from the point on the ground where the man is standing.
MEASURING IN THE PLANE AND SPACE
A.G.1: COMPOSITIONS OF POLYGONS AND CIRCLES

672 A playground in a local community consists of a rectangle and two semicircles, as shown in the diagram below.

Which expression represents the amount of fencing, in yards, that would be needed to completely enclose the playground?

1. $15\pi + 50$
2. $15\pi + 80$
3. $30\pi + 50$
4. $30\pi + 80$

673 A designer created a garden, as shown in the diagram below. The garden consists of four quarter-circles of equal size inside a square. The designer put a fence around both the inside and the outside of the garden.

Which expression represents the amount of fencing, in yards, that the designer used for the fence?

1. $40 + 10\pi$
2. $40 + 25\pi$
3. $100 + 10\pi$
4. $100 + 25\pi$

674 A garden is in the shape of an isosceles trapezoid and a semicircle, as shown in the diagram below. A fence will be put around the perimeter of the entire garden.

Which expression represents the length of fencing, in meters, that will be needed?

1. $22 + 6\pi$
2. $22 + 12\pi$
3. $15 + 6\pi$
4. $15 + 12\pi$
675 What is the perimeter of the figure shown below, which consists of an isosceles trapezoid and a semicircle?

![Diagram](image)

1. $20 + 3\pi$
2. $20 + 6\pi$
3. $26 + 3\pi$
4. $26 + 6\pi$

676 Serena’s garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment $AB$ is the diameter of semicircle $P$. Serena wants to put a fence around her garden.

![Diagram](image)

To the nearest foot, what is the length of the string of lights that Tess will need to decorate the window?

678 A figure is made up of a rectangle and a semicircle as shown in the diagram below.

![Diagram](image)

What is the area of the figure, to the nearest tenth of a square centimeter?

1. 39.4
2. 44.1
3. 48.8
4. 58.3
679 In the figure below, $ABCD$ is a square and semicircle $O$ has a radius of 6.

What is the area of the figure?
1. $36 + 6\pi$
2. $36 + 18\pi$
3. $144 + 18\pi$
4. $144 + 36\pi$

680 Luis is going to paint a basketball court on his driveway, as shown in the diagram below. This basketball court consists of a rectangle and a semicircle.

Which expression represents the area of this basketball court, in square feet?
1. 80
2. $80 + 8\pi$
3. $80 + 16\pi$
4. $80 + 64\pi$

681 The figure shown below is composed of two rectangles and a quarter circle.

What is the area of this figure, to the nearest square centimeter?
1. 33
2. 37
3. 44
4. 58

682 In the diagram below, circle $O$ is inscribed in square $ABCD$. The square has an area of 36.

What is the area of the circle?
1. 9?
2. 6?
3. 3?
4. 36?
683 In the diagram below, $MATH$ is a rectangle, $GB = 4.6$, $MH = 6$, and $HT = 15$.

What is the area of polygon $MBATH$?
1 34.5
2 55.5
3 90.0
4 124.5

684 A designer created the logo shown below. The logo consists of a square and four quarter-circles of equal size.

Express, in terms of $\pi$, the exact area, in square inches, of the shaded region.

685 In the diagram below of rectangle $AFEB$ and a semicircle with diameter $CD$, $AB = 5$ inches, $AB = BC = DE = FE$, and $CD = 6$ inches. Find the area of the shaded region, to the nearest hundredth of a square inch.

686 In the diagram below, the circumference of circle $O$ is $16\pi$ inches. The length of $BC$ is three-quarters of the length of diameter $AD$ and $CE = 4$ inches. Calculate the area, in square inches, of trapezoid $ABCD$.

A.G.2: VOLUME

687 Lenny made a cube in technology class. Each edge measured 1.5 cm. What is the volume of the cube in cubic centimeters?
1 2.25
2 3.375
3 9.0
4 13.5

688 How many cubes with 5-inch sides will completely fill a cube that is 10 inches on a side?
1 50
2 25
3 8
4 4

689 The diagram below represents Joe's two fish tanks.

Joe's larger tank is completely filled with water. He takes water from it to completely fill the small tank. Determine how many cubic inches of water will remain in the larger tank.
690 A cylindrical container has a diameter of 12 inches and a height of 15 inches, as illustrated in the diagram below.

What is the volume of this container to the nearest tenth of a cubic inch?
1  6,785.8
2  4,241.2
3  2,160.0
4  1,696.5

691 Oatmeal is packaged in a cylindrical container, as shown in the diagram below.

The diameter of the container is 13 centimeters and its height is 24 centimeters. Determine, in terms of \( \pi \), the volume of the cylinder, in cubic centimeters.

692 A cylinder has a diameter of 10 inches and a height of 2.3 inches. What is the volume of this cylinder, to the nearest tenth of a cubic inch?
1  72.3
2  83.1
3  180.6
4  722.6

693 The volume of a cylindrical can in \( 32\pi \) cubic inches. If the height of the can is 2 inches, what is its radius, in inches?
1  8
2  2
3  16
4  4

694 A soup can is in the shape of a cylinder. The can has a volume of 342 cm\(^3\) and a diameter of 6 cm. Express the height of the can in terms of \( \pi \). Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

A.G.2: SURFACE AREA

695 The rectangular prism shown below has a length of 3.0 cm, a width of 2.2 cm, and a height of 7.5 cm.

What is the surface area, in square centimeters?
1  45.6
2  49.5
3  78.0
4  91.2
696 Mrs. Ayer is painting the outside of her son’s toy box, including the top and bottom. The toy box measures 3 feet long, 1.5 feet wide, and 2 feet high. What is the total surface area she will paint?

1 9.0 ft²
2 13.5 ft²
3 22.5 ft²
4 27.0 ft²

697 How many square inches of wrapping paper are needed to entirely cover a box that is 2 inches by 3 inches by 4 inches?

1 18
2 24
3 26
4 52

698 The length and width of the base of a rectangular prism are 5.5 cm and 3 cm. The height of the prism is 6.75 cm. Find the exact value of the surface area of the prism, in square centimeters.

699 A plastic storage box in the shape of a rectangular prism has a length of \(x + 3\), a width of \(x - 4\), and a height of 5. Represent the surface area of the box as a trinomial in terms of \(x\).

700 Mike buys his ice cream packed in a rectangular prism-shaped carton, while Carol buys hers in a cylindrical-shaped carton. The dimensions of the prism are 5 inches by 3.5 inches by 7 inches. The cylinder has a diameter of 5 inches and a height of 7 inches. Which container holds more ice cream? Justify your answer. Determine, to the nearest tenth of a cubic inch, how much more ice cream the larger container holds.

701 Find the volume, in cubic centimeters, and the surface area, in square centimeters, of the rectangular prism shown below.

702 If the volume of a cube is 8 cubic centimeters, what is its surface area, in square centimeters?

1 32
2 24
3 12
4 4
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic

Answer Section

1 ANS: 1
\[ \frac{4(-6) + 18}{4!} = \left| \frac{-6}{24} \right| = \frac{1}{4} \]

PTS: 2 REF: 081220ia STA: A.N.6 TOP: Evaluating Expressions

2 ANS: 3
\[ 6! + \frac{5! (3!)}{4!} - 10 = 720 + 5(6) - 10 = 740 \]

PTS: 2 REF: 061309ia STA: A.N.6 TOP: Evaluating Expressions

3 ANS: 3
\[ | -5(5) + 12 | = | -13 | = 13 \]

PTS: 2 REF: 080923ia STA: A.N.6 TOP: Evaluating Expressions

4 ANS: 1
\[ -|a - b| = -\left| 7 - (-3) \right| = -|10| = -10 \]

PTS: 2 REF: 011010ia STA: A.N.6 TOP: Evaluating Expressions

5 ANS: 2
\[ |-3 - 4| - (-3)^2 = 7 - 9 = -2 \]

PTS: 2 REF: 011321ia STA: A.N.6 TOP: Evaluating Expressions

6 ANS: 1
\[ -3(-4)^2(2) + 4(-4) = -96 - 16 = -112 \]

PTS: 2 REF: 081113ia STA: A.N.6 TOP: Evaluating Expressions

7 ANS: 2 PTS: 2 REF: 011110ia STA: A.N.6 TOP: Evaluating Expressions

8 ANS: 3 PTS: 2 REF: fall0705ia STA: A.N.1 TOP: Identifying Properties

9 ANS: 2 PTS: 2 REF: 080802ia STA: A.N.1 TOP: Identifying Properties

10 ANS: 1 PTS: 2 REF: 081319ia STA: A.N.1 TOP: Identifying Properties

11 ANS:
(1) Distributive; (2) Commutative

PTS: 2 REF: 061132ia STA: A.N.1 TOP: Identifying Properties

12 ANS: 3 PTS: 2 REF: 060926ia STA: A.N.1 TOP: Properties of Reals

13 ANS: 1 PTS: 2 REF: 081209ia STA: A.N.1 TOP: Properties of Reals
14 ANS: 4 PTS: 2 REF: 011114ia STA: A.N.1 TOP: Properties of Reals
15 ANS: 3 PTS: 2 REF: 011224ia STA: A.N.1 TOP: Properties of Reals
16 ANS: distribute
   -6a + 42.
17 ANS: 4 PTS: 2 REF: 061032ia STA: A.N.1 TOP: Properties of Reals
18 ANS: 1 PTS: 2 REF: 061021ia STA: A.A.29 TOP: Set Theory
19 ANS: 2 PTS: 2 REF: 011119ia STA: A.A.29 TOP: Set Theory
20 ANS: 3 PTS: 2 REF: 081117ia STA: A.A.29 TOP: Set Theory
21 ANS: 3 PTS: 2 REF: 061217ia STA: A.A.29 TOP: Set Theory
22 ANS: 1 PTS: 2 REF: 061310ia STA: A.A.29 TOP: Set Theory
23 ANS: 4 PTS: 2 REF: 011318ia STA: A.A.29 TOP: Set Theory
24 ANS: 3 PTS: 2 REF: 010917ia STA: A.A.29 TOP: Set Theory
25 ANS: 4 PTS: 2 REF: 060930ia STA: A.A.29 TOP: Set Theory
26 ANS: 4 PTS: 2 REF: 081022ia STA: A.A.29 TOP: Set Theory
27 ANS: 2 PTS: 2 REF: 061128ia STA: A.A.29 TOP: Set Theory
28 ANS: 4 PTS: 2 REF: 011222ia STA: A.A.29 TOP: Set Theory
29 ANS: 4 PTS: 2 REF: 081321ia STA: A.A.29 TOP: Set Theory
30 ANS: 4 PTS: 2 REF: 061001ia STA: A.A.30 TOP: Set Theory
31 ANS: 3 PTS: 2 REF: 081009ia STA: A.A.30 TOP: Set Theory
32 ANS: 3 PTS: 2 REF: 081103ia STA: A.A.30 TOP: Set Theory
33 ANS: 2
   The set of integers greater than -2 and less than 6 is \{-1, 0, 1, 2, 3, 4, 5\}. The subset of this set that is the positive factors of 5 is \{1\}. The complement of this subset is \{-1, 0, 2, 3, 4\}.

   PTS: 2 REF: 060818ia STA: A.A.30 TOP: Set Theory
34 ANS: 4
\[ A = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\} \]

PTS: 2 REF: 080912ia STA: A.A.30 TOP: Set Theory

35 ANS: 2
\[ A = \{4, 9, 16, 25, 36, 49, 64, 81, 100\} \]

PTS: 2 REF: 011326ia STA: A.A.30 TOP: Set Theory

36 ANS: 4
\[ A = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\} \]

PTS: 2 REF: 081306ia STA: A.A.30 TOP: Set Theory

37 ANS: \{1, 2, 4, 5, 9, 10, 12\}

PTS: 2 REF: 080833ia STA: A.A.30 TOP: Set Theory

38 ANS: 4
PTS: 2 REF: 061123ia STA: A.A.31 TOP: Set Theory

39 ANS: 4
PTS: 2 REF: 011225ia STA: A.A.31 TOP: Set Theory

40 ANS: 2
PTS: 2 REF: 081003ia STA: A.A.31 TOP: Set Theory

41 ANS: 3
PTS: 2 REF: fall0710ia STA: A.A.31 TOP: Set Theory

42 ANS: 1
PTS: 2 REF: 011004ia STA: A.A.31 TOP: Set Theory

43 ANS: 1
PTS: 2 REF: 011101ia STA: A.A.31 TOP: Set Theory

44 ANS: 3
PTS: 2 REF: 061208ia STA: A.A.31 TOP: Set Theory

45 ANS: 3
PTS: 2 REF: 061324ia STA: A.A.31 TOP: Set Theory

46 ANS: 3
\[ A \cup C = \{1, 2, 3, 5, 7, 9\} \]

PTS: 2 REF: 081221ia STA: A.A.31 TOP: Set Theory

47 ANS: \[ 0 \leq t \leq 40 \]

PTS: 2 REF: 060833ia STA: A.A.31 TOP: Set Theory
48 ANS:

![Frequency Histogram](image)

PTS: 2 REF: 081132ia STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables KEY: frequency histograms

49 ANS:

![Bar Graph and Table](image)

PTS: 4 REF: 060938ia STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables KEY: frequency histograms
50 ANS:

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>51–60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61–70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71–80</td>
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<tr>
<td>81–90</td>
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<tr>
<td>91–100</td>
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</tbody>
</table>

51 ANS:

PTS: 3  REF: 011135ia  STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables  KEY: frequency histograms

52 ANS: 3

25 – 18 = 7

53 ANS: 3  PTS: 2  REF: 061230ia  STA: A.S.9
TOP: Frequency Histograms, Bar Graphs and Tables

54 ANS:

30, 20, 71-80, 81-90 and 91-100

PTS: 4  REF: 061038ia  STA: A.S.9
TOP: Frequency Histograms, Bar Graphs and Tables
55 ANS:
3, 0, 20. $15 - 12 = 3$. $12 - 12 = 0$

PTS: 3 REF: 081234ia STA: A.S.9
TOP: Frequency Histograms, Bar Graphs and Tables

56 ANS: 2
The median score, 10, is the vertical line in the center of the box.

PTS: 2 REF: fall0709ia STA: A.S.5 TOP: Box-and-Whisker Plots

57 ANS:

PTS: 4 REF: 080939ia STA: A.S.5 TOP: Box-and-Whisker Plots

58 ANS:
minimum is 120, 1st quartile is 145, median is 292, 3rd quartile is 407, and maximum is 452

PTS: 3 REF: 081034ia STA: A.S.5 TOP: Box-and-Whisker Plots

59 ANS:

PTS: 4 REF: 081034ia STA: A.S.5 TOP: Box-and-Whisker Plots

60 ANS: 3
75 – 15 = 60

PTS: 2 REF: 011337ia STA: A.S.5 TOP: Box-and-Whisker Plots

61 ANS: 2
Three scores are above 41.

PTS: 4 REF: 011337ia STA: A.S.5 TOP: Box-and-Whisker Plots

62 ANS: 3
The value of the third quartile is the last vertical line of the box.

PTS: 2 REF: 080818ia STA: A.S.6 TOP: Box-and-Whisker Plots

63 ANS: 3
The value of the upper quartile is the last vertical line of the box.

PTS: 2 REF: 060915ia STA: A.S.6 TOP: Box-and-Whisker Plots

64 ANS: 1

PTS: 2 REF: 011001ia STA: A.S.6
TOP: Box-and-Whisker Plots

65 ANS: 3

PTS: 2 REF: 011220ia STA: A.S.6
TOP: Box-and-Whisker Plots

66 ANS: 4

PTS: 2 REF: 081312ia STA: A.S.6
TOP: Box-and-Whisker Plots

67 ANS: 4

PTS: 2 REF: 010929ia STA: A.S.6
TOP: Box-and-Whisker Plots
70 ANS: 4
\[
\frac{95000}{125000} = 0.76
\]

PTS: 2 REF: 061207ia STA: A.S.11 TOP: Quartiles and Percentiles

71 ANS: 2 PTS: 2 REF: fall0701ia STA: A.S.7 TOP: Scatter Plots

72 ANS: 3 PTS: 2 REF: 081001ia STA: A.S.7 TOP: Scatter Plots

73 ANS: 2 PTS: 2 REF: 061115ia STA: A.S.7 TOP: Scatter Plots

74 ANS: 4

75 ANS: 4 PTS: 2 REF: 011229ia STA: A.S.8 TOP: Scatter Plots

76 ANS: 3 PTS: 2 REF: 060936ia STA: A.S.8 TOP: Scatter Plots

77 ANS: 4 PTS: 2 REF: 060805ia STA: A.S.12 TOP: Scatter Plots

78 ANS: 2 PTS: 2 REF: 011019ia STA: A.S.12 TOP: Scatter Plots

79 ANS: 3 PTS: 2 REF: 011103ia STA: A.S.12 TOP: Scatter Plots

80 ANS: 1 PTS: 2 REF: 081204ia STA: A.S.12 TOP: Scatter Plots
They will not reach their goal in 18 months.

mean = 6, median = 6 and mode = 7

mean = $81\frac{7}{11}$, median = 81 and mode = 76

mean = 7, median = 6 and mode = 6

The mean is $80\frac{6}{11}$, the median is 84.5 and the mode is 87.
93 ANS:
225000, 175000, the median better represents the value since it is closer to more values than the mean.

