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A.N.6: EVALUATING EXPRESSIONS

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

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

3. 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

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

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

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

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

8. When \(x = 4\), the value of \(2x^0 + x!\) is
   - 1. 24
   - 2. 25
   - 3. 26
   - 4. 28

A.N.1: IDENTIFYING PROPERTIES

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

10. 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
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.

\[
\begin{align*}
5(x - 2) - 2(x - 5) &= 9 \\
(1) & \\
5x - 10 - 2x + 10 &= 9 \\
(2) & \\
5x - 2x &= 9 + 10 \\
3x &= 19 \\
x &= \frac{19}{3}
\end{align*}
\]

12 The equation $3(4x) = (4x)3$ illustrates which property?
1 commutative
2 associative
3 distributive
4 multiplicative inverse

A.N.1: PROPERTIES OF REALS

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

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

15 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 $(x + y) + z = x + (y + z)$

16 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 $3 + (x + y) = (x + y) + 3$

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

18 Which equation illustrates the multiplicative inverse property?
1 $a \cdot 1 = a$
2 $a \cdot 0 = 0$
3 $a \left( \frac{1}{a} \right) = 1$
4 $(-a)(-a) = a^2$

A.A.29: SET THEORY

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

20 The set \{1, 2, 3, 4\} is equivalent to
1 $\{x \mid 1 < x < 4, \text{ where } x \text{ is a whole number}\}$
2 $\{x \mid 0 < x < 4, \text{ where } x \text{ is a whole number}\}$
3 $\{x \mid 0 < x \leq 4, \text{ where } x \text{ is a whole number}\}$
4 $\{x \mid 1 < x \leq 4, \text{ where } x \text{ is a whole number}\}$

21 The set \{11, 12\} is equivalent to
1 $\{x \mid 11 < x < 12, \text{ where } x \text{ is an integer}\}$
2 $\{x \mid 11 < x \leq 12, \text{ where } x \text{ is an integer}\}$
3 $\{x \mid 10 \leq x < 12, \text{ where } x \text{ is an integer}\}$
4 $\{x \mid 10 < x \leq 12, \text{ where } x \text{ is an integer}\}$

22 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 $[5, 12]$
23 Which set-builder notation describes 
\{-3, -2, -1, 0, 1, 2\}?
1 \{x| -3 ≤ x < 2, where x is an integer\}
2 \{x| -3 < x ≤ 2, where x is an integer\}
3 \{x| -3 < x < 2, where x is an integer\}
4 \{x| -3 ≤ x ≤ 2, where x is an integer\}

24 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]

25 Which notation describes \{1, 2, 3\}?
1 \{x|1 ≤ x < 3, where x is an integer\}
2 \{x|0 < x ≤ 3, where x is an integer\}
3 \{x|1 < x < 3, where x is an integer\}
4 \{x|0 ≤ x ≤ 3, where x is an integer\}

26 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]

27 Which set builder notation describes 
\{-2, -1, 0, 1, 2, 3\}?
1 \{x| -2 ≤ x ≤ 3, where x is an integer\}
2 \{x| -2 < x ≤ 3, where x is an integer\}
3 \{x| -2 < x < 3, where x is an integer\}
4 \{x| -2 ≤ x < 4, where x is an integer\}

28 Which interval notation describes the set 
\{x|1 ≤ x < 10\}?
1 [1, 10]
2 (1, 10]
3 [1, 10)
4 (1, 10)

29 The inequality -2 ≤ x ≤ 3 can be written as
1 (-2, 3)
2 [-2, 3)
3 (-2, 3]
4 [-2, 3]

30 Which interval notation represents -3 ≤ x ≤ 3?
1 [-3, 3]
2 (-3, 3)
3 [-3, 3)
4 (-3, 3]

31 Written in set-builder notation, \{1, 3, 5, 7, 9\} is
1 \{x|1 < x < 9, where x is a prime number\}
2 \{x|1 ≤ x ≤ 9, where x is a prime number\}
3 \{x|1 < x < 9, where x is an odd integer\}
4 \{x|1 ≤ x ≤ 9, where x is an odd integer\}

A.A.30: SET THEORY

32 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\}

33 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.
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:  Set \( U = \{ S, O, P, H, I, A \} \)
   Set \( B = \{ A, I, O \} \)
   If set \( B \) is a subset of set \( U \), what is the complement of set \( B \)?
   1. \( \{ O, P, S \} \)
   2. \( \{ I, P, S \} \)
   3. \( \{ A, H, P \} \)
   4. \( \{ H, P, S \} \)

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

37. 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 \}

38. 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. \( \{ 4,16,36,49,64,100 \} \)

39. 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. \( \{ 1,3,5,7,19 \} \)

40. Given:  \( U = \{ x | 0 < x < 10 \text{ and } x \text{ is an integer} \} \)
   \( S = \{ x | 0 < x < 10 \text{ and } x \text{ is an odd integer} \} \)
   The complement of set \( S \) within the universal set \( U \) is
   1. \( \{ 0,2,4,6,8,10 \} \)
   2. \( \{ 2,4,6,8,10 \} \)
   3. \( \{ 0,2,4,6,8 \} \)
   4. \( \{ 2,4,6,8 \} \)

A.A.31: SET THEORY

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 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, \( t \).

43 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 \( \{0, 1, 2, 3, 4, 6\} \)

44 Which set represents the intersection of sets \( A \), \( B \), and \( C \) shown in the diagram below?

45 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 \( \{1, 2, 3, 4, 5, 6\} \)

46 Given: \( A = \{3, 6, 9, 12, 15\} \)
\[ B = \{2, 4, 6, 8, 10, 12\} \]
What is the union of sets \( A \) and \( B \)?
1 \( \{6\} \)
2 \( \{6, 12\} \)
3 \( \{2, 3, 4, 8, 9, 10, 15\} \)
4 \( \{2, 3, 4, 6, 8, 9, 10, 12, 15\} \)

47 Given: \( A = \{2, 4, 5, 7, 8\} \)
\[ B = \{3, 5, 8, 9\} \]
What is \( A \cup B \)?
1 \( \{5\} \)
2 \( \{5, 8\} \)
3 \( \{2, 3, 4, 7, 9\} \)
4 \( \{2, 3, 4, 5, 7, 8, 9\} \)

48 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 \( \{0\} \)
49 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. \( A \cap C = \{3, 5, 7\} \)

50 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. \( \{2, 4\} \)

**GRAPHS AND STATISTICS**

A.S.5: FREQUENCY HISTOGRAMS, BAR GRAPHS AND TABLES

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>2–3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4–5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Complete the cumulative frequency table below using these data.
52 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.

53 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.
54 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.

55 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>20–69</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

56 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.
57 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

58 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.

59 The cumulative frequency table below shows the number of minutes 31 students spent text messaging on a weekend.

<table>
<thead>
<tr>
<th>Text-Use Interval (minutes)</th>
<th>Cumulative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>41–50</td>
<td>2</td>
</tr>
<tr>
<td>41–60</td>
<td>5</td>
</tr>
<tr>
<td>41–70</td>
<td>10</td>
</tr>
<tr>
<td>41–80</td>
<td>19</td>
</tr>
<tr>
<td>41–90</td>
<td>31</td>
</tr>
</tbody>
</table>

Determine which 10-minute interval contains the median. Justify your choice.
A.S.5: BOX-AND-WHISKER PLOTS

60 The data set 5, 6, 7, 8, 9, 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

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

62 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.

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

63 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.

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

1 6
2 8.5
3 10
4 12

65 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.
66 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

67 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

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

1 40
2 45
3 60
4 100

69 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.

70 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

71 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
72. 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

73. The box-and-whisker plot shown below represents the number of magazine subscriptions sold by members of a club.

Which statistical measures do points B, D, and E represent, respectively?
1 minimum, median, maximum
2 first quartile, median, third quartile
3 first quartile, third quartile, maximum
4 median, third quartile, maximum

A.S.11: QUARTILES AND PERCENTILES

74. 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

75. 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

76 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

77 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
78 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

79 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. \( y = \frac{3}{2} x + 1 \)
80 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.