PTS: 4 REF: fall0737ia STA: A.S.4
TOP: Frequency Histograms, Bar Graphs and Tables

94 ANS:
315,000, 180,000, the median better represents value since it is closer to more prices than the mean.

PTS: 4 REF: 060839ia STA: A.S.4
TOP: Frequency Histograms, Bar Graphs and Tables

95 ANS: 2 PTS: 2 REF: 081327ia STA: A.S.16
TOP: Central Tendency

96 ANS:
81.3, 80, both increase

PTS: 3 REF: 011035ia STA: A.S.16 TOP: Central Tendency

97 ANS:
12, 7. Both the median and the mode will increase.

PTS: 3 REF: 061134ia STA: A.S.16 TOP: Central Tendency

98 ANS: 4
\[
\frac{2 + 3 + 0 + 1 + 3 + 2 + 4 + 0 + 2 + 3}{10} = \frac{20}{10} = 2 \quad \frac{x}{10} = 2 + 0.5
\]
\[x = 25\]

PTS: 2 REF: 081020ia STA: A.S.16 TOP: Average Known with Missing Data

99 ANS: 3
The other situations are quantitative.

PTS: 2 REF: 060819ia STA: A.S.1 TOP: Analysis of Data

100 ANS: 3
The other situations are quantitative.

PTS: 2 REF: 060905ia STA: A.S.1 TOP: Analysis of Data

101 ANS: 4
The other situations are quantitative.

PTS: 2 REF: 081122ia STA: A.S.1 TOP: Analysis of Data

102 ANS: 1
The other situations are quantitative.

PTS: 2 REF: 061308ia STA: A.S.1 TOP: Analysis of Data

103 ANS: 4
The other sets of data are qualitative.

PTS: 2 REF: 011116ia STA: A.S.1 TOP: Analysis of Data
104 ANS: 2
The other sets of data are qualitative.

PTS: 2 REF: 011211ia STA: A.S.1 TOP: Analysis of Data

105 ANS: 3
The other situations are quantitative.

PTS: 2 REF: 081313ia STA: A.S.1 TOP: Analysis of Data

106 ANS: 3
The other situations are qualitative.

PTS: 2 REF: 081213ia STA: A.S.1 TOP: Analysis of Data

107 ANS: 2
The two values are shoe size and height.

PTS: 2 REF: fall0714ia STA: A.S.2 TOP: Analysis of Data

108 ANS: 3 PTS: 2 REF: 061206ia STA: A.S.2 TOP: Analysis of Data

109 ANS: 3
Frequency is not a variable.

PTS: 2 REF: 011014ia STA: A.S.2 TOP: Analysis of Data

110 ANS: 3 PTS: 2 REF: 061011ia STA: A.S.2 TOP: Analysis of Data

111 ANS: 3
Due to lack of specificity in the wording, this 13th question was removed from the June, 2013 Regents Exam.

PTS: 2 REF: 061313ia STA: A.S.2 TOP: Analysis of Data

112 ANS: 1
To determine student interest, survey the widest range of students.

PTS: 2 REF: 060803ia STA: A.S.3 TOP: Analysis of Data

113 ANS: 2
People at a gym or football game and members of a soccer team are more biased towards sports.

PTS: 2 REF: 061202ia STA: A.S.3 TOP: Analysis of Data

114 ANS: 2
To determine student opinion, survey the widest range of students.

PTS: 2 REF: 011313ia STA: A.S.3 TOP: Analysis of Data

115 ANS: 1
Everyone eats, can shop in malls and wear clothes. People who work in a sporting goods store probably watch more sports television than most.

PTS: 2 REF: 010923ia STA: A.S.3 TOP: Analysis of Data
Surveying persons leaving a football game about a sports budget contains the most bias.

Asking school district employees about a school board candidate produces the most bias.

The number of correct answers on a test causes the test score.

A rooster crows before sunrise, not because of the sun.

The age of a child does not cause the number of siblings he has, or vice versa.

\[
\frac{149.6 - 174.2}{149.6} \approx 0.1644
\]

\[
\frac{55.42 - 50.27}{55.42} \approx 0.093
\]
128. \[
\frac{(12.3 \times 11.9) - (12.2 \times 11.8)}{12.3 \times 11.9} \approx 0.0165
\]

PTS: 2  REF: 061120ia  STA: A.M.3  TOP: Error
KEY: area

129. \[
\frac{13.5 - 12.8}{13.5} \approx 0.093
\]

PTS: 2  REF: 081123ia  STA: A.M.3  TOP: Error
KEY: area

130. \[
\frac{(2.6 \times 6.9) - (2.5 \times 6.8)}{(2.6 \times 6.9)} \approx 0.052
\]

PTS: 2  REF: 011209ia  STA: A.M.3  TOP: Error
KEY: area

131. ANS: 618.45, 613.44, 0.008. 21.7 \times 28.5 = 618.45. 21.6 \times 28.4 = 613.44. \[
\frac{618.45 - 613.44}{613.44} \approx 0.008
\] An error of less than 1% would seem to be insignificant.

PTS: 4  REF: 060838ia  STA: A.M.3  TOP: Error
KEY: area

132. ANS: 1,512, 1,551.25, 0.025. 36 \times 42 = 1512. 36.5 \times 42.5 = 1551.25. \[
RE = \frac{1512 - 1551.25}{1551.25} \approx 0.025
\]

PTS: 3  REF: 010934ia  STA: A.M.3  TOP: Error
KEY: area

133. ANS: \[
\frac{8100 - 7678.5}{7678.5} \approx 0.055
\]

PTS: 2  REF: 061233ia  STA: A.M.3  TOP: Error
KEY: area

134. ANS: \[
\frac{(24.2 \times 14.1) - (24 \times 14)}{(24.2 \times 14.1)} = \frac{5.22}{341.22} \approx 0.015
\]

PTS: 3  REF: 011336ia  STA: A.M.3  TOP: Error
KEY: area
\[
\frac{(10.75)(12.5) - (10.5)(12.25)}{(10.75)(12.5)} \approx 0.043
\]

PTS: 3  REF: 081336ia  STA: A.M.3  TOP: Error

KEY: area

\[
\left| \frac{289 - 282}{289} \right| = 0.024
\]

PTS: 2  REF: 080828ia  STA: A.M.3  TOP: Error

KEY: volume and surface area

137 ANS: 2

The volume of the cube using Ezra’s measurements is 8 (2^3). The actual volume is 9.261 (2.1^3). The relative error is \[
\left| \frac{9.261 - 8}{9.261} \right| \approx 0.14.
\]

PTS: 2  REF: 060928ia  STA: A.M.3  TOP: Error

KEY: volume and surface area

\[
0.102. \frac{(5.3 \times 8.2 \times 4.1) - (5 \times 8 \times 4)}{5.3 \times 8.2 \times 4.1} = \frac{178.16 - 160}{178.16} = 0.102
\]

PTS: 3  REF: 011036ia  STA: A.M.3  TOP: Error

KEY: volume and surface area

\[
\frac{600 - 592}{592} \approx 0.014
\]

PTS: 2  REF: 061031ia  STA: A.M.3  TOP: Error

KEY: volume and surface area

\[
0.029. \frac{[2\pi(5.1)^2 + 2\pi(5.1)(15.1)] - [2\pi(5)^2 + 2\pi(5)(15)]}{2\pi(5.1)^2 + 2\pi(5.1)(15.1)} \approx \frac{647.294 - 628.319}{647.294} \approx 0.029
\]

PTS: 4  REF: 011137ia  STA: A.M.3  TOP: Error

KEY: volume and surface area

\[
\frac{(5.9 \times 10.3 \times 1.7) - (6 \times 10 \times 1.5)}{5.9 \times 10.3 \times 1.7} \approx 0.129
\]

PTS: 3  REF: 081235ia  STA: A.M.3  TOP: Error

KEY: volume and surface area
142 ANS: 3
(2, T), (4, T), (6, T)

PTS: 2 REF: 081324ia STA: A.S.19 TOP: Sample Space

143 ANS:
\[ \frac{3}{8}, (H, H, H), (H, H, T), (H, T, H), (H, T, T), (T, H, H), (T, H, T), (T, T, H), (T, T, T) \]

PTS: 2 REF: 080933ia STA: A.S.19 TOP: Sample Space

144 ANS:
(S, S), (S, K), (S, D), (K, S), (K, K), (K, D), (D, S), (D, K), (D, D), \( \frac{4}{9} \)

PTS: 3 REF: fall0736ia STA: A.S.19 TOP: Sample Space

145 ANS:
(H, F, M), (H, F, J), (H, F, S), (H, A, M), (H, A, J), (H, A, S), (C, F, M), (C, F, J), (C, F, S), (C, A, M), (C, A, J), (C, A, S), (T, F, M), (T, F, J), (T, F, S), (T, A, M), (T, A, J), (T, A, S). There are 18 different kids’ meals, 12 do not include juice and 6 include chicken nuggets.

PTS: 4 REF: 010939ia STA: A.S.19 TOP: Sample Space

146 ANS:

PTS: 4 REF: 061138ia STA: A.S.19 TOP: Sample Space

147 ANS:

PTS: 4 REF: 011238ia STA: A.S.19 TOP: Sample Space

148 ANS:
(C, B, T), (C, B, 5), (C, N, T), (C, N, 5), (C, 2, T), (C, 2, 5), (F, B, T), (F, B, 5), (F, N, T), (F, N, 5), (F, 2, T), (F, 2, 5). 1, 2.

PTS: 4 REF: 081237ia STA: A.S.19 TOP: Sample Space

149 ANS:
(1, A), (1, B), (1, C), (3, A), (3, B), (3, C), (5, A), (5, B), (5, C), (7, A), (7, B), (7, C), (9, A), (9, B), (9, C). 6

PTS: 3 REF: 011334ia STA: A.S.19 TOP: Sample Space


151 ANS: 3
\[ \frac{15}{15 + 13 + 12} = \frac{15}{40} = \frac{3}{8} \]

PTS: 2 REF: 061006ia STA: A.S.21 TOP: Experimental Probability
\[
\begin{align*}
3 + 2 + 4 + 3 &= \frac{12}{20} \\
\text{PTS: 2} & \quad \text{REF: 011129ia} \quad \text{STA: A.S.21} \quad \text{TOP: Experimental Probability} \\
\end{align*}
\]

\[
\begin{align*}
\frac{6}{25} \cdot \frac{25 - (11 + 5 + 3)}{25} \\
\text{PTS: 2} & \quad \text{REF: 011232ia} \quad \text{STA: A.S.21} \quad \text{TOP: Experimental Probability} \\
\end{align*}
\]

\[
\begin{align*}
P(O) &= \frac{5}{10}, \quad P(P) = \frac{4}{10}, \quad P(\leq 5) = \frac{6}{10}, \quad P(\geq 3) = \frac{4}{10} \\
\text{PTS: 2} & \quad \text{REF: 011002ia} \quad \text{STA: A.S.20} \\
\end{align*}
\]

\[
\begin{align*}
P(O) &= \frac{3}{6}, \quad P(E) = \frac{3}{6}, \quad P(< 6) = \frac{5}{6}, \quad P(> 4) = \frac{2}{6} \\
\text{PTS: 2} & \quad \text{REF: 081303ia} \quad \text{STA: A.S.22} \\
\end{align*}
\]

\[
\begin{align*}
P(\text{odd}) &= \frac{7 + 14 + 20}{75} = \frac{41}{75}, \quad P(\text{even}) = \frac{22 + 6 + 6}{75} = \frac{34}{75}, \quad P(\text{3 or less}) = \frac{14 + 22 + 7}{75} = \frac{43}{75}. \\
P(\text{2 or 4}) &= \frac{22 + 6}{75} = \frac{28}{75} \\
\text{PTS: 2} & \quad \text{REF: 011325ia} \quad \text{STA: A.S.22} \\
\end{align*}
\]

\[
\begin{align*}
\text{orchestra: } \frac{3}{26} > \frac{4}{36} \\
\text{PTS: 2} & \quad \text{REF: 011033ia} \quad \text{STA: A.S.22} \\
\end{align*}
\]

\[
\begin{align*}
\text{Hat A, add 1 not green to Hat A, add 11 green to Hat B, and add none to Hat C.} \\
\text{PTS: 4} & \quad \text{REF: 010903ia} \quad \text{STA: A.S.22} \\
\end{align*}
\]

\[
\begin{align*}
\text{White. There are 31 white blocks, 30 red blocks and 29 blue blocks.} \\
\text{PTS: 4} & \quad \text{REF: 081038ia} \quad \text{STA: A.S.22} \\
\end{align*}
\]

\[
\begin{align*}
\text{ANS: fall0702ia} & \quad \text{STA: A.S.23} \quad \text{TOP: Theoretical Probability} \\
\text{KEY: mutually exclusive events} & \\
\end{align*}
\]
The events are not mutually exclusive: \( P(\text{prime}) = \frac{3}{6} \), \( P(\text{even}) = \frac{3}{6} \), \( P(\text{prime AND even}) = \frac{1}{6} \)

\[
P(\text{prime OR even}) = \frac{3}{6} + \frac{3}{6} - \frac{1}{6} = \frac{5}{6}
\]

PTS: 2  REF: 080830ia  STA: A.S.23  TOP: Theoretical Probability
KEY: not mutually exclusive events

\[
P(S) \cdot P(M) = P(S \text{ and } M)
\]

\[
\frac{3}{5} \cdot P(M) = \frac{3}{10}
\]

\[
P(M) = \frac{1}{2}
\]

PTS: 2  REF: 081024ia  STA: A.S.23  TOP: Theoretical Probability
KEY: independent events

\[
\frac{4}{12} \times \frac{2}{11} \times \frac{1}{10} = \frac{8}{1320} \quad \frac{6}{12} \times \frac{5}{11} \times \frac{4}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10} = \frac{120}{1320} + \frac{24}{1320} = \frac{144}{1320}
\]

PTS: 4  REF: 081137ia  STA: A.S.23  TOP: Theoretical Probability
KEY: dependent events

\[
\frac{5}{8} \times \frac{3}{7} = \frac{15}{56} \quad \frac{5}{8} \times \frac{4}{7} = \frac{20}{56} \quad \frac{20}{56} + \frac{3}{8} \times \frac{2}{7} = \frac{26}{56}
\]

PTS: 4  REF: 061338ia  STA: A.S.23  TOP: Theoretical Probability
KEY: dependent events

\[
\frac{12}{20} \times \frac{8}{19} + \frac{8}{20} \times \frac{12}{19} = \frac{192}{380} \quad 1 - P(BB) = 1 - \left( \frac{8}{20} \times \frac{7}{19} \right) = \frac{380}{380} - \frac{56}{380} = \frac{324}{380}
\]

PTS: 4  REF: 081339ia  STA: A.S.23  TOP: Theoretical Probability
KEY: dependent events