81 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. $y = 5x + 25$
A.S.12: SCATTER PLOTS

82 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?

83 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?
84 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

85 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.
86 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

87 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
88 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

89 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

90 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
91 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.

92 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

93 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
94 The graph below illustrates the number of acres used for farming in Smalltown, New York, over several years.

![Graph of Acres vs Year]

Using a line of best fit, approximately how many acres will be used for farming in the 5th year?
1. 0
2. 200
3. 300
4. 400

A.S.4: CENTRAL TENDENCY

95 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.

96 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.

97 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

98 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

99 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
100 Which statement is true about the data set 4, 5, 6, 7, 9, 12?
1 mean = mode
2 mode = median
3 mean < median
4 mode > mean

A.S.16: CENTRAL TENDENCY

101 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.

102 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.

103 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.

A.S.16: AVERAGE KNOWN WITH MISSING DATA

104 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

105 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
106 Which data set describes a situation that could be classified as qualitative?
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

111 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

107 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

112 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

108 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

113 Which data can be classified as quantitative?
1. favorite stores at which you shop
2. U.S. Representatives and their home states
3. sales tax rate in each New York county
4. opinion of a freshman on the color of Paul's shirt

109 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

110 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

114 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.
115 Which data table represents univariate data?

116 Which table does not show bivariate data?

117 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
118 Which table shows bivariate data?

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>18</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Car</th>
<th>Average Gas Mileage (mpg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>van</td>
<td>25</td>
</tr>
<tr>
<td>SUV</td>
<td>23</td>
</tr>
<tr>
<td>luxury</td>
<td>26</td>
</tr>
<tr>
<td>compact</td>
<td>28</td>
</tr>
<tr>
<td>pickup</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Spent Studying (hr)</th>
<th>Test Grade (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>72</td>
</tr>
<tr>
<td>3</td>
<td>83</td>
</tr>
<tr>
<td>4</td>
<td>85</td>
</tr>
<tr>
<td>5</td>
<td>92</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Temperature (degrees F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>63</td>
</tr>
<tr>
<td>Tuesday</td>
<td>58</td>
</tr>
<tr>
<td>Wednesday</td>
<td>72</td>
</tr>
<tr>
<td>Thursday</td>
<td>74</td>
</tr>
<tr>
<td>Friday</td>
<td>78</td>
</tr>
</tbody>
</table>

A.S.3: ANALYSIS OF DATA

119 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

120 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

121 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.
122 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.

123 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

124 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

125 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.

126 Which statement regarding biased sampling is false?
1. Online sampling is biased because only the people who happen to visit the web site will take the survey.
2. A radio call-in survey is biased because only people who feel strongly about the topic will respond.
3. A survey handed to every third person leaving a library is biased because everyone leaving the library was not asked to participate.
4. Asking for experts to take a survey is biased because they may have particular knowledge of the topic.

A.S.13: ANALYSIS OF DATA

127 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

128 Which situation does not describe a causal relationship?
1. The higher the volume on a radio, the louder the sound will be.
2. The faster a student types a research paper, the more pages the paper will have.
3. The shorter the distance driven, the less gasoline that will be used.
4. The slower the pace of a runner, the longer it will take the runner to finish the race.
A.S.14: ANALYSIS OF DATA

129 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.

130 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

131 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

132 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

133 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. \( \frac{(130)(60) - (120)(54)}{(130)(60)} \)
4. \( \frac{(130)(60) - (120)(54)}{(130)(60)} \)

134 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.

135 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
136 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.

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 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

139 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.

140 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.

141 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

142 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.

143 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

144 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

145 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
146 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.

147 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.

148 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.

149 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.

150 Terry estimated the length of the edge of a cube to be 5 cm. The actual length of the side is 5.2 cm. Find the relative error of the surface area of the cube, to the nearest thousandth.

151 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.