ANS: 3  PTS: 2  REF: 080907ia  STA: A.S.20  TOP: Geometric Probability

ANS: 3  PTS: 2  REF: 061218ia  STA: A.S.20  TOP: Geometric Probability
172 ANS:
\[
\frac{1375}{1600} = \frac{40^2 - 15^2}{40^2}
\]
PTS: 2 REF: 011132ia STA: A.S.20 TOP: Geometric Probability

173 ANS: 4
\[P(G \text{ or } W) = \frac{4}{8}, \quad P(G \text{ or } B) = \frac{3}{8}, \quad P(Y \text{ or } B) = \frac{4}{8}, \quad P(Y \text{ or } G) = \frac{5}{8}\]
PTS: 2 REF: 060802ia STA: A.S.22 TOP: Geometric Probability

174 ANS: 3
\[P(odd) = \frac{3}{6}, \quad P(prime) = \frac{3}{6}, \quad P(perfect \ square) = \frac{2}{6}, \quad P(even) = \frac{3}{6}\]
PTS: 2 REF: 061104ia STA: A.S.22 TOP: Geometric Probability

175 ANS: 1
\[
\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}
\]
PTS: 2 REF: 010928ia STA: A.S.23 TOP: Geometric Probability

176 ANS:
\[
\frac{3}{8} \cdot P(s_1 < 4) \times P(s_2 = \text{back}) = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}
\]
PTS: 2 REF: 080832ia STA: A.S.23 TOP: Geometric Probability

177 ANS: 4
TOP: Conditional Probability
PTS: 2 REF: 011308ia STA: A.S.18

178 ANS: 1
\[
\frac{20 - 6}{(20 - 6) + 15 + 7 + 8} = \frac{14}{44}
\]
PTS: 2 REF: 061302ia STA: A.S.18 TOP: Conditional Probability

179 ANS:
\[
\frac{1}{8} \quad \text{After the English and social studies books are taken, 8 books are left and 1 is an English book.}
\]
PTS: 2 REF: 060933ia STA: A.S.18 TOP: Conditional Probability

180 ANS: 3
\[\frac{(3 - 1) \times 2 \times 3}{(3 - 1) \times 2 	imes 3 = 12}\]
PTS: 2 REF: 080905ia STA: A.N.7 TOP: Conditional Probability

181 ANS: 4
\[5 \times 2 \times 3 = 30\]
PTS: 2 REF: 061002ia STA: A.N.7 TOP: Multiplication Counting Principle

182 ANS: 3
TOP: Permutations
183 \[ P_4 = 4 \times 3 \times 2 \times 1 = 24 \]

PTS: 2  REF: 080816ia  STA: A.N.8  TOP: Permutations

184 \[ P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120 \]

PTS: 2  REF: 061109ia  STA: A.N.8  TOP: Permutations

185 \[ P_3 = 4896 \]

PTS: 2  REF: 061328ia  STA: A.N.8  TOP: Permutations

186 \[ P_3 = 336 \]

PTS: 2  REF: 061026ia  STA: A.N.8  TOP: Permutations

187 \[ P_4 = 360 \]

PTS: 2  REF: 081028ia  STA: A.N.8  TOP: Permutations

188 \[ P_3 = 60 \]

PTS: 2  REF: 060931ia  STA: A.N.8  TOP: Permutations

189 \[ 15,600,000 \times 4,368,000.\ 10 \times 10 \times 10 \times 26 \times 25 \times 24 = 15,600,000.\ 10 \times 9 \times 8 \times 26 \times 25 \times 24 = 11,232,000.\ 15,600,000 - 11,232,000 = 4,368,000.\]

PTS: 4  REF: 011037ia  STA: A.N.8  TOP: Permutations

190 \[ 5 \times 3 \times 5 \times 3 = 225.\ 1 \times 3 \times 5 \times 3 = 45.\ 1 \times 2 \times 5 \times 3 = 30 \]

PTS: 4  REF: 061334ia  STA: A.N.7  TOP: Multiplication Counting Principle

191 \[ 26 \times 25 \times 24 \times 23 = 358,800. \ 10^6 = 1,000,000. \ Use the numeric password since there are over 500,000 employees \]

PTS: 4  REF: 061239ia  STA: A.N.8  TOP: Permutations

192 \[ 25(x - 3) = 25x - 75 \]

PTS: 2  REF: 060823ia  STA: A.A.1  TOP: Expressions

193 \[ A = lw = (3w - 7)(w) = 3w^2 - 7w \]

PTS: 2  REF: 010924ia  STA: A.A.1  TOP: Expressions
Not all of the homework problems are equations. The first problem is an expression.
214  ANS: 4

\[ 5p - 1 = 2p + 20 \]

\[ 3p = 21 \]

\[ p = 7 \]

PTS: 2  REF: 080801ia  STA: A.A.22  TOP: Solving Equations

215  ANS: 1

\[ 2(x - 4) = 4(2x + 1) \]

\[ 2x - 8 = 8x + 4 \]

\[ -12 = 6x \]

\[ -2 = x \]

PTS: 2  REF: 011106ia  STA: A.A.22  TOP: Solving Equations

216  ANS: 4

\[ 5 - 2x = -4x - 7 \]

\[ 2x = -12 \]

\[ x = -6 \]

PTS: 2  REF: 011305ia  STA: A.A.22  TOP: Solving Equations

217  ANS: 2

Debbie failed to distribute the 3 properly.

PTS: 2  REF: 011009ia  STA: A.A.22  TOP: Solving Equations

218  ANS:

\[ 4. \quad 3 + 2g = 5g - 9 \]

\[ 12 = 3g \]

\[ g = 4 \]

PTS: 2  REF: fall0732ia  STA: A.A.22  TOP: Solving Equations
219  ANS:
4. \(3(x + 1) - 5x = 12 - (6x - 7)\)
   \(3x + 3 - 5x = 12 - 6x + 7\)
   
   \(-2x + 3 = -6x + 19\)
   \(4x = 16\)
   \(x = 4\)

PTS: 4      REF: 061238ia      STA: A.A.22      TOP: Solving Equations

220  ANS: 4

\[
\frac{2x}{5} + \frac{1}{3} = \frac{7x - 2}{15}
\]

\[
\frac{(2x \times 3) + (5 \times 1)}{5 \times 3} = \frac{7x - 2}{15}
\]

\[
\frac{6x + 5}{15} = \frac{7x - 2}{15}
\]

\(6x + 5 = 7x - 2\)
\(x = 7\)

PTS: 2      REF: 080820ia      STA: A.A.25      TOP: Solving Equations with Fractional Expressions

221  ANS: 1

\[
\frac{(2x \times 6) + (3 \times x)}{3 \times 6} = 5
\]

\[
\frac{12x + 3x}{18} = 5
\]

\(15x = 90\)
\(x = 6\)

PTS: 2      REF: 060907ia      STA: A.A.25      TOP: Solving Equations with Fractional Expressions
222 ANS: 2
\[
\frac{3}{5} (x + 2) = x - 4
\]
\[
3(x + 2) = 5(x - 4)
\]
\[
3x + 6 = 5x - 20
\]
\[
26 = 2x
\]
\[
x = 13
\]

PTS: 2 REF: 080909ia STA: A.A.25
TOP: Solving Equations with Fractional Expressions

223 ANS: 3
\[
\frac{x}{3} + \frac{x + 1}{2} = x
\]
\[
\frac{2x + 3(x + 1)}{6} = x
\]
\[
5x + 3 = 6x
\]
\[
x = 3
\]

PTS: 2 REF: 061019ia STA: A.A.25
TOP: Solving Equations with Fractional Expressions

224 ANS: 1
\[
\frac{2x}{3} + \frac{1}{2} = \frac{5}{6}
\]
\[
\frac{2x}{3} = \frac{1}{3}
\]
\[
6x = 3
\]
\[
x = \frac{1}{2}
\]

PTS: 2 REF: 011112ia STA: A.A.25
TOP: Solving Equations with Fractional Expressions

225 ANS: 1
\[
\frac{1}{7} + \frac{2x}{3} = \frac{15x - 3}{21}
\]
\[
\frac{14x + 3}{21} = \frac{15x - 3}{21}
\]
\[
14x + 3 = 15x - 3
\]
\[
x = 6
\]

PTS: 2 REF: 011328ia STA: A.A.25
TOP: Solving Equations with Fractional Expressions
226 ANS:
\[
\frac{m}{5} + \frac{3(m - 1)}{2} = 2(m - 3)
\]
\[
\frac{2m}{10} + \frac{15(m - 1)}{10} = 2m - 6
\]
\[
\frac{17m - 15}{10} = 2m - 6
\]

\[
17m - 15 = 20m - 60
\]

\[
45 = 3m
\]

\[
15 = m
\]

PTS: 4 REF: 081139ia STA: A.A.25 TOP: Solving Equations with Fractional Expressions

227 ANS: 3
0.06y + 200 = 0.03y + 350

\[
0.03y = 150
\]

\[
y = 5,000
\]

PTS: 2 REF: 081203ia STA: A.A.25 TOP: Solving Equations with Decimals

228 ANS: 2 PTS: 2 REF: 080901ia STA: A.A.4 TOP: Modeling Equations

229 ANS: 4
\[
w(w + 5) = 36
\]
\[
w^2 + 5w - 36 = 0
\]

PTS: 2 REF: fall0726ia STA: A.A.5 TOP: Modeling Equations

230 ANS: 2 PTS: 2 REF: 010915ia STA: A.A.5 TOP: Modeling Equations

231 ANS: 4 PTS: 2 REF: 081011ia STA: A.A.5 TOP: Modeling Equations

232 ANS: 3 PTS: 2 REF: 061225ia STA: A.A.5 TOP: Modeling Equations

233 ANS: 4
Let \( x \) = youngest brother and \( x + 4 \) = oldest brother. \( 3x - (x + 4) = 48 \).

\[
2x - 4 = 48
\]

\[
x = 26
\]

PTS: 2 REF: 080928ia STA: A.A.6 TOP: Modeling Equations
234 ANS:
7, 9, 11. \( x + (x + 2) + (x + 4) = 5(x + 2) - 18 \)
\[ 3x + 6 = 5x - 8 \]
\[ 14 = 2x \]
\[ 7 = x \]

PTS: 4  REF: 011237ia  STA: A.A.6  TOP: Modeling Equations

235 ANS: 4
\[ 3 + 2 - 1 = 4 \]

PTS: 2  REF: 081320ia  STA: A.A.6  TOP: Venn Diagrams

236 ANS: 3
\[ 3ax + b = c \]
\[ 3ax = c - b \]
\[ x = \frac{c - b}{3a} \]

PTS: 2  REF: 080808ia  STA: A.A.23  TOP: Transforming Formulas

237 ANS: 2
\[ P = 2l + 2w \]
\[ P - 2l = 2w \]
\[ \frac{P - 2l}{2} = w \]

PTS: 2  REF: 010911ia  STA: A.A.23  TOP: Transforming Formulas

238 ANS: 3
\[ a + ar = b + r \]
\[ a(1 + r) = b + r \]
\[ a = \frac{b + r}{1 + r} \]

PTS: 2  REF: 060913ia  STA: A.A.23  TOP: Transforming Formulas

239 ANS: 4  PTS: 2  REF: 011016ia  STA: A.A.23  TOP: Transforming Formulas

240 ANS: 2  PTS: 2  REF: 061023ia  STA: A.A.23  TOP: Transforming Formulas
241 ANS: 4

\[ \frac{ey}{n} + k = t \]

\[ \frac{ey}{n} = t - k \]

\[ y = \frac{n(t-k)}{e} \]

PTS: 2 REF: 011125ia STA: A.A.23 TOP: Transforming Formulas

242 ANS: 1

\[ s = \frac{2x+t}{r} \]

\[ rs = 2x + t \]

\[ rs - t = 2x \]

\[ \frac{rs - t}{2} = x \]

PTS: 2 REF: 011228ia STA: A.A.23 TOP: Transforming Formulas
**Integrated Algebra Regents Exam Questions by Performance Indicator: Topic**

**Answer Section**

243 \[ k = am + 3mx \]
\[ k = m(a + 3x) \]
\[ \frac{k}{a + 3x} = m \]

**PTS:** 2  
**REF:** 061215ia  
**STA:** A.A.23  
**TOP:** Transforming Formulas

244 \[ rx - st = r \]
\[ rx = r + st \]
\[ x = \frac{r + st}{r} \]

**PTS:** 2  
**REF:** 061316ia  
**STA:** A.A.23  
**TOP:** Transforming Formulas

246 \[ 2y + 2w = x \]
\[ 2w = x - 2y \]
\[ w = \frac{x - 2y}{2} \]

**PTS:** 2  
**REF:** 061330ia  
**STA:** A.A.23  
**TOP:** Transforming Formulas

247 \[ bc + ac = ab \]
\[ c(b + a) = ab \]
\[ c = \frac{ab}{b + a} \]

**PTS:** 2  
**REF:** 081131ia  
**STA:** A.A.23  
**TOP:** Transforming Formulas

248 \[ 0.75 \text{ hours} = 45 \text{ minutes.} \]
\[ \frac{120}{1} = \frac{x}{45} \]
\[ x = 5400 \]

**PTS:** 2  
**REF:** 080814ia  
**STA:** A.M.1  
**TOP:** Using Rate
249 \[ \frac{120}{60} = \frac{m}{150} \]
\[ m = 300 \]

PTS: 2 
REF: 081202ia 
STA: A.M.1 
TOP: Using Rate

250 \[ \frac{20}{3.98} = \frac{180}{x} \]
\[ 20x = 716.4 \]
\[ x = 35.82 \approx 36 \]

PTS: 2 
REF: 011302ia 
STA: A.M.1 
TOP: Using Rate

251 \[ \frac{2,160}{25} = \frac{x}{45} \]
\[ 25x = 54,000 \]
\[ x = 2,160 \]

PTS: 2 
REF: 081032ia 
STA: A.M.1 
TOP: Using Rate

252 Ann’s. \[ \frac{225}{15} = 15 \text{ mpg} \text{ is greater than } \frac{290}{23.2} = 12.5 \text{ mpg} \]

PTS: 2 
REF: 060831ia 
STA: A.M.1 
TOP: Using Rate

253 \[ \frac{distance}{time} = \frac{24}{6} = 4 \]

PTS: 2 
REF: 060831ia 
STA: A.M.1 
TOP: Using Rate

254 \[ \frac{5}{45} = \frac{8}{x} \]
\[ 5x = 360 \]
\[ x = 72 \]

PTS: 2 
REF: 010902ia 
STA: A.M.1 
TOP: Speed

255 \[ s = \frac{d}{t} = \frac{150 \text{ m}}{1.5 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 6,000 \text{ m/hr} \]

PTS: 2 
REF: 061025ia 
STA: A.M.1 
TOP: Speed
256 ANS: 1  
\[
\frac{12.8 + 17.2}{3 + 5} = 3.75
\]

PTS: 2  
REF: 061117ia  
STA: A.M.1  
TOP: Speed

257 ANS: 1  
\[
\frac{\text{distance}}{\text{time}} = \frac{350.7}{4.2} = 83.5
\]

PTS: 2  
REF: 061201ia  
STA: A.M.1  
TOP: Speed

258 ANS: 111.25.  
\[
\frac{\text{distance}}{\text{time}} = \frac{89}{0.8} = 111.25
\]

PTS: 2  
REF: 080831ia  
STA: A.M.1  
TOP: Speed

259 ANS:  
Greg’s rate of 5.5 is faster than Dave’s rate of 5.3.  
\[
\frac{\text{distance}}{\text{time}} = \frac{11}{2} = 5.5.  \quad \frac{16}{3} = 5.3
\]

PTS: 3  
REF: 080936ia  
STA: A.M.1  
TOP: Speed

260 ANS:  
\[t = \frac{d}{s} = \frac{136,000,000}{31,000} \approx 4387.1 \text{ hours}. \quad \frac{4387.1}{24} \approx 183\]

PTS: 2  
REF: 061333ia  
STA: A.M.1  
TOP: Speed

261 ANS:  
The turtle won by .5 minutes.  
Turtle: \[\frac{d}{s} = \frac{100}{20} = 5.\]  
Rabbit: \[\frac{d}{s} = \frac{100}{40} = 2.5 + 3 = 5.5\]