152 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>Kids' Meal Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamburger</td>
</tr>
<tr>
<td>Side dish</td>
</tr>
<tr>
<td>Drink</td>
</tr>
<tr>
<td>French fries</td>
</tr>
<tr>
<td>Applesauce</td>
</tr>
<tr>
<td>Milk</td>
</tr>
<tr>
<td>Chicken nuggets</td>
</tr>
<tr>
<td>Apple sauce</td>
</tr>
<tr>
<td>Juice</td>
</tr>
<tr>
<td>Turkey sandwich</td>
</tr>
<tr>
<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.

153 Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.

154 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.
155 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 \textit{not} include turkey. Determine the number of sandwiches that will include rye bread and Swiss cheese.

156 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.

157 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.”

158 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?

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

159 Doug has four baseball caps: one tan, one blue, one red, and one green. He also has three jackets: one blue, one red, and one white. Draw a tree diagram or list a sample space to show all possible outfits consisting of one baseball cap and one jacket. Find the number of Doug’s outfits that consist of a cap and a jacket that are different colors. On Spirit Day, Doug wants to wear either green or white, his school’s colors. Find the number of his outfits from which he can choose.
A.S.21: EXPERIMENTAL PROBABILITY

160 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>8</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>1</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}

161 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}
162 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. $\frac{14}{20}$

163 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.

164 Two cubes with sides numbered 1 through 6 were rolled 20 times. Their sums are recorded in the table below.

<table>
<thead>
<tr>
<th>4</th>
<th>9</th>
<th>8</th>
<th>9</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>4</td>
<td>6</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>9</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

What is the empirical probability of rolling a sum of 9?

1. $\frac{4}{20}$
2. $\frac{5}{20}$
3. $\frac{4}{36}$
4. $\frac{5}{36}$

A.S.20: THEORETICAL PROBABILITY

165 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

166 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
167 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.

168 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.

169 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

170 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.

171 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 $P(2 \text{ or 4}) < P(3 \text{ or less})$

172 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.
A.S.23: THEORETICAL PROBABILITY

173 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 \( \frac{6}{8} \)

174 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 \( \frac{1}{6} \)

175 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 \( \frac{9}{10} \)

176 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.

177 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 \( \frac{2}{3} \)

178 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 \( \frac{1}{2} + \frac{2}{5} \)
3 \( \frac{1}{2} \times \frac{3}{5} \)
4 \( \frac{1}{2} \times \frac{2}{5} \)

179 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.
180 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.

A.S.20: GEOMETRIC PROBABILITY

181 The spinner below is divided into eight equal regions and is spun once. What is the probability of not getting red?

\[
\begin{array}{c|c|c|c|c|c|c|c|c}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\hline
\text{Green} & \text{Yellow} & \text{Red} & \text{Blue} & \text{Red} & \text{White} & \text{Red} & \text{Purple} \\
\end{array}
\]

1 \[ \frac{3}{5} \]
2 \[ \frac{3}{8} \]
3 \[ \frac{5}{8} \]
4 \[ \frac{7}{8} \]

182 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.
183 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 \( \frac{49}{81} \)

184 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.

185 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

186 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

188 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?

187 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 \(\frac{1}{4}\)
189 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. \( \frac{6}{10} \)

190 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. \( \frac{20}{50} \)

A.N.7: MULTIPLICATION COUNTING PRINCIPLE

191 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

192 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

193 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></td>
<td>cookie</td>
<td></td>
</tr>
<tr>
<td>chicken tenders</td>
<td></td>
<td>ice cream cup</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.

A.N.8: PERMUTATIONS

194 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. \( _{10}P_7 \)
195 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

196 Determine how many three-letter arrangements are possible with the letters A, N, G, L, and E if no letter may be repeated.

197 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.

198 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

199 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

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

1 5
2 15
3 25
4 120

201 A large company must choose 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.

202 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

EXPRESSIONS AND EQUATIONS

A.A.1: EXPRESSIONS

203 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

204 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 3w² – 4w
4 3w² – 7w
205. 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. \( 58 + s + w \)

206. 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. \( 5x + 20 \)

207. 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. \( 4(x + 2) \)

208. 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. \( 15 - 9x \)

209. 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. \( d - \frac{h}{2} \)

210. 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. \( 4 - 3x \)

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

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

212. 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. \( \frac{d}{x} \)

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

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

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

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

215. 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. \( 58 + s + w \)
216 Julie has three children whose ages are consecutive odd integers. If \( x \) represents the youngest child’s age, which expression represents the sum of her children’s ages?
1. \( 3x + 3 \)
2. \( 3x + 4 \)
3. \( 3x + 5 \)
4. \( 3x + 6 \)

A.A.2: EXPRESSIONS

217 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 \( n \)

218 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

219 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

220 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

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

222 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. \(x = 2\)

223 An example of an algebraic expression is
1. \(x + 2\)
2. \(y = x + 2\)
3. \(y < x + 2\)
4. \(y = x^2 + 2x\)

224 An example of an algebraic expression is
1. \(y = mx + b\)
2. \(3x + 4y = 7\)
3. \(2x + 3y \leq 18\)
4. \((x + y)(x - y) = 25\)
225 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

226 An example of an equation is
1. $2x^2 - 4x + 12$
2. $|x - 6|$
3. $4(x + 6)(x - 2)$
4. $2x = x^2 + 3$

A.A.22: SOLVING EQUATIONS

227 Solve for $g$: $3 + 2g = 5g - 9$

228 Which value of $p$ is the solution of $5p - 1 = 2p + 20$?
1. $\frac{19}{7}$
2. $\frac{19}{3}$
3. 3
4. 7

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

\[
\begin{align*}
\text{[Line 1]} & \quad 3(x + 4) - 2 = 16 \\
\text{[Line 2]} & \quad 3x + 12 = 18 \\
\text{[Line 3]} & \quad 3x = 18 \\
\text{[Line 4]} & \quad x = 6 \\
\text{[Line 5]} & \quad x = 4 \frac{2}{3}
\end{align*}
\]

She made an error between lines
1. 1 and 2
2. 2 and 3
3. 3 and 4
4. 4 and 5

230 What is the value of $x$ in the equation $2(x - 4) = 4(2x + 1)$?
1. $-2$
2. 2
3. $-\frac{1}{2}$
4. $\frac{1}{2}$

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

232 The solution of the equation $5 - 2x = -4x - 7$ is
1. 1
2. 2
3. $-2$
4. $-6$
A.A.25: SOLVING EQUATIONS WITH FRACTIONAL EXPRESSIONS

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

1 \( \frac{3}{5} \)
2 \( \frac{31}{26} \)
3 \( 3 \)
4 \( 7 \)

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

1 \( 6 \)
2 \( 10 \)
3 \( 15 \)
4 \( 30 \)

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

1 \( 8 \)
2 \( 13 \)
3 \( 15 \)
4 \( 23 \)

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

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

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

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

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

239 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 \( \frac{6}{29} \)

A.A.25: SOLVING EQUATIONS WITH DECIMALS

240 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

241 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 \( 60h + 9 = 375 \)

242 The width of a rectangle is 4 less than half the length. If \( l \) represents the length, which equation could be used to find the width, \( w \)?

1 \( w = \frac{1}{2} (4 - \ell) \)
2 \( w = \frac{1}{2} (\ell - 4) \)
3 \( w = \frac{1}{2} \ell - 4 \)
4 \( w = 4 - \frac{1}{2} \ell \)
A.A.5: MODELING EQUATIONS

243 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. \( w^2 + 5w - 36 = 0 \)

244 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. \( 0.15(x + 6) = 1.35 \)

245 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. \( x(2x - 3) = 43 \)

246 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

247 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

248 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

249 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

250 If \( 3ax + b = c \), then \( x \) equals

1. \( c - b + 3a \)
2. \( c + b - 3a \)
3. \( \frac{c - b}{3a} \)
4. \( \frac{b - c}{3a} \)
251 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. \( w = \frac{P - 2w}{2l} \)