PTS: 3  
REF: 011236ia  
STA: A.M.1  
TOP: Speed

262 ANS:  
50, 1.5, 10.  
\[
\frac{\text{distance}}{\text{time}} = \frac{60}{1.2} = 50. \quad \frac{\text{distance}}{\text{time}} = \frac{60}{40} = 1.5. \quad \text{speed} \times \text{time} = 55 \times 2 = 110. \quad 120 - 110 = 10
\]

PTS: 3  
REF: fall0734ia  
STA: A.M.1  
TOP: Speed

263 ANS: 3  
\[F = \frac{9}{5} C + 32 = \frac{9}{5} (15) + 32 = 59\]

PTS: 2  
REF: 010901ia  
STA: A.M.2  
TOP: Conversions  
KEY: formula

264 ANS: 3  
PTS: 2  
REF: 011317ia  
STA: A.M.2  
TOP: Conversions  
KEY: dimensional analysis
265 ANS: 1
\[
\frac{3}{4} \times 5 = \frac{15}{4}\text{teaspoons} \times \frac{1 \text{tablespoon}}{3 \text{teaspoons}} = \frac{5}{4} = 1\frac{1}{4} \text{tablespoon}
\]

PTS: 2 REF: 061228ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

266 ANS: 4
\[
8900 \text{ft} \times \frac{1 \text{mi}}{5280 \text{ft}} \approx 1.7 \text{mi}
\]

PTS: 2 REF: 081210ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

267 ANS: 4
\[
\frac{344 \text{m}}{\text{sec}} \times \frac{60 \text{sec}}{1 \text{min}} \times \frac{60 \text{min}}{1 \text{hr}} = 1,238,400 \frac{\text{m}}{\text{hr}}
\]

PTS: 2 REF: 060911ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

268 ANS: 4
\[
5.5 \text{g} \times \frac{4 \text{q}}{1 \text{g}} \times \frac{32 \text{oz}}{1 \text{q}} = 704 \text{oz}
\]

PTS: 2 REF: 061305ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

269 ANS:
\[
77120 + 33500 = 110620 \text{sq. ft.} \times \frac{1 \text{acre}}{43560 \text{sq. ft.}} \approx 2.54 \text{acres}
\]

PTS: 2 REF: 081133ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

270 ANS:
\[
\frac{5.4 \text{miles}}{\text{hour}} \times \frac{5280 \text{feet}}{\text{mile}} \times \frac{1 \text{hour}}{60 \text{min}} = 475.2 \frac{\text{ft}}{\text{min}}
\]

PTS: 2 REF: 081331ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

271 ANS:
16. 12 feet equals 4 yards. \(4 \times 4 = 16\).

PTS: 2 REF: 011031ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

272 ANS:
\[
5. 48 \text{inches} \times \frac{1 \text{yard}}{36 \text{inches}} = \frac{4}{3} \text{yards} \times $3.75 = $5.00
\]

PTS: 2 REF: 011131ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis
Candidate B received 45%. $45\% \times 1860 = 837$

\[
\text{PTS: 2} \quad \text{REF: 081007ia} \quad \text{STA: A.N.5} \quad \text{TOP: Percents}
\]

\[
\text{ANS: } \quad \frac{1}{6}, 16.67\%, \$13.50. \quad \frac{18 - 15}{18} = \frac{1}{6}. \quad 18 \times 0.75 = 13.5
\]

\[
\text{PTS: 3} \quad \text{REF: 060835ia} \quad \text{STA: A.N.5} \quad \text{TOP: Percents}
\]

\[
\text{ANS: } \quad \frac{7.50 - 5.75}{5.75} = 30.4\%. \quad \frac{7.50 - 5.75}{7.50} = 23.3\%
\]

\[
\text{PTS: 3} \quad \text{REF: 080935ia} \quad \text{STA: A.N.5} \quad \text{TOP: Percents}
\]

\[
\text{ANS: } \quad 259.99 \times 1.07 - 259.99(1 - 0.3) \times 1.07 = 83.46
\]

\[
\text{PTS: 4} \quad \text{REF: 011239ia} \quad \text{STA: A.N.5} \quad \text{TOP: Percents}
\]

\[
\text{ANS: } \quad 800 - (895)(0.75)(1.08) = 75.05
\]

\[
\text{PTS: 3} \quad \text{REF: 081334ia} \quad \text{STA: A.N.5} \quad \text{TOP: Percents}
\]

\[
\text{ANS: 4} \quad \frac{150}{20} = \frac{x}{30} \quad 20x = 4500 \quad x = 225
\]

\[
\text{PTS: 2} \quad \text{REF: 081101ia} \quad \text{STA: A.N.5} \quad \text{TOP: Direct Variation}
\]

\[
\text{ANS: } \quad d = 6.25h, 250. \quad d = 6.25(40) = 250
\]

\[
\text{PTS: 2} \quad \text{REF: 010933ia} \quad \text{STA: A.N.5} \quad \text{TOP: Direct Variation}
\]

\[
\text{ANS: 2} \quad \text{PTS: 2} \quad \text{REF: 080823ia} \quad \text{STA: A.A.32} \quad \text{TOP: Slope}
\]

\[
\text{ANS: 2} \quad \text{PTS: 2} \quad \text{REF: 081223ia} \quad \text{STA: A.A.32} \quad \text{TOP: Slope}
\]

\[
\text{ANS: 1} \quad \text{PTS: 2} \quad \text{REF: 081115ia} \quad \text{STA: A.A.32} \quad \text{TOP: Slope}
\]

\[
\text{ANS: 3} \quad m = \frac{4 - 10}{3 - (-6)} = -\frac{2}{3}
\]

\[
\text{PTS: 2} \quad \text{REF: fall0716ia} \quad \text{STA: A.A.33} \quad \text{TOP: Slope}
\]
284 ANS: 3
\[ m = \frac{1 - (-4)}{-6 - 4} = -\frac{1}{2} \]

PTS: 2  REF: 060820ia  STA: A.A.33  TOP: Slope

285 ANS: 2
\[ m = \frac{5 - 3}{2 - 7} = -\frac{2}{5} \]

PTS: 2  REF: 010913ia  STA: A.A.33  TOP: Slope

286 ANS: 1
\[ m = \frac{4 - (-4)}{-5 - 15} = -\frac{2}{5} \]

PTS: 2  REF: 080915ia  STA: A.A.33  TOP: Slope

287 ANS: 2
\[ m = \frac{5 - 2}{3 - (-2)} = \frac{3}{5} \]

PTS: 2  REF: 061004ia  STA: A.A.33  TOP: Slope

288 ANS: 3
\[ m = \frac{6 - 4}{3 - (-2)} = \frac{2}{5} \]

PTS: 2  REF: 061004ia  STA: A.A.33  TOP: Slope

289 ANS: 4
\[ m = \frac{-3 - 1}{2 - 5} = \frac{-4}{-3} = \frac{4}{3} \]

PTS: 2  REF: 011215ia  STA: A.A.33  TOP: Slope

290 ANS: 2
\[ m = \frac{-7 - 1}{4 - 9} = \frac{-8}{-5} = \frac{8}{5} \]

PTS: 2  REF: 081310ia  STA: A.A.33  TOP: Slope

291 ANS: 4
\[ A(-3, 4) \text{ and } B(5, 8). \quad m = \frac{4 - 8}{-3 - 5} = \frac{-4}{-8} = \frac{1}{2} \]

PTS: 2  REF: 011007ia  STA: A.A.33  TOP: Slope

292 ANS: 2
\[ A(-3, 8) \text{ and } B(3, 6). \quad m = \frac{8 - 6}{-3 - 3} = \frac{2}{-6} = -\frac{1}{3} \]

PTS: 2  REF: 081005ia  STA: A.A.33  TOP: Slope
If the car can travel 75 miles on 4 gallons, it can travel 300 miles on 16 gallons. \( \frac{75}{4} = \frac{x}{16} \).

\[ x = 300 \]

\[ y = mx + b \]

\[ -6 = (-3)(4) + b \]

\[ b = 6 \]

\[ y = mx + b \]

\[ -1 = (2)(3) + b \]

\[ b = -7 \]

\[ y = mx + b \]

\[ 5 = (-2)(1) + b \]

\[ b = 7 \]
300 ANS: 3
\[ y = mx + b \quad y = \frac{3}{4} x - \frac{1}{2} \]
\[ 1 = \left( \frac{3}{4} \right)(2) + b \quad 4y = 3x - 2 \]
\[ 1 = \frac{3}{2} + b \]
\[ b = -\frac{1}{2} \]
PTS: 2  REF: 081219ia  STA: A.A.34  TOP: Writing Linear Equations

301 ANS:
\[ y = \frac{3}{4} x + 10. \quad y = mx + b \]
\[ 4 = \frac{3}{4} (-8) + b \]
\[ 4 = -6 + b \]
\[ 10 = b \]
PTS: 3  REF: 011134ia  STA: A.A.34  TOP: Writing Linear Equations

302 ANS: 1
\[ m = \frac{3 - 0}{0 - 2} = \frac{-3}{2} \]
Using the given y-intercept (0,3) to write the equation of the line \( y = -\frac{3}{2} x + 3 \).
PTS: 2  REF: fall0713ia  STA: A.A.35  TOP: Writing Linear Equations

303 ANS: 3  PTS: 2  REF: 010910ia  STA: A.A.35  TOP: Writing Linear Equations

304 ANS: 3
\[ m = \frac{7 - 3}{-3 - 3} = \frac{4}{-6} = -\frac{2}{3} \quad y = mx + b \]
\[ 3 = -\frac{2}{3} (3) + b \]
\[ 3 = -2 + b \]
\[ 5 = b \]
PTS: 2  REF: 011013ia  STA: A.A.35  TOP: Writing Linear Equations

305 ANS: 2
\[ m = \frac{5 - 3}{8 - 1} = \frac{2}{7} \quad y - y_1 = m(x - x_i) \]
\[ y - 5 = \frac{2}{7} (x - 8) \]
PTS: 2  REF: 081029ia  STA: A.A.35  TOP: Writing Linear Equations
\[ y = \frac{2}{5}x + 2. \quad m = \frac{4 - 0}{5 - (-5)} = \frac{2}{5}. \quad y = mx + b. \]
\[ 4 = \frac{2}{5}(5) + b \]
\[ b = 2 \]

307 ANS: 1
\[ 4y - 2x = 0 \]
\[ 4(-1) - 2(-2) = 0 \]
\[ -4 + 4 = 0 \]

308 ANS: 4
\[ 2x - 3y = 9 \]
\[ 2(0) - 3(-3) = 9 \]
\[ 0 + 9 = 9 \]

309 ANS: 4
\[ 3y + 2x = 8 \]
\[ 3(-2) + 2(7) = 8 \]
\[ -6 + 14 = 8 \]

310 ANS: 4
\[ 2(2) - (-7) = 11 \]

311 ANS: 3
\[ 2(5) + k = 9 \]
\[ 10 + k = 9 \]
\[ k = -1 \]

312 ANS: 3
\[ 2(1) + 3 = 5 \]

313 ANS: 2
\[ 2 \quad PTS: \quad 2 \quad REF: \quad 080810ia \quad STA: \quad A.A.36 \quad TOP: \quad Parallel and Perpendicular Lines \]

314 ANS: 1
\[ PTS: \quad 2 \quad REF: \quad 080911ia \quad STA: \quad A.A.36 \quad TOP: \quad Parallel and Perpendicular Lines \]
The slope of both is $-4$.

The slope of $y = 3 - 2x$ is $-2$. Using $m = -\frac{A}{B}$, the slope of $4x + 2y = 5$ is $-\frac{4}{2} = -2$.

The slope of $2x - 4y = 16$ is $-\frac{A}{B} = \frac{-2}{-4} = \frac{1}{2}$.

Using $m = -\frac{A}{B}$, the slope of $2x - 3y = 9$ is $\frac{2}{3}$.

$m = -3$

$y - 4x = 7$ may be rewritten as $y = 4x + 7$

$3(2m - 1) \leq 4m + 7$

$6m - 3 \leq 4m + 7$

$2m \leq 10$

$m \leq 5$

$y - 4x = 7$ may be rewritten as $y = 4x + 7$
326 \[ -6x - 17 \geq 8x + 25 \]
\[ -42 \geq 14x \]
\[ -3 \geq x \]

PTS: 2  REF: 081121ia  STA: A.A.24  TOP: Solving Inequalities

327 \[ 2(x - 4) \geq \frac{1}{2} (5 - 3x) \]
\[ 4(x - 4) \geq 5 - 3x \]
\[ 4x - 16 \geq 5 - 3x \]
\[ 7x \geq 21 \]
\[ x \geq 3 \]

PTS: 3  REF: 011234ia  STA: A.A.24  TOP: Solving Inequalities

328 \[ -5(x - 7) < 15 \]
\[ x - 7 > -3 \]
\[ x > 4 \]

PTS: 2  REF: 061331ia  STA: A.A.24  TOP: Solving Inequalities

329 \[ -2x + 5 > 17 \]
\[ -2x > 12 \]
\[ x < -6 \]

PTS: 2  REF: fall0724ia  STA: A.A.21  TOP: Interpreting Solutions

330 \[ -4x + 2 > 10 \]
\[ -4x > 8 \]
\[ x < -2 \]

PTS: 2  REF: 080805ia  STA: A.A.21  TOP: Interpreting Solutions

331 \[ \frac{4}{3} x + 5 < 17 \]
\[ \frac{4}{3} x < 12 \]
\[ 4x < 36 \]
\[ x < 9 \]

PTS: 2  REF: 060914ia  STA: A.A.21  TOP: Interpreting Solutions
\[ -2(x - 5) < 4 \\
-2x + 10 < 4 \\
-2x < -6 \\
x > 3 \\

PTS: 2  REF: 080913ia  STA: A.A.21  TOP: Interpreting Solutions

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 081309ia  STA: A.A.21  TOP: Interpreting Solutions

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: 061034ia  STA: A.A.21  TOP: Interpreting Solutions

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 081317ia  STA: A.A.21

TOP: Interpreting Solutions

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: 061034ia  STA: A.A.21  TOP: Interpreting Solutions

TOP: Modeling Inequalities

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 080803ia  STA: A.A.4

TOP: Modeling Inequalities

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: 061034ia  STA: A.A.21  TOP: Interpreting Solutions

TOP: Modeling Inequalities

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 060906ia  STA: A.A.4

TOP: Modeling Inequalities

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: fall0715ia  STA: A.A.5

TOP: Modeling Inequalities

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 060821ia  STA: A.A.5

TOP: Modeling Inequalities

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: 011005ia  STA: A.A.5

TOP: Modeling Inequalities

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 081107ia  STA: A.A.5

TOP: Modeling Inequalities

\[ -12 \left( \frac{2}{3}x + 3 < -2x - 7 \right) \\
x + 9 < -6x - 21 \\
7x < -30 \\
x < \frac{-30}{7} \\

PTS: 3  REF: 081212ia  STA: A.A.5

TOP: Modeling Inequalities

\[ -3x + 8 \geq 14 \\
-3x \geq 6 \\
x \leq -2 \\

PTS: 2  REF: 061321ia  STA: A.A.5

TOP: Modeling Inequalities
13

ANS: 1
\[ 0.07m + 19 \leq 29.50 \]
\[ 0.07m \leq 10.50 \]
\[ m \leq 150 \]

PTS: 2  REF: 010904ia  STA: A.A.6  TOP: Modeling Inequalities

ANS: 1
\[ 13.95 + 0.49s \leq 50.00 \]
\[ 0.49s \leq 36.05 \]
\[ s \leq 73.57 \]

PTS: 2  REF: 080904ia  STA: A.A.6  TOP: Modeling Inequalities

ANS: 3
\[ 5x < 55 \]
\[ x < 11 \]

PTS: 2  REF: 061211ia  STA: A.A.6  TOP: Modeling Inequalities

ANS: 4
\[ 375 + 155w \geq 900 \]
\[ 155w \geq 525 \]
\[ w \geq 3.4 \]

PTS: 2  REF: 081206ia  STA: A.A.6  TOP: Modeling Inequalities

ANS:
7.  \[ 15x + 22 \geq 120 \]
\[ x \geq 6.53 \]

PTS: 3  REF: fall0735ia  STA: A.A.6  TOP: Modeling Inequalities

ANS:
10.  \[ 10 + 2d \geq 75, 33.  10 + 2d \geq 75 \]
\[ d \geq 32.5 \]

PTS: 3  REF: 060834ia  STA: A.A.6  TOP: Modeling Inequalities

ANS:
0.65x + 35 \leq 45
\[ 0.65x \leq 10 \]
\[ x \leq 15 \]

PTS: 3  REF: 061135ia  STA: A.A.6  TOP: Modeling Inequalities

ANS: 4  PTS: 2  REF: 061028ia  STA: A.G.6  TOP: Linear Inequalities
352 ANS: 2
The slope of the inequality is \(-\frac{1}{2}\).