252 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. \( \frac{1 + b}{r + b} \)

253 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. \( n = \frac{r}{p} \)

254 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. \( a = \frac{v}{2t^2} \)

255 If \( \frac{cy}{n} + k = t \), 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. \( y = \frac{n(t - k)}{e} \)

256 Solve for \( c \) in terms of \( a \) and \( b \): \( bc + ac = ab \)

257 If \( s = \frac{2x + t}{r} \), then \( x \) equals
1. \( \frac{rs - t}{2} \)
2. \( \frac{rs + 1}{2} \)
3. \( 2rs - t \)
4. \( rs - 2t \)
258 If \( k = am + 3mx \), the value of \( m \) in terms of \( a, k, \) and \( x \) can be expressed as
\[
1 \quad \frac{k}{a + 3x} \\
2 \quad \frac{k - 3mx}{a} \\
3 \quad \frac{k - am}{3x} \\
4 \quad \frac{k - a}{3x}
\]

259 The formula for the volume of a pyramid is \( V = \frac{1}{3} Bh \). What is \( h \) expressed in terms of \( B \) and \( V \)?
\[
1 \quad h = \frac{1}{3} VB \\
2 \quad h = \frac{V}{3B} \\
3 \quad h = \frac{3V}{B} \\
4 \quad h = 3VB
\]

260 If \( rx - st = r \), which expression represents \( x \)?
\[
1 \quad \frac{r + st}{r} \\
2 \quad \frac{r}{r + st} \\
3 \quad \frac{r}{r - st} \\
4 \quad \frac{r - st}{r}
\]

261 If \( 2y + 2w = x \), then \( w \), in terms of \( x \) and \( y \), is equal to
\[
1 \quad x - y \\
2 \quad \frac{x - 2y}{2} \\
3 \quad x + y \\
4 \quad \frac{x + 2y}{2}
\]

262 If \( abx - 5 = 0 \), what is \( x \) in terms of \( a \) and \( b \)?
\[
1 \quad x = \frac{5}{ab} \\
2 \quad x = -\frac{5}{ab} \\
3 \quad x = 5 - ab \\
4 \quad x = ab - 5
\]

RATE
A.M.1: USING RATE

263 Tom drove 290 miles from his college to home and used 23.2 gallons of gasoline. His sister, Ann, drove 225 miles from her college to home and used 15 gallons of gasoline. Whose vehicle had better gas mileage? Justify your answer.

264 Nicole’s aerobics class exercises to fast-paced music. If the rate of the music is 120 beats per minute, how many beats would there be in a class that is 0.75 hour long?
\[
1 \quad 90 \\
2 \quad 160 \\
3 \quad 5,400 \\
4 \quad 7,200
\]

265 Joseph typed a 1,200-word essay in 25 minutes. At this rate, determine how many words he can type in 45 minutes.

266 A cell phone can receive 120 messages per minute. At this rate, how many messages can the phone receive in 150 seconds?
\[
1 \quad 48 \\
2 \quad 75 \\
3 \quad 300 \\
4 \quad 18,000
\]
267 A car uses one gallon of gasoline for every 20 miles it travels. If a gallon of gasoline costs $3.98, how much will the gas cost, to the nearest dollar, to travel 180 miles?

1. 9
2. 36
3. 45
4. 80

A.M.1: SPEED

268 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?

269 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.

270 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

271 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

272 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.

273 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

274 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

275 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.

276 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
277 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.

278 Jonathan drove to the airport to pick up his friend. A rainstorm forced him to drive at an average speed of 45 mph, reaching the airport in 3 hours. He drove back home at an average speed of 55 mph. How long, to the nearest tenth of an hour, did the trip home take him?
   1. 2.0 hours
   2. 2.5 hours
   3. 2.8 hours
   4. 3.7 hours

A.M.2: CONVERSIONS

279 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

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

   60 seconds = 1 minute
   60 minutes = 1 hour

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

281 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.

282 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.

283 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.