353 ANS: 4
PTS: 2
REF: fall0720ia
STA: A.G.6
TOP: Linear Inequalities

354 ANS: 1
PTS: 2
REF: 011210ia
STA: A.G.6
TOP: Linear Inequalities

355 ANS: 1
PTS: 2
REF: 060920ia
STA: A.G.6
TOP: Linear Inequalities

356 ANS: 2
PTS: 2
REF: 081314ia
STA: A.G.6
TOP: Linear Inequalities

357 ANS:

\[(1, -3) \text{ is in the solution set. } 4(1) - 3(-3) > 9\]
\[4 + 9 > 9\]

358 ANS: 3
PTS: 2
REF: 011038ia
STA: A.G.6
TOP: Linear Inequalities

359 ANS:

360 ANS: 4
The transformation is a reflection in the x-axis.

PTS: 2
REF: fall0722ia
STA: A.G.5
TOP: Graphing Absolute Value Functions
361 ANS: 3  PTS: 2  REF: 011017ia  STA: A.G.5  TOP: Graphing Absolute Value Functions

362 ANS: 4  PTS: 2  REF: 011206ia  STA: A.G.5  TOP: Graphing Absolute Value Functions

The transformation is a reflection in the $x$-axis.

363 ANS:  

![Graph of an absolute value function](image)

The graph becomes wider as the coefficient approaches 0.

364 ANS:  

![Graph of an absolute value function](image)

The graph becomes steeper.

365 ANS: 2  PTS: 2  REF: 061105ia  STA: A.A.20  TOP: Factoring Polynomials

366 ANS: 2  PTS: 2  REF: 080806ia  STA: A.A.20  TOP: Factoring Polynomials

\[2x^2 + 10x - 12 = 2(x^2 + 5x - 6) = 2(x + 6)(x - 1)\]
367 ANS: 2 PTS: 2 REF: 061027ia STA: A.A.20
TOP: Factoring Polynomials

368 ANS: 4
\[3x^3 - 33x^2 + 90x = 3x(x^2 - 11x + 30) = 3x(x - 5)(x - 6)\]
PTS: 2 REF: 061227ia STA: A.A.20 TOP: Factoring Polynomials

369 ANS:
\[5x^3 - 20x^2 - 60x\]
\[5x(x^2 - 4x - 12)\]
\[5x(x + 2)(x - 6)\]
PTS: 2 REF: 011332ia STA: A.A.20 TOP: Factoring Polynomials

370 ANS: 2 PTS: 2 REF: 011022ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

371 ANS: 3 PTS: 2 REF: fall0706ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

372 ANS: 1 PTS: 2 REF: 011306ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

373 ANS: 2 PTS: 2 REF: 011201ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

374 ANS: 3 PTS: 2 REF: 081008ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

375 ANS: 1 PTS: 2 REF: 060804ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

376 ANS: 2 PTS: 2 REF: 010909ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

377 ANS: 1 PTS: 2 REF: 080902ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

378 ANS: 3 PTS: 2 REF: 061101ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

379 ANS: 2
\[36x^2 - 100y^6 = 4(9x^2 - 25y^6) = 4(3x + 5y^3)(3x - 5y^3)\]
PTS: 2 REF: 081129ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

380 ANS: 3 PTS: 2 REF: 081207ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

381 ANS: 2
\[a^3 - 4a = a(a^2 - 4) = a(a - 2)(a + 2)\]
PTS: 2 REF: 011108ia STA: A.A.19
TOP: Factoring the Difference of Perfect Squares
382 ANS:
\[4x(x + 3)(x - 3). \quad 4x^3 - 36x = 4x(x^2 - 9) = 4x(x + 3)(x - 3)\]

PTS: 2  REF: 060932ia  STA: A.A.19  TOP: Factoring the Difference of Perfect Squares

383 ANS: 2
\[x^2 - 16x + 28 = 0\]
\[(x - 14)(x - 2) = 0\]
\[x = 14, 2\]

PTS: 2  REF: 061311ia  STA: A.A.27  TOP: Solving Quadratics by Factoring

384 ANS: 3
\[x^2 - 6x = 0\]
\[x(x - 6) = 0\]
\[x = 0 \quad x = 6\]

PTS: 2  REF: 080921ia  STA: A.A.27  TOP: Solving Quadratics by Factoring

385 ANS: 3
\[x^2 - 10x + 21 = 0\]
\[(x - 7)(x - 3) = 0\]
\[x = 7 \quad x = 3\]

PTS: 2  REF: 010914ia  STA: A.A.28  TOP: Roots of Quadratics

386 ANS: 4
\[x^2 - 7x + 6 = 0\]
\[(x - 6)(x - 1) = 0\]
\[x = 6 \quad x = 1\]

PTS: 2  REF: 060902ia  STA: A.A.28  TOP: Roots of Quadratics

387 ANS: 2
\[x^2 - 2x - 15 = 0\]
\[(x - 5)(x + 3) = 0\]
\[x = 5 \quad x = -3\]

PTS: 2  REF: 011128ia  STA: A.A.28  TOP: Roots of Quadratics

388 ANS: 2
\[x^2 - 5x + 6 = 0\]
\[(x - 3)(x - 2) = 0\]
\[x = 3 \quad x = 2\]

PTS: 2  REF: 081120ia  STA: A.A.28  TOP: Roots of Quadratics
389 \( ANS: 1 \)
\( 3x^2 - 27x = 0 \)
\( 3x(x - 9) = 0 \)
\( x = 0, 9 \)

\( PTS: 2 \) \( REF: 011223ia \) \( STA: A.A.28 \) \( TOP: \) Roots of Quadratics

390 \( ANS: 4 \)
\( x^2 - 14x + 48 = 0 \)
\( (x - 6)(x - 8) = 0 \)
\( x = 6, 8 \)

\( PTS: 2 \) \( REF: 011320ia \) \( STA: A.A.28 \) \( TOP: \) Roots of Quadratics

391 \( ANS: 2 \) \( PTS: 2 \)
\( REF: 061326ia \) \( STA: A.A.28 \) \( TOP: \) Roots of Quadratics

392 \( ANS: \)
\(-2, 3. \quad x^2 - x = 6 \)
\( x^2 - x - 6 = 0 \)
\( (x - 3)(x + 2) = 0 \)
\( x = 3 \) or \( -2 \)

\( PTS: 3 \) \( REF: 011034ia \) \( STA: A.A.28 \) \( TOP: \) Roots of Quadratics

393 \( ANS: \)
\(-15, 2 \quad x^2 + 13x - 30 = 0 \)
\( (x + 15)(x - 2) = 0 \)
\( x = -15, 2 \)

\( PTS: 3 \) \( REF: 081036ia \) \( STA: A.A.28 \) \( TOP: \) Roots of Quadratics

394 \( ANS: 4 \) \( PTS: 2 \)
\( REF: 060829ia \) \( STA: A.G.5 \) \( TOP: \) Graphing Quadratic Functions

395 \( ANS: 2 \) \( PTS: 2 \)
\( REF: 061113ia \) \( STA: A.G.5 \) \( TOP: \) Graphing Quadratic Functions

396 \( ANS: 2 \) \( PTS: 2 \)
\( REF: 081218ia \) \( STA: A.G.5 \) \( TOP: \) Graphing Quadratic Functions

397 \( ANS: 2 \) \( PTS: 2 \)
\( REF: 011330ia \) \( STA: A.G.5 \) \( TOP: \) Graphing Quadratic Functions

398 \( ANS: 1 \) \( PTS: 2 \)
\( REF: 081015ia \) \( STA: A.G.5 \) \( TOP: \) Graphing Quadratic Functions

399 \( ANS: 3 \) \( PTS: 2 \)
\( REF: 060924ia \) \( STA: A.G.8 \) \( TOP: \) Solving Quadratics by Graphing

400 \( ANS: 2 \) \( PTS: 2 \)
\( REF: 080916ia \) \( STA: A.G.8 \) \( TOP: \) Solving Quadratics by Graphing

401 \( ANS: 4 \) \( PTS: 2 \)
\( REF: 011111ia \) \( STA: A.G.8 \) \( TOP: \) Solving Quadratics by Graphing
402 ANS: 3 PTS: 2 REF: 061306ia STA: A.G.8
TOP: Solving Quadratics by Graphing

403 ANS: 

404 ANS: 

405 ANS: 1
\[ x^2 - 36 = 5x \]
\[ x^2 - 5x - 36 = 0 \]
\[ (x - 9)(x + 4) = 0 \]
\[ x = 9 \]

406 ANS: 3
\[ b = 3 + d \quad (3 + d)d = 40 \]
\[ bd = 40 \quad d^2 + 3d - 40 = 0 \]
\[ (d + 8)(d - 5) = 0 \]
\[ d = 5 \]

PTS: 3 REF: 061234ia STA: A.G.8 TOP: Solving Quadratics by Graphing

PTS: 3 REF: 060836ia STA: A.G.8 TOP: Solving Quadratics by Graphing

PTS: 3 REF: 061020ia STA: A.A.8 TOP: Writing Quadratics

PTS: 2 REF: 011208ia STA: A.A.8 TOP: Writing Quadratics
407 ANS: 3
\[ N = 5 + J \quad N(N - 5) = 84 \]
\[ J = N - 5 \quad N^2 - 5N - 84 = 0 \]
\[ NJ = 84 \quad (N - 12)(N + 7) = 0 \]
\[ N = 12 \]

PTS: 2  REF: 081304ia  STA: A.A.8  TOP: Writing Quadratics

408 ANS:
6, 8, 10. Three consecutive even integers are \( x, x + 2 \) and \( x + 4 \). \((x + 2)(x + 4) = 10x + 20\)
\[ x^2 + 6x + 8 = 10x + 20 \]
\[ x^2 - 4x - 12 = 0 \]
\[ (x - 6)(x + 2) = 0 \]
\[ x = 6 \]

PTS: 4  REF: 011039ia  STA: A.A.8  TOP: Writing Quadratics

409 ANS: 2
\[ l(l - 5) = 24 \]
\[ l^2 - 5l - 24 = 0 \]
\[ (l - 8)(l + 3) = 0 \]
\[ l = 8 \]

PTS: 2  REF: 080817ia  STA: A.A.8  TOP: Geometric Applications of Quadratics

410 ANS: 2
\[ l(l - 3) = 40 \]
\[ l^2 - 3l - 40 = 0 \]
\[ (l - 8)(l + 5) = 0 \]
\[ l = 8 \]

PTS: 2  REF: 081116ia  STA: A.A.8  TOP: Geometric Applications of Quadratics

411 ANS:
\( w(w + 15) = 54, 3, 18. \quad w(w + 15) = 54 \)
\[ w^2 + 15w - 54 = 0 \]
\[ (w + 18)(w - 3) = 0 \]
\[ w = 3 \]

PTS: 4  REF: 060837ia  STA: A.A.8  TOP: Geometric Applications of Quadratics

412 ANS: 1  PTS: 2  REF: 060811ia  STA: A.G.10  TOP: Identifying the Vertex of a Quadratic Given Graph

413 ANS: 1  PTS: 2  REF: 080813ia  STA: A.G.10  TOP: Identifying the Vertex of a Quadratic Given Graph
Identifying the Vertex of a Quadratic Given Graph

414 ANS: 2
PTS: 2
REF: 010916ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

415 ANS: 2
PTS: 2
REF: 011015ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

416 ANS: 1
PTS: 2
REF: 061005ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

417 ANS: 2
PTS: 2
REF: 081111ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

418 ANS: 4
PTS: 2
REF: 081214ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

419 ANS: 4
PTS: 2
REF: 081322ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

420 ANS:
\[ x = 1; \ (1, -5) \]

PTS: 2
REF: 061133ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.G.10

421 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-(-16)}{2(1)} = 8. y = (8)^2 - 16(8) + 63 = -1 \]

PTS: 2
REF: 060918ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.A.41

422 ANS: 3
\[ x = \frac{-b}{2a} = \frac{-10}{2(-1)} = 5. \]

PTS: 2
REF: 081018ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.A.41

423 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-6}{2(-1)} = 3. \]

PTS: 2
REF: 011127ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.A.41

424 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-(-3)}{2(2)} = \frac{3}{4}. \]

PTS: 2
REF: 011219ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.A.41

425 ANS: 3
\[ x = \frac{-b}{2a} = \frac{-24}{2(-2)} = 6. y = -2(6)^2 + 24(6) - 100 = -28 \]

PTS: 2
REF: 061214ia
TOP: Identifying the Vertex of a Quadratic Given Graph
STA: A.A.41
426  \[ x = \frac{-b}{2a} = \frac{-8}{2(1)} = -4. \quad y = (-4)^2 + 8(-4) + 10 = -6. \quad (-4, -6) \]

427  \[ x = \frac{-b}{2a} = \frac{-(-8)}{2(-2)} = -2 \]
\[ y = -2(-2)^2 - 8(-2) + 3 = 11 \]

428  \[ 5x + 2y = 48 \]
\[ 3x + 2y = 32 \]
\[ 2x = 16 \]
\[ x = 8 \]

429  \[ x + 2y = 9 \]
\[ x - y = 3 \]
\[ 3y = 6 \]
\[ y = 2 \]

430  \[ x - 2y = 1 \]
\[ x + 4y = 7 \]
\[ -6y = -6 \]
\[ y = 1 \]

431  \[ c + 3d = 8 \]
\[ 4d - 6 + 3d = 8 \]
\[ 7d = 14 \quad c = 2 \]
\[ d = 2 \]

PTS: 2  REF: 061012ia  STA: A.A.10  TOP: Solving Linear Systems
2(x – 3y = -3)
2x + y = 8
2x – 6y = -6
7y = 14
y = 2

PTS: 2   REF: 081021ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 3
2x – 5y = 11  2x – 5(-1) = 11
-2x + 3y = -9  2x = 6
-2y = 2  x = 3
y = -1

PTS: 2   REF: 081109ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 1   PTS: 2   REF: 081315ia  STA: A.A.10
TOP: Solving Linear Systems

ANS:
(-2, 5). 3x + 2y = 4  12x + 8y = 16.  3x + 2y = 4
4x + 3y = 7  12x + 9y = 21  3x + 2(5) = 4
y = 5  3x = -6
x = -2

PTS: 4   REF: 010937ia  STA: A.A.10  TOP: Solving Linear Systems

ANS:
2. Subtracting the equations: 3y = 6

y = 2

PTS: 2   REF: 061231ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 3   PTS: 2   REF: 081201ia  STA: A.G.7
TOP: Solving Linear Systems

ANS: 3   PTS: 2   REF: 011304ia  STA: A.G.7
TOP: Solving Linear Systems
ID: A

439 ANS:

PTS: 4  REF: 080938ia  STA: A.G.7  TOP: Solving Linear Systems

440 ANS:

PTS: 3  REF: 011235ia  STA: A.G.7  TOP: Solving Linear Systems

441 ANS: 2

\[ L + S = 47 \]
\[ L - S = 15 \]
\[ 2L = 62 \]
\[ L = 31 \]

PTS: 2  REF: 060912ia  STA: A.A.7  TOP: Writing Linear Systems

442 ANS: 2

\[ 3c + 4m = 12.50 \]
\[ 3c + 2m = 8.50 \]
\[ 2m = 4.00 \]
\[ m = 2.00 \]