284 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?

   3 teaspoons = 1 tablespoon

   1. 1 \( \frac{1}{4} \)
   2. 1 \( \frac{3}{4} \)
   3. 3 \( \frac{3}{4} \)
   4. 5 \( \frac{3}{4} \)
285 Peter walked 8,900 feet from home to school.

\[
1 \text{ mile} = 5,280 \text{ feet}
\]

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

1 0.5

2 0.6

3 1.6

4 1.7

286 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 \[
\frac{75 \text{ km}}{1 \text{ hr}} \times \frac{1,000 \text{ m}}{1 \text{ km}} \times \frac{60 \text{ min}}{1 \text{ hr}}
\]

287 A soda container holds \(\frac{5}{2}\) gallons of soda. How many ounces of soda does this container hold?

\[
1 \text{ quart} = 32 \text{ ounces}
\]

\[
1 \text{ gallon} = 4 \text{ quarts}
\]

1 44

2 176

3 640

4 704

288 A jogger ran at a rate of 5.4 miles per hour. Find the jogger's exact rate, in feet per minute.

\[
1 \text{ mile} = 5,280 \text{ feet}
\]

A.N.5: PERCENTS

289 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?

290 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.

291 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?

1 186

2 837

3 1,023

4 1,805

292 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.

293 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

294 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.

295 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?

1 100  
2 180  
3 200  
4 225

LINEAR EQUATIONS
A.A.32: SLOPE

296 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

297 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

298 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

A.A.33: SLOPE

299 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 \( \frac{-3}{2} \)
300 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 \(\frac{1}{2}\)

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

302 What is the slope of the line that passes through the points (−5, 4) and (15, −4)?
1 \(\frac{2}{5}\)
2 0
3 \(-\frac{5}{2}\)
4 undefined

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

304 What is the slope of the line that passes through the points (3, 5) and (−2, 2)?
1 \(\frac{1}{5}\)
2 \(\frac{3}{5}\)
3 \(\frac{5}{3}\)
4 5
305 What is the slope of the line passing through the points $A$ and $B$, as shown on the graph below?

![Graph showing line passing through points A and B]

1. $-3$
2. $rac{1}{3}$
3. $3$
4. $rac{1}{3}$

306 What is the slope of the line passing through the points $(-2, 4)$ and $(3, 6)$?

1. $-\frac{5}{2}$
2. $-\frac{2}{5}$
3. $\frac{2}{5}$
4. $\frac{5}{2}$

307 What is the slope of the line that passes through the points $(2, -3)$ and $(5, 1)$?

1. $-\frac{2}{3}$
2. $\frac{2}{3}$
3. $-\frac{4}{3}$
4. $\frac{4}{3}$

308 What is the slope of the line that passes through the points $(4, -7)$ and $(9, 1)$?

1. $\frac{5}{8}$
2. $\frac{8}{5}$
3. $-\frac{6}{12}$
4. $-\frac{13}{6}$

A.A.37: SLOPE

309 What is the slope of the line whose equation is $3x - 7y = 9$?

1. $-\frac{3}{7}$
2. $\frac{3}{7}$
3. $-\frac{7}{3}$
4. $\frac{7}{3}$

310 The line represented by the equation $2y - 3x = 4$ has a slope of

1. $-\frac{3}{2}$
2. $2$
3. $3$
4. $\frac{3}{2}$

311 What is the slope of the line represented by the equation $4x + 3y = 12$?

1. $\frac{4}{3}$
2. $\frac{3}{4}$
3. $-\frac{3}{4}$
4. $-\frac{4}{3}$
312 What is the slope of a line represented by the equation $2y = x - 4$?