PTS: 2  REF: 060806ia  STA: A.A.7  TOP: Writing Linear Systems
443 ANS: 3
   \[ b = 42 - r \quad r = 2b + 3 \]
   \[ r = 2b + 3 \quad r = 2(42 - r) + 3 \]
   \[ r = 84 - 2r + 3 \]
   \[ 3r = 87 \]
   \[ r = 29 \]

PTS: 2          REF: 060812ia      STA: A.A.7      TOP: Writing Linear Systems

444 ANS: 2
   \[ s + a = 126. \quad s + 2s = 126 \]
   \[ a = 2s \quad s = 42 \]

PTS: 2          REF: 080811ia      STA: A.A.7      TOP: Writing Linear Systems

445 ANS: 1
   \[ so = f + 60 \quad j = 2f - 50 \quad se = 3f. \quad f + (f + 60) + (2f - 50) + 3f = 1424 \]
   \[ 7f + 10 = 1424 \]
   \[ f = 202 \]

PTS: 2          REF: 060917ia      STA: A.A.7      TOP: Writing Linear Systems

446 ANS: 1
   \[ 1P + 2C = 5 \]
   \[ 1P + 4C = 6 \]
   \[ 2C = 1 \]
   \[ C = 0.5 \]

PTS: 2          REF: 011003ia      STA: A.A.7      TOP: Writing Linear Systems

447 ANS: 2
   \[ J - M = 3 \]
   \[ 8J + 8M = 120 \]
   \[ 8J - 8M = 24 \]
   \[ 16J = 144 \]
   \[ J = 9 \]

PTS: 2          REF: 011115ia      STA: A.A.7      TOP: Writing Linear Systems

448 ANS: 1
   \[ f + m = 53 \]
   \[ f - m = 25 \]
   \[ 2m = 28 \]
   \[ m = 14 \]

PTS: 2          REF: 061126ia      STA: A.A.7      TOP: Writing Linear Systems
449 \text{ANS: 1} 
\quad b = 2j + 4 \quad 2j + 4 = 31 - j 
\quad b + j = 31 \quad 3j = 27 
\quad b = 31 - j \quad j = 9 

\text{PTS: 2} \quad \text{REF: 081119ia} \quad \text{STA: A.A.7} \quad \text{TOP: Writing Linear Systems} 

450 \text{ANS: 2} 
\quad W + L = 72 
\quad W - L = 12 
\quad 2W = 84 
\quad W = 42 

\text{PTS: 2} \quad \text{REF: 081227ia} \quad \text{STA: A.A.7} \quad \text{TOP: Writing Linear Systems} 

451 \text{ANS:} 
\quad m = 50\epsilon, \quad p = 15\epsilon. \quad 3m + 2p = 1.80, \quad 9m + 6p = 5.40, \quad 4(50) + 6p = 2.90 
\quad 4m + 6p = 2.90 \quad 4m + 6p = 2.90 \quad 6p = .90 
\quad 5m = 2.50 \quad p = .015 
\quad m = .50 

\text{PTS: 4} \quad \text{REF: 080837ia} \quad \text{STA: A.A.7} \quad \text{TOP: Writing Linear Systems} 

452 \text{ANS:} 
\quad 3n + 4p = 8.50 \quad 3(2.50) + 4p = 8.50 
\quad 5n + 8p = 14.50 \quad 4p = 1 
\quad 6n + 8p = 17 \quad p = .25 
\quad n = 2.50 

\text{PTS: 3} \quad \text{REF: 011335ia} \quad \text{STA: A.A.7} \quad \text{TOP: Writing Linear Systems} 

453 \text{ANS:} 
\quad L - S = 28 \quad 2S - 8 = S + 28 
\quad L = 2S - 8 \quad S = 36 
\quad L = S + 28 \quad L = 36 + 28 = 64 

\text{PTS: 3} \quad \text{REF: 081335ia} \quad \text{STA: A.A.7} \quad \text{TOP: Writing Linear Systems} 

454 \text{ANS: 1} \quad \text{PTS: 2} \quad \text{REF: 061010ia} \quad \text{STA: A.A.40} 
\text{TOP: Systems of Linear Inequalities} 

455 \text{ANS: 2} \quad \text{PTS: 2} \quad \text{REF: 081127ia} \quad \text{STA: A.A.40} 
\text{TOP: Systems of Linear Inequalities} 

456 \text{ANS: 4} \quad \text{PTS: 2} \quad \text{REF: 080825ia} \quad \text{STA: A.A.40} 
\text{TOP: Systems of Linear Inequalities} 

457 \text{ANS: 2} \quad \text{PTS: 2} \quad \text{REF: 011023ia} \quad \text{STA: A.A.40} 
\text{TOP: Systems of Linear Inequalities}
458 ANS: 4
TOP: Systems of Linear Inequalities
PTS: 2
REF: 061222ia STA: A.A.40

459 ANS: 2
\(-1 \leq 3(2) + 1. \ 2 - (-1) > 1\)
\(-1 \leq 7 \quad 3 > 1\)
PTS: 2
REF: 011323ia STA: A.A.40 TOP: Systems of Linear Inequalities

460 ANS:

461 ANS:

PTS: 4
REF: 010938ia STA: A.G.7 TOP: Systems of Linear Inequalities

PTS: 4
REF: 081037ia STA: A.G.7 TOP: Systems of Linear Inequalities
462 ANS:

PTS: 4   REF: 011139ia   STA: A.G.7   TOP: Systems of Linear Inequalities

463 ANS:

PTS: 4   REF: 061139ia   STA: A.G.7   TOP: Systems of Linear Inequalities

464 ANS:

PTS: 4   REF: 081239ia   STA: A.G.7   TOP: Systems of Linear Inequalities
Since \( y = x \), the solutions are \((2, 2)\) and \((-1, -1)\).

\[
x^2 - 2 = x
\]

\[
x^2 - x - 2 = 0
\]

\[
(x - 2)(x + 1) = 0
\]

\[
x = 2 \text{ or } -1
\]

PTS: 2  REF: 060810ia  STA: A.A.11  TOP: Quadratic-Linear Systems

\[
x^2 + 5x + 6 = -x + 1. \quad y = -x + 1
\]

\[
x^2 + 6x + 5 = 0 \quad = -(5) + 1
\]

\[
(x + 5)(x + 1) = 0 \quad = 6
\]

\[
x = -5 \text{ or } -1
\]

PTS: 2  REF: 080812ia  STA: A.A.11  TOP: Quadratic-Linear Systems

\[
x^2 - x - 20 = 3x - 15. \quad y = 3x - 15
\]

\[
x^2 - 4x - 6 = 0 \quad = 3(-1) - 15
\]

\[
(x = 5)(x + 1) = 0 \quad = -18
\]

\[
x = 5 \text{ or } -1
\]

PTS: 2  REF: 010922ia  STA: A.A.11  TOP: Quadratic-Linear Systems

\[
x^2 - x = x + 3. \quad \text{Since } y = x + 3, \text{ the solutions are } (3, 6) \text{ and } (-1, 2).
\]

\[
x^2 - 2x - 3 = 0
\]

\[
(x - 3)(x + 1) = 0
\]

\[
x = 3 \text{ or } -1
\]

PTS: 2  REF: 061118ia  STA: A.A.11  TOP: Quadratic-Linear Systems
\[
\begin{align*}
y &= -x + 5. \quad -x + 5 &= x^2 - 25 & y &= (-6) + 5 = 11. \\
0 &= x^2 + x - 30 & y &= -5 + 5 = 0 \\
0 &= (x + 6)(x - 5) & x &= -6, 5
\end{align*}
\]

\[
\begin{align*}
\text{PTS: } 2 & \quad \text{REF: 061213ia} & \text{STA: A.A.11} & \text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
\text{ANS: } & (-3, -5), (3, 7). \quad x^2 + 2x - 8 &= 2x + 1. & y &= 2(3) + 1 = 7 \\
& x^2 - 9 &= 0 & y &= 2(-3) + 1 = -5 \\
& x &= \pm 3
\end{align*}
\]

\[
\begin{align*}
\text{PTS: } 3 & \quad \text{REF: 081236ia} & \text{STA: A.A.11} & \text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
\text{ANS: } & 2 \quad \text{PTS: } 2 & \text{REF: 011012ia} & \text{STA: A.G.9} \\
\text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
\text{ANS: } & 1 \quad \text{PTS: } 2 & \text{REF: 011207ia} & \text{STA: A.G.9} \\
\text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
2y - 2x &= 10 & \text{axis of symmetry: } x &= \frac{-b}{2a} = \frac{-2}{2(1)} = -1 \\
2y &= 2x + 10 \\
y &= x + 10
\end{align*}
\]

\[
\begin{align*}
\text{PTS: } 2 & \quad \text{REF: 081010ia} & \text{STA: A.G.9} & \text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
\text{ANS: } & 4 \quad \text{PTS: } 2 & \text{REF: 011102ia} & \text{STA: A.G.9} \\
\text{TOP: Quadratic-Linear Systems}
\end{align*}
\]

\[
\begin{align*}
\text{ANS: } & 1 \\
x^2 - 5x + 3 &= x - 6 & y &= 3 - 6 = -3 \ (3, -3) \\
x^2 - 6x + 9 &= 0 \\
(x - 3)^2 &= 0 \\
\quad x &= 3
\end{align*}
\]

\[
\begin{align*}
\text{PTS: } 2 & \quad \text{REF: 061330ia} & \text{STA: A.G.9} & \text{TOP: Quadratic-Linear Systems}
\end{align*}
\]
476 ANS:

477 ANS:

478 ANS:

PTS: 4  REF: fall0738ia  STA: A.G.9  TOP: Quadratic-Linear Systems

PTS: 4  REF: 080839ia  STA: A.G.9  TOP: Quadratic-Linear Systems

PTS: 4  REF: 060939ia  STA: A.G.9  TOP: Quadratic-Linear Systems
ID: A

479 ANS:

PTS: 4    REF: 061039ia    STA: A.G.9    TOP: Quadratic-Linear Systems

480 ANS:

PTS: 4    REF: 081138ia    STA: A.G.9    TOP: Quadratic-Linear Systems

481 ANS:

PTS: 4    REF: 011339ia    STA: A.G.9    TOP: Quadratic-Linear Systems
482 ANS:

\[ y = mx + b \]

PTS: 4 REF: 081337ia STA: A.G.9 TOP: Quadratic-Linear Systems

483 ANS: 4

\[-3x(x - 4) - 2x(x + 3) = -3x^2 + 12x - 2x^2 - 6x = -5x^2 + 6x\]

PTS: 2 REF: 081114ia STA: A.A.13 TOP: Addition and Subtraction of Monomials
484 ANS: 3 PTS: 2 REF: 080819ia STA: A.A.13 TOP: Addition and Subtraction of Polynomials KEY: subtraction
486 ANS: 3 PTS: 2 REF: 061003ia STA: A.A.13 TOP: Addition and Subtraction of Polynomials KEY: addition
487 ANS: 1 PTS: 2 REF: 011126ia STA: A.A.13 TOP: Addition and Subtraction of Polynomials KEY: subtraction
489 ANS: 3 PTS: 2 REF: 081205ia STA: A.A.13 TOP: Addition and Subtraction of Polynomials KEY: addition
491 ANS: 2 PTS: 2 REF: 011213ia STA: A.A.13 TOP: Addition and Subtraction of Polynomials KEY: subtraction
494 ANS: 1 PTS: 2 REF: 060807ia STA: A.A.13 TOP: Multiplication of Polynomials

495 ANS: 3
(3x + 2)(x - 7) = 3x^2 - 21x + 2x - 14 = 3x^2 - 19x - 14

PTS: 2 REF: 061210ia STA: A.A.13 TOP: Multiplication of Polynomials

496 ANS: 3
\[
\frac{12x^3 - 6x^2 + 2x}{2x} = \frac{2x(6x^2 - 3x + 1)}{2x} = 6x^2 - 3x + 1
\]

PTS: 2 REF: 011211ia STA: A.A.14 TOP: Division of Polynomials

497 ANS: 4 PTS: 2 REF: 061203ia STA: A.A.14 TOP: Division of Polynomials

498 ANS: 2 PTS: 2 REF: 011316ia STA: A.A.14 TOP: Division of Polynomials

499 ANS:
\[
3a^2b^2 - 6a \cdot \frac{45a^4b^3 - 90a^3b}{15a^2b} = \frac{45a^4b^3}{15a^2b} - \frac{90a^3b}{15a^2b} = 3a^2b^2 - 6a
\]

PTS: 2 REF: 081031ia STA: A.A.14 TOP: Division of Polynomials

500 ANS: 4 PTS: 2 REF: 011020ia STA: A.A.12 TOP: Multiplication of Powers
501 ANS: 4  PTS: 2  REF: 080903ia  STA: A.A.12  
TOP: Multiplication of Powers

502 ANS: 4
\[
\frac{2^6}{2^1} = 2^5
\]

PTS: 2  REF: 060813ia  STA: A.A.12  TOP: Division of Powers

503 ANS: 3
\[
\frac{3^6}{3^1} = 3^5
\]

PTS: 2  REF: 061219ia  STA: A.A.12  TOP: Division of Powers

504 ANS: 1  PTS: 2  REF: 060903ia  STA: A.A.12  
TOP: Division of Powers

505 ANS: 4  PTS: 2  REF: 061018ia  STA: A.A.12  
TOP: Division of Powers

506 ANS: 1  PTS: 2  REF: 061103ia  STA: A.A.12  
TOP: Division of Powers

507 ANS: 3
\[
\frac{(2x^3)(8x^5)}{4x^6} = \frac{16x^8}{4x^6} = 4x^2
\]

PTS: 2  REF: fall0703ia  STA: A.A.12  TOP: Division of Powers

508 ANS: 2  PTS: 2  REF: 081311ia  STA: A.A.12  
TOP: Division of Powers

509 ANS:
\[
\frac{3k^2m^6}{4}
\]

PTS: 2  REF: 010932ia  STA: A.A.12  TOP: Division of Powers

510 ANS: 4  PTS: 2  REF: 080827ia  STA: A.A.12  
TOP: Powers of Powers

511 ANS: 3
\[
\frac{(10w^3)^2}{5w} = \frac{100w^6}{5w} = 20w^5
\]

PTS: 2  REF: 011124ia  STA: A.A.12  TOP: Powers of Powers

512 ANS: 4
\[
\frac{(4x^3)^2}{2x} = \frac{16x^6}{2x} = 8x^5
\]

PTS: 2  REF: 011216ia  STA: A.A.12  TOP: Powers of Powers

513 ANS: 2  PTS: 2  REF: 061312ia  STA: A.A.12  
TOP: Powers of Powers
514 ANS: 2    PTS: 2    REF: 081318ia    STA: A.A.12
TOP: Powers of Powers

515 ANS: 2    PTS: 2    REF: 061127ia    STA: A.N.4
TOP: Operations with Scientific Notation

516 ANS: 4    PTS: 2    REF: 010927ia    STA: A.N.4
TOP: Operations with Scientific Notation

517 ANS: 4    PTS: 2    REF: 060927ia    STA: A.N.4
TOP: Operations with Scientific Notation

518 ANS: 4
\[
\frac{9.2 \times 10^6}{2.3 \times 10^2} = 4 \times 10^4
\]

PTS: 2    REF: 081006ia    STA: A.N.4    TOP: Operations with Scientific Notation

519 ANS: 2    PTS: 2    REF: fall0725ia    STA: A.N.4
TOP: Operations with Scientific Notation

520 ANS: 3    PTS: 2    REF: 011319ia    STA: A.N.4
TOP: Operations with Scientific Notation

521 ANS:
6.56 \times 10^{-2}

PTS: 2    REF: 081231ia    STA: A.N.4    TOP: Operations with Scientific Notation

522 ANS: 3    PTS: 2    REF: 011310ia    STA: A.A.9
TOP: Exponential Functions

523 ANS: 3
500(1 + 0.06)^3 \approx 596

PTS: 2    REF: 080929ia    STA: A.A.9    TOP: Exponential Functions

524 ANS: 1
\[
\frac{6}{15000(1.2)^3} = 21,600.\ 21,600 - 15,000 = 6,600
\]

PTS: 2    REF: 061030ia    STA: A.A.9    TOP: Exponential Functions

525 ANS: 2
2000(1 + 0.04)^3 \approx 2249

PTS: 2    REF: 081124ia    STA: A.A.9    TOP: Exponential Functions

526 ANS: 1    PTS: 2    REF: 011202ia    STA: A.A.9
TOP: Exponential Functions

527 ANS:
5,583.86.\ A = P(1 + R)^t = 5000(1 + 0.0375)^3 \approx 5583.86

PTS: 3    REF: 060935ia    STA: A.A.9    TOP: Exponential Functions

3
\[ A = P(1 + R)^t = 2000(1 + 0.035)^4 \approx 2295 \]

528 ANS:  

PTS: 2  REF: 081333ia  STA: A.A.9  TOP: Exponential Functions

529 ANS: 2  PTS: 2  REF: 060830ia  STA: A.A.9
TOP: Exponential Functions

530 ANS: 4  PTS: 2  REF: 010908ia  STA: A.A.9
TOP: Exponential Functions

531 ANS: 2  PTS: 2  REF: 061229ia  STA: A.A.9
TOP: Exponential Functions

532 ANS: 3  PTS: 2  REF: 081211ia  STA: A.A.9
TOP: Exponential Functions

533 ANS: 3

\[ 35000(1 - 0.05)^4 \approx 28507.72 \]

PTS: 2  REF: fall0719ia  STA: A.A.9  TOP: Exponential Functions

534 ANS: 2

20000(0.88)^3 = 13629.44

PTS: 2  REF: 061124ia  STA: A.A.9  TOP: Exponential Functions

535 ANS: 2

\[ R = 0.5^{d-1} \]

PTS: 2  REF: 011006ia  STA: A.A.9  TOP: Exponential Functions

536 ANS:

\[ 24,435.19. \ 30000(0.95)^4 \approx 24435.19 \]

PTS: 4  REF: 011138ia  STA: A.A.9  TOP: Exponential Functions

537 ANS:

The graph will never intersect the x-axis as \(2^x > 0\) for all values of \(x\).

PTS: 3  REF: 080835ia  STA: A.G.4  TOP: Graphing Exponential Functions
538 ANS:

\[ \begin{array}{c}
\end{array} \]

PTS: 2 REF: 081233ia STA: A.G.4 TOP: Graphing Exponential Functions

539 ANS: 3

\[ \sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2} \]

PTS: 2 REF: 010920ia STA: A.N.2 TOP: Simplifying Radicals

540 ANS: 2

\[ \sqrt{32} = \sqrt{16 \cdot 2} = 4\sqrt{2} \]

PTS: 2 REF: 060910ia STA: A.N.2 TOP: Simplifying Radicals

541 ANS: 2

\[ 5\sqrt{20} = 5\sqrt{4 \cdot 5} = 10\sqrt{5} \]

PTS: 2 REF: 080922ia STA: A.N.2 TOP: Simplifying Radicals

542 ANS: 3

\[ 3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10} \]

PTS: 2 REF: 061106ia STA: A.N.2 TOP: Simplifying Radicals

543 ANS: 3

\[ 2\sqrt{45} = 2\sqrt{9 \cdot 5} = 6\sqrt{5} \]

PTS: 2 REF: 011203ia STA: A.N.2 TOP: Simplifying Radicals

544 ANS: 1

\[ \frac{\sqrt{32}}{4} = \frac{\sqrt{16 \cdot 2}}{4} = \sqrt{2} \]

PTS: 2 REF: 060828ia STA: A.N.2 TOP: Simplifying Radicals

545 ANS:

\[ 30\sqrt{2} \cdot 5\sqrt{72} = 5\sqrt{36 \cdot 2} = 30\sqrt{2} \]

PTS: 2 REF: fall0731ia STA: A.N.2 TOP: Simplifying Radicals

546 ANS:

\[ -3\sqrt{48} = -3\sqrt{16 \cdot 3} = -12\sqrt{3} \]

PTS: 2 REF: 081033ia STA: A.N.2 TOP: Simplifying Radicals
547 ANS: 
\[ 4 \sqrt{75} = 4 \sqrt{25 \cdot 3} = 20 \sqrt{3} \]

PTS: 2  REF: 011331ia  STA: A.N.2  TOP: Simplifying Radicals

548 ANS: 
\[ 2 \sqrt{108} = 2 \sqrt{36 \cdot 3} = 12 \sqrt{3} \]

PTS: 2  REF: 081332ia  STA: A.N.2  TOP: Simplifying Radicals

549 ANS: 4
\[ 6 \sqrt{50} + 6 \sqrt{2} = 6 \sqrt{25 \cdot 2} + 6 \sqrt{2} = 30 \sqrt{2} + 6 \sqrt{2} = 36 \sqrt{2} \]

KEY: addition

550 ANS: 3
\[ \sqrt{72} - 3 \sqrt{2} = \sqrt{36 \cdot 2} - 3 \sqrt{2} = 6 \sqrt{2} - 3 \sqrt{2} = 3 \sqrt{2} \]

PTS: 2  REF: 061008ia  STA: A.N.3  TOP: Operations with Radicals

KEY: subtraction

551 ANS: 3
\[ 3 \sqrt{2} + \sqrt{8} = 3 \sqrt{2} + \sqrt{4 \cdot 2} = 3 \sqrt{2} + 2 \sqrt{2} = 5 \sqrt{2} \]

PTS: 2  REF: 011121ia  STA: A.N.3  TOP: Operations with Radicals

KEY: addition

552 ANS: 
\[ \frac{3 \sqrt{75} + \sqrt{27}}{3} = \frac{3 \sqrt{25 \cdot 3} + \sqrt{9 \cdot 3}}{3} = \frac{15 \sqrt{3} + 3 \sqrt{3}}{3} = \frac{18 \sqrt{3}}{3} = 6 \sqrt{3} \]

PTS: 3  REF: 061236ia  STA: A.N.3  TOP: Operations with Radicals

553 ANS: 
\[ 5 - 2 \sqrt{3} + \sqrt{9 \cdot 3} + 2(3) = 5 - 2 \sqrt{3} + 3 \sqrt{3} + 6 = 11 + \sqrt{3} \]

PTS: 3  REF: 061336ia  STA: A.N.3  TOP: Operations with Radicals

554 ANS: 
\[ 60 - 42 \sqrt{5}. \quad 3 \sqrt{20} (2 \sqrt{5} - 7) = 6 \sqrt{100} - 21 \sqrt{20} = 60 - 21 \sqrt{4 \cdot 5} = 60 - 42 \sqrt{5} \]

KEY: multiplication

555 ANS: 
\[ -2 \sqrt{3} \left( \frac{16 \sqrt{21}}{2 \sqrt{7}} - 5 \sqrt{12} \right) = 8 \sqrt{3} - 5 \sqrt{4 \cdot 3} = 8 \sqrt{3} - 10 \sqrt{3} = -2 \sqrt{3} \]

PTS: 3  REF: 081136ia  STA: A.N.3  TOP: Operations with Radicals
\[
\frac{9x^4 - 27x^6}{3x^3} = \frac{9x^4(1 - 3x^2)}{3x^3} = 3x(1 - 3x^2)
\]

PTS: 2  REF: fall0718ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{2x^2 - 12x}{x - 6} = \frac{2x(x - 6)}{x - 6} = 2x\]

PTS: 2  REF: 060824ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{25x - 125}{x^2 - 25} = \frac{25(x - 5)}{(x + 5)(x - 5)} = \frac{25}{x + 5}\]

PTS: 2  REF: 080821ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{x^2 - 2x - 15}{x^2 + 3x} = \frac{(x - 5)(x + 3)}{x(x + 3)} = \frac{x - 5}{x}\]

PTS: 2  REF: 060921ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{x^2 - x - 6}{x^2 - 5x + 6} = \frac{(x - 3)(x + 2)}{(x - 3)(x + 2)} = \frac{x + 2}{x - 2}\]

PTS: 2  REF: 011130ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{x^2 - 3x - 10}{x^2 - 25} = \frac{(x - 5)(x + 2)}{(x + 5)(x - 5)} = \frac{x + 2}{x + 5}\]

PTS: 2  REF: 061216ia  STA: A.A.16  TOP: Rational Expressions

\[\frac{2x^2(x^4 - 9x^2 + 1)}{2x^2}\]

PTS: 2  REF: 081222ia  STA: A.A.16  TOP: Rational Expressions
\[
\frac{2x^2 + 10x - 28}{4x + 28} = \frac{2(x^2 + 5x - 14)}{4x + 28} = \frac{2(x + 7)(x - 2)}{4(x + 7)} = \frac{x - 2}{2}
\]

PTS: 2  REF: 011327ia  STA: A.A.16  TOP: Rational Expressions
KEY: a > 0

\[
\frac{(x + 5)(x + 3)}{x + 5} = x + 3
\]

PTS: 2  REF: 061307ia  STA: A.A.16  TOP: Rational Expressions
KEY: a > 0

\[
\frac{x^2 - 5x - 24}{x - 8} = \frac{(x - 8)(x + 3)}{x - 8} = x + 3
\]

PTS: 2  REF: 061131ia  STA: A.A.16  TOP: Rational Expressions
KEY: a > 0

\[
\frac{x - 1}{x + 2} \cdot \frac{x^2 - 1}{x^2 + 3x + 2} = \frac{(x + 1)(x - 1)}{(x + 2)(x + 1)}
\]

PTS: 2  REF: 011233ia  STA: A.A.16  TOP: Rational Expressions
KEY: a > 0

\[
x^2 - 9 = 0
\]

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

\[
x = \pm 3
\]

PTS: 2  REF: 061014ia  STA: A.A.15  TOP: Undefined Rationals
573 ANS: 3
\[ x^2 - 4 = 0 \]
\[ (x + 2)(x - 2) = 0 \]
\[ x = \pm 2 \]

PTS: 2  REF: 081225ia  STA: A.A.15  TOP: Undefined Rationals

574 ANS: 1
\[ x^2 + 7x + 10 = 0 \]
\[ (x + 5)(x + 2) = 0 \]
\[ x = -5 \text{ or } -2 \]

PTS: 2  REF: 080918ia  STA: A.A.15  TOP: Undefined Rationals

575 ANS: 4
\[ x^2 - 4x - 12 = 0 \]
\[ (x - 6)(x + 2) = 0 \]
\[ x = 6 \text{ or } -2 \]

PTS: 2  REF: 061125ia  STA: A.A.15  TOP: Undefined Rationals

576 ANS: 1
\[ x^2 + 5x - 6 = 0 \]
\[ (x + 6)(x - 1) = 0 \]
\[ x = -6, 1 \]

PTS: 2  REF: 011214ia  STA: A.A.15  TOP: Undefined Rationals

577 ANS: 4
\[ x^2 - 2x - 15 = 0 \]
\[ (x + 3)(x - 5) = 0 \]
\[ x = -3, 5 \]

PTS: 2  REF: 081316ia  STA: A.A.15  TOP: Undefined Rationals

578 ANS: 4
\[ \frac{x^2 - 1}{x + 1} \cdot \frac{x + 3}{3x - 3} = \frac{(x + 1)(x - 1)}{x + 1} \cdot \frac{x + 3}{3(x - 1)} = \frac{x + 3}{3} \]

PTS: 2  REF: 060815ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: multiplication

579 ANS: 1
\[ \frac{4x}{x - 1} \cdot \frac{x^2 - 1}{3x + 3} = \frac{4x}{x - 1} \cdot \frac{(x + 1)(x - 1)}{3(x + 1)} = \frac{4x}{3} \]

PTS: 2  REF: 080826ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: multiplication
\[
\frac{x + 2}{2} \times \frac{4(x + 5)}{(x + 4)(x + 2)} = \frac{2(x + 5)}{x + 4}
\]

PTS: 2  REF: 081232ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: multiplication

\[
\frac{x}{x + 4} + \frac{2x}{x^2 - 16} = \frac{x}{x + 4} \cdot \frac{x^2 - 16}{2x} = \frac{1}{x + 4} \cdot \frac{(x + 4)(x - 4)}{2} = \frac{x - 4}{2}
\]

PTS: 2  REF: 081130ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: division

\[
\frac{x^2 + 9x + 14}{x^2 - 49} + \frac{3x + 6}{x^2 - x - 56} = \frac{(x + 7)(x + 2)}{(x + 7)(x - 7)} \cdot \frac{(x + 8)(x - 7)}{3(x + 2)} = \frac{x + 8}{3}
\]

PTS: 4  REF: 061037ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: division

\[
\frac{x - 7}{3x} \cdot \frac{2x^2 - 8x - 42}{6x^2} + \frac{x^2 - 9}{x^2 - 3x} = \frac{2(x^2 - 4x - 21)}{6x^2} \cdot \frac{x(x - 3)}{(x + 3)(x - 3)} = \frac{(x - 7)(x + 3)}{3x} \cdot \frac{1}{x + 3} = \frac{x - 7}{3x}
\]

PTS: 4  REF: 080937ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: division

\[
\frac{3}{4x - 8} \cdot \frac{3x + 6}{4x + 12} \div \frac{x^2 - 4}{x + 3} = \frac{3(x + 2)}{4(x + 3)} \cdot \frac{x + 3}{(x + 2)(x - 2)} = \frac{3}{4(x - 2)}
\]

PTS: 3  REF: 010935ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: division

\[
\frac{3x(x + 3)}{(x + 3)(x + 2)} \times \frac{(x - 3)(x + 2)}{(x + 3)(x - 3)} = \frac{3x}{x + 3}
\]

PTS: 4  REF: 081338ia  STA: A.A.18  TOP: Multiplication and Division of Rationals
KEY: division

\[
\frac{(d \times 3) + (2 \times 2d)}{2 \times 3} = \frac{3d + 4d}{6} = \frac{7d}{6}
\]

PTS: 2  REF: fall0727ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals
\[ \frac{3}{2x} + \frac{4}{3x} = \frac{9x + 8x}{6x^2} = \frac{17x}{6x^2} = \frac{17}{6x} \]

PTS: 2  REF: 080917ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{3}{2x} + \frac{7}{4x} = \frac{12x + 14x}{8x^2} = \frac{26x}{8x^2} = \frac{13}{4x} \]

PTS: 2  REF: 011120ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{2 + x}{5x} - \frac{x - 2}{5x} = \frac{2 + x - x + 2}{5x} = \frac{4}{5x} \]

PTS: 2  REF: 081027ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{6}{5x} - \frac{2}{3x} = \frac{18x - 10x}{15x^2} = \frac{8x}{15x^2} = \frac{8}{15x} \]

PTS: 2  REF: 010921ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{6}{4a} - \frac{2}{3a} = \frac{18a - 8a}{12a^2} = \frac{10a}{12a^2} = \frac{5}{6a} \]

PTS: 2  REF: 060929ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{4}{3a} - \frac{5}{2a} = \frac{8}{6a} - \frac{15}{6a} = \frac{7}{6a} \]

PTS: 2  REF: 081328ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{7}{12x} - \frac{y}{6x^2} = \frac{42x^2 - 12xy}{72x^3} = \frac{6x(7x - 2y)}{72x^3} = \frac{7x - 2y}{12x^2} \]

PTS: 2  REF: 061120ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{2y}{y + 5} + \frac{10}{y + 5} = \frac{2y + 10}{y + 5} = \frac{2(y + 5)}{y + 5} = 2 \]

PTS: 2  REF: 011230ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals

\[ \frac{2y}{y + 5} + \frac{10}{y + 5} = \frac{2y + 10}{y + 5} = \frac{2(y + 5)}{y + 5} = 2 \]

PTS: 2  REF: 011230ia  STA: A.A.17  TOP: Addition and Subtraction of Rationals
\[
\frac{5}{x} = \frac{x + 13}{6}
\]
\[x^2 + 13x = 30\]
\[x^2 + 13x - 30 = 0\]
\[(x + 15)(x - 2) = 0\]
\[x = -15 \text{ or } 2\]

PTS: 2  REF: 060826ia  STA: A.A.26  TOP: Solving Rationals

\[
\frac{k + 4}{2} = \frac{k + 9}{3}
\]
\[3(k + 4) = 2(k + 9)\]
\[3k + 12 = 2k + 18\]
\[k = 6\]

PTS: 2  REF: 010906ia  STA: A.A.26  TOP: Solving Rationals

\[
\frac{2}{x} - 3 = \frac{26}{x}
\]
\[-3 = \frac{24}{x}\]
\[x = -8\]

PTS: 2  REF: 010918ia  STA: A.A.26  TOP: Solving Rationals
\[
\frac{x + 2}{x - 2} = \frac{-3}{x}
\]

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

\[
x^2 + 2x = -3x + 6
\]

\[
x^2 + 5x - 6 = 0
\]

\[
(x + 6)(x - 1) = 0
\]

\[
x = -6 \text{ or } 1
\]

PTS: 2  REF: 011028ia  STA: A.A.26  TOP: Solving Rationals

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

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

\[
6x - 9 = 2x - 8
\]

\[
4x = 1
\]

\[
x = \frac{1}{4}
\]

PTS: 2  REF: 081012ia  STA: A.A.26  TOP: Solving Rationals

\[
\frac{2}{x + 1} = \frac{x + 1}{2}
\]

\[
x^2 + 2x + 1 = 4
\]

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

\[
(x + 3)(x - 1) = 3
\]

\[
x = -3, 1
\]

PTS: 2  REF: 081226ia  STA: A.A.26  TOP: Solving Rationals
\[ \frac{x + 2}{2} = \frac{4}{x} \]
\[ x^2 + 2x = 8 \]
\[ x^2 + 2x - 8 = 0 \]
\[ (x + 4)(x - 2) = 0 \]
\[ x = -4, 2 \]

PTS: 2  REF: 061317ia  STA: A.A.26  TOP: Solving Rationals

\[ \frac{x + 1}{x} = \frac{-7}{x - 12} \]
\[ (x + 1)(x - 12) = -7x \]
\[ x^2 - 11x - 12 = -7x \]
\[ x^2 - 4x - 12 = 0 \]
\[ (x - 6)(x + 2) = 0 \]
\[ x = 6 \text{ or } -2 \]

PTS: 4  REF: fall0739ia  STA: A.A.26  TOP: Solving Rationals

\[ \frac{x + 2}{6} = \frac{3}{x - 1} \]
\[ (x + 2)(x - 1) = 18 \]
\[ x^2 - x + 2x - 2 = 18 \]
\[ x^2 + x - 20 = 0 \]
\[ (x + 5)(x - 4) = 0 \]
\[ x = -5 \text{ or } 4 \]

PTS: 3  REF: 011136ia  STA: A.A.26  TOP: Solving Rationals
\[
\begin{align*}
\frac{9}{4} + \frac{3}{4} &= \frac{-(x + 11)}{4x} + \frac{1}{2x} \\
\frac{3}{4} &= \frac{-x - 11}{4x} + \frac{2}{4x} \\
\frac{3}{4} &= \frac{-x - 9}{4x} \\
12x &= -4x - 36 \\
16x &= -36 \\
x &= \frac{-9}{4}
\end{align*}
\]

- **ANS:** 3  
  - **PTS:** 2  
  - **REF:** 061318ia  
  - **STA:** A.G.4  
  - **TOP:** Identifying the Equation of a Graph

\[
\begin{align*}
\frac{2}{3x} + \frac{12}{3x} &= \frac{7}{x + 1} \\
\frac{14}{3x} &= \frac{7}{x + 1} \\
21x &= 14x + 14 \\
7x &= 14 \\
x &= 2
\end{align*}
\]

- **ANS:** 4  
  - **PTS:** 2  
  - **REF:** 081025ia  
  - **STA:** A.G.4  
  - **TOP:** Identifying the Equation of a Graph
An element of the domain, 1, is paired with two different elements of the range, 3 and 7.

In (4), each element in the domain corresponds to a unique element in the range.

In (2), each element in the domain corresponds to a unique element in the range.

$30^2 + 40^2 = c^2$. 30, 40, 50 is a multiple of 3, 4, 5.

$2500 = c^2$

$50 = c$
ANS: 3

\[ 3^2 + 5^2 = x^2 \]

\[ 34 = x^2 \]

\[ \sqrt{34} = x \]

PTS: 2

ANS: 1

\[ 8^2 + 15^2 = c^2 \]

\[ c^2 = 289 \]

\[ c = 17 \]

PTS: 2

ANS: 2

\[ \sqrt{5^2 + 7^2} \approx 8.6 \]

PTS: 2

ANS: 2

\[ \sqrt{18.4^2 - 7^2} \approx 17 \]

PTS: 2

ANS: 1

\[ \sqrt{1700^2 - 1300^2} \approx 1095 \]

PTS: 2

ANS: 3

\[ 10^2 + 10^2 = c^2 \]

\[ c^2 = 200 \]

\[ c \approx 14.1 \]

PTS: 2

ANS: 2

\[ 13^2 + 13^2 = x^2 \]

\[ 338 = x^2 \]

\[ \sqrt{338} = x \]

\[ 18 \approx x \]

PTS: 2
639 ANS: 4
\[ 16^2 + b^2 = 34^2 \]
\[ b^2 = 900 \]
\[ b = 30 \]

PTS: 2 REF: 080809ia STA: A.A.45 TOP: Pythagorean Theorem

640 ANS: 3
\[ \sqrt{8^2 - 6^2} = \sqrt{28} = 2\sqrt{7} \]

PTS: 2 REF: 061329ia STA: A.A.45 TOP: Pythagorean Theorem

641 ANS: 3
\[ \sqrt{13^2 - 7^2} = \sqrt{120} \]

PTS: 2 REF: 081323ia STA: A.A.45 TOP: Pythagorean Theorem

642 ANS: 2
\[ \sin U = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{15}{17} \]

PTS: 2 REF: 010919ia STA: A.A.42 TOP: Trigonometric Ratios

643 ANS: 2
\[ \tan B = \frac{\text{opposite}}{\text{adjacent}} = \frac{8}{15} = 0.53 \]

PTS: 2 REF: 081026ia STA: A.A.42 TOP: Trigonometric Ratios

644 ANS: 1
\[ \sin x = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{28}{53} \]

PTS: 2 REF: 011109ia STA: A.A.42 TOP: Trigonometric Ratios

645 ANS: 2
\[ \tan ABC = \frac{\text{opposite}}{\text{adjacent}} = \frac{5}{12} \]

PTS: 2 REF: 081112ia STA: A.A.42 TOP: Trigonometric Ratios

646 ANS: 3
\[ \tan PLM = \frac{\text{opposite}}{\text{adjacent}} = \frac{4}{3} \]

PTS: 2 REF: 011226ia STA: A.A.42 TOP: Trigonometric Ratios

647 ANS: 2
\[ \cos x = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{16}{20} \]

PTS: 2 REF: 011307ia STA: A.A.42 TOP: Trigonometric Ratios
\[
\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{3}{5}
\]

PTS: 2  REF: 081329ia  STA: A.A.42  TOP: Trigonometric Ratios

\[
\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{15}{17}
\]

PTS: 2  REF: 011008ia  STA: A.A.42  TOP: Trigonometric Ratios

\[
\sin C = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{13}{85}
\]

PTS: 2  REF: fall0721ia  STA: A.A.42  TOP: Trigonometric Ratios

\[
\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{14}{48}
\]

PTS: 2  REF: 061009ia  STA: A.A.42  TOP: Trigonometric Ratios

652 ANS: 4

If \( \angle C = 90 \), then \( AB \) is the hypotenuse, and the triangle is a 3-4-5 triangle.

PTS: 2  REF: 061224ia  STA: A.A.42  TOP: Trigonometric Ratios

\[
\cos 30 = \frac{x}{24}
\]

\[
x \approx 21
\]

PTS: 2  REF: 010912ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

\[
\tan 32 = \frac{x}{25}
\]

\[
x \approx 15.6
\]

PTS: 2  REF: 080914ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

\[
\sin 57 = \frac{x}{8}
\]

\[
x \approx 6.7
\]

PTS: 2  REF: 061108ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side
656 ANS: 2
\[
\cos 38 = \frac{10}{x}
\]
\[
x = \frac{10}{\cos 38} \approx 12.69
\]

PTS: 2 REF: 081126ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

657 ANS:
\[
\tan 48 = \frac{9}{x}, \quad \sin 48 = \frac{9}{y}
\]
\[
x \approx 8, \quad y \approx 12
\]

PTS: 4 REF: 011338ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

658 ANS:
\[
39, 63. \quad \tan 52 = \frac{50}{x}, \quad \sin 52 = \frac{50}{x}
\]
\[
x \approx 39, \quad x \approx 63
\]

PTS: 4 REF: 060937ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

659 ANS:
\[
84, 71. \quad \sin 50 = \frac{x}{110}, \quad \cos 50 = \frac{y}{110}
\]
\[
x \approx 84, \quad y \approx 71
\]

PTS: 4 REF: 081039ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

660 ANS:
\[
2.1. \quad \cos 65 = \frac{x}{5}
\]
\[
x \approx 2.1
\]

PTS: 2 REF: 011133ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

661 ANS: 1
PTS: 2 REF: 080824ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle

662 ANS: 4
\[
\sin D = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{12}{13}
\]

PTS: 2 REF: 061325ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle

663 ANS: 1
PTS: 2 REF: 061114ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle
ANS: \[\sin A = \frac{8}{12}\]
\[A \approx 42\]

PTS: 2  
REF: 060816ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS: 3
\[\sin A = \frac{10}{16}\]
\[B = 180 - (90 = 38.7) = 51.3. \text{ A } 90^\circ \text{ angle is not acute.}\]
\[A \approx 38.7\]

PTS: 2  
REF: 080829ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS:
\[\sin x = \frac{30}{50}\]
\[x = \sin^{-1} \frac{3}{5}\]
\[x \approx 37\]

PTS: 2  
REF: 081033ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS:
\[\cos A = \frac{17}{29}\]
\[\sqrt{29^2 - 17^2} \approx 23\]
\[x \approx 54\]

PTS: 2  
REF: 081238ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS:
\[\sin x = \frac{8}{12}\]
\[A \approx 41.8\]

PTS: 3  
REF: 081135ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS:
\[\sin A = \frac{16}{20}\]
\[A \approx 53\]

PTS: 2  
REF: 011032ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

ANS:
\[\cos x = \frac{6}{28}\]
\[x \approx 78\]

PTS: 3  
REF: 061235ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle
\[\tan x = \frac{350}{1000}\]
\[x \approx 19\]

PTS: 3  REF: 061335ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

672 ANS: 1  PTS: 2  REF: 080924ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

\[4(5 + 5) + 10\pi = 40 + 10\pi\]

PTS: 2  REF: 081326ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

674 ANS: 1
\[7 + 8 + 7 + \frac{12\pi}{2} = 22 + 6\pi\]

PTS: 2  REF: 081128ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

675 ANS: 1
\[4 + 6 + 10 + \frac{6\pi}{2} = 20 + 3\pi\]

PTS: 2  REF: 081228ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

676 ANS:
33.4. Serena needs 24 \((9 + 6 + 9)\) feet of fencing to surround the rectangular portion of the garden. The length of the fencing needed for the semicircular portion of the garden is \(\frac{1}{2} \pi d = 3\pi \approx 9.4\) feet.

PTS: 2  REF: fall0733ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

677 ANS:
50. \(12 + 10 + 12 + \frac{1}{2} (10\pi) \approx 50\)

PTS: 2  REF: 010931ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

678 ANS: 2
\[A = lw + \frac{\pi r^2}{2} = 6 \cdot 5 + \frac{\pi \cdot 3^2}{2} \approx 44.1\]

PTS: 2  REF: 061029ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area

679 ANS: 3  PTS: 2  REF: 011315ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area
If the area of the square is 36, a side is 6, the diameter of the circle is 6, and its radius is 3. $A = \pi r^2 = 3^2 \pi = 9\pi$

Area of rectangle minus area of semicircle: $(5 + 6 + 5) \times 5 - \frac{\pi \times 3^2}{2} \approx 65.86$

56. If the circumference of circle $O$ is $16\pi$ inches, the diameter, $AD$, is 16 inches and the length of $BC$ is 12 inches $\frac{3}{4} \times 16$. The area of trapezoid $ABCD$ is $\frac{1}{2} \times 4(12 + 16) = 56$. 
ANS: 2

$1.5^3 = 3.375$

PTS: 2  REF: 060809ia  STA: A.G.2  TOP: Volume

688 ANS: 3

$\frac{10^3}{5^3} = \frac{1000}{125} = 8$

PTS: 2  REF: 011312ia  STA: A.G.2  TOP: Volume

712 ANS: (12 \times 30 \times 16) - (6 \times 12 \times 9) = 5112

PTS: 2  REF: 080932ia  STA: A.G.2  TOP: Volume

690 ANS: 4

$V = \pi r^2 h = \pi \cdot 6^2 \cdot 15 \approx 1696.5$

PTS: 2  REF: fall0712ia  STA: A.G.2  TOP: Volume

691 ANS:

$V = \pi r^2 h = \pi \cdot 6.5^2 \cdot 24 = 1014\pi$

PTS: 2  REF: 061332ia  STA: A.G.2  TOP: Volume

692 ANS: 3

$V = \pi r^2 h = \pi \cdot 5^2 \cdot 2.3 \approx 180.6$

PTS: 2  REF: 081105ia  STA: A.G.2  TOP: Volume

693 ANS: 4

$V = \pi r^2 h$

$32\pi = \pi r^2 (2)$

$16 = r^2$

$4 = r$

PTS: 2  REF: 081224ia  STA: A.G.2  TOP: Volume

694 ANS:

$\frac{38}{\pi} \cdot 2. \quad V = \pi r^2 h \cdot \frac{36}{\pi} \approx 2.97. \text{ Three cans will not fit. The maximum number is } 2.$

$342 = \pi \left( \frac{6}{2} \right)^2 h \left( \frac{38}{\pi} \right)$

$\frac{342}{9\pi} = h$

$\frac{38}{\pi} = h$

PTS: 3  REF: 010936ia  STA: A.G.2  TOP: Volume
ANS: 4
SA = 2lw + 2hw + 2lh = 2(3)(2.2) + 2(7.5)(2.2) + 2(3)(7.5) = 91.2
PTS: 2 REF: 081216ia STA: A.G.2 TOP: Surface Area

ANS: 4
SA = 2lw + 2hw + 2lh = 2(3)(1.5) + 2(2)(1.5) + 2(3)(2) = 27
PTS: 2 REF: 060827ia STA: A.G.2 TOP: Surface Area

ANS: 4
SA = 2lw + 2hw + 2lh = 2(2)(3) + 2(4)(3) + 2(2)(4) = 52
PTS: 2 REF: 011029ia STA: A.G.2 TOP: Surface Area

ANS:
147.75 2 × 5.5 × 3 + 2 × 6.75 × 3 + 2 × 5.5 × 6.75 = 147.75
PTS: 2 REF: 011231ia STA: A.G.2 TOP: Surface Area

ANS:
2(x + 3)(x - 4) + 2(5)(x - 4) + 2(x + 3)(5)
2(x^2 - 4x + 3x - 12) + 10(x - 4) + 10(x + 3)
2x^2 - 2x - 24 + 10x - 40 + 10x + 30
2x^2 + 18x - 34
PTS: 3 REF: 061136ia STA: A.G.2 TOP: Surface Area

ANS:
Carol's, by 14.9. \( V_M = 5 \times 3.5 \times 7 = 122.5 \). \( V_C = \pi \times 2.5^2 	imes 7 \approx 137.4 \). 137.4 - 122.5 = 14.9
PTS: 4 REF: 061237ia STA: A.G.2 TOP: Volume

ANS:
80, 136 \( V = lwh = 10 \cdot 2 \cdot 4 = 80 \) \( SA = 2lw + 2hw + 2lh = 2 \cdot 10 \cdot 2 + 2 \cdot 4 \cdot 2 + 2 \cdot 10 \cdot 4 = 136 \)
PTS: 3 REF: 081035ia STA: A.G.2 TOP: Surface Area

ANS: 2
\( s^3 = 8 \). 6 × (2 × 2) = 24
\( s = 2 \)
PTS: 2 REF: 081325ia STA: A.G.2 TOP: Surface Area