1 $1$

2 $\frac{1}{2}$

3 $-1$

4 $-\frac{1}{2}$

A.G.4: GRAPHING LINEAR FUNCTIONS

313 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

**314** 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. $y = -3x + 14$

**315** 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. $y = 2x - 7$

**316** 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.

**317** 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. $y = 2x + 3$

**318** 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. $4y = 3x + 5$

**319** What is an equation of the line that passes through the point $(-2, -8)$ and has a slope of 3?
1. $y = 3x - 2$
2. $y = 3x - 22$
3. $y = 3x + 2$
4. $y = 3x + 22$

### A.A.35: WRITING LINEAR EQUATIONS

**320** 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. $y = -\frac{2}{3}x - 2$

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

**322** 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. $x = y$

**323** 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. $y = -\frac{2}{3}x + 9$

**324** 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. $y + 5 = \frac{2}{7}(x - 8)$
A.A.39: IDENTIFYING POINTS ON A LINE

325 Which point is on the line $4y - 2x = 0$?
1. $(-2, -1)$
2. $(-2, 1)$
3. $(-1, -2)$
4. $(1, 2)$

326 Which linear equation represents a line containing the point $(1, 3)$?
1. $x + 2y = 5$
2. $x - 2y = 5$
3. $2x + y = 5$
4. $2x - y = 5$

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

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

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

330 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. $-2$

A.A.36: PARALLEL AND PERPENDICULAR LINES

331 Which equation represents a line parallel to the $x$-axis?
1. $x = 5$
2. $y = 10$
3. $x = \frac{1}{3}y$
4. $y = 5x + 17$

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

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

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

335 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. $y = -3$
336 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. $y = 4$

A.A.38: PARALLEL AND PERPENDICULAR LINES

337 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. $y = 4x + 5$

338 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. $y = 4x - 2$

339 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. $y = 2x + 8$

340 The graphs of the equations $y = 2x - 7$ and $y - kx = 7$ are parallel when $k$ equals
1. $-2$
2. $2$
3. $-7$
4. $7$

341 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. $y = -\frac{3}{2}x + 4$

342 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. $y = 3x - 2$

INEQUALITIES
A.A.24: SOLVING INEQUALITIES

343 What is the solution of $3(2m - 1) \leq 4m + 7$?
1. $m \leq 5$
2. $m \geq 5$
3. $m \leq 4$
4. $m \geq 4$

344 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. $x \leq -3$

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

346 Solve the inequality $-5(x - 7) < 15$ algebraically for $x$. 

56
347 Which graph represents the solution set of
\[2x - 5 < 3?\]

A.A.21: INTERPRETING SOLUTIONS

348 Which value of \(x\) is in the solution set of the inequality \(-2x + 5 > 17?\)
1. \(-8\)
2. \(-6\)
3. \(-4\)
4. \(12\)

349 Which value of \(x\) is in the solution set of the inequality \(-4x + 2 > 10?\)
1. \(-2\)
2. \(2\)
3. \(3\)
4. \(-4\)

350 Which value of \(x\) is in the solution set of
\[\frac{4}{3} x + 5 < 17?\]
1. \(8\)
2. \(9\)
3. \(12\)
4. \(16\)

351 Which value of \(x\) is in the solution set of the inequality \(-2(x - 5) < 4?\)
1. \(0\)
2. \(2\)
3. \(3\)
4. \(5\)

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

353 Which value of \(x\) is in the solution set of
\[-3x + 8 \geq 14?\]
1. \(-3\)
2. \(-1\)
3. \(0\)
4. \(3\)

354 The statement \(|-15| < x < |-20|\) is true when \(x\) is equal to
1. \(-16\)
2. \(-14\)
3. \(17\)
4. \(21\)

A.A.4: MODELING INEQUALITIES

355 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. \(8 - 3x < 15\)

356 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

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. \(75d + 30c \geq 255\)

A.A.6: MODELING INEQUALITIES

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. \(30 + 2w \geq 50\)

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. \(2x + x \geq 90\)

Jeremy is hosting a Halloween party for 80 children. He will give each child at least one candy bar. If each bag of candy contains 18 candy bars, which inequality can be used to determine how many bags, \(c\), Jeremy will need to buy?

1. \(18c \geq 80\)
2. \(18c \leq 80\)
3. \(\frac{c}{18} \geq 80\)
4. \(\frac{c}{18} \leq 80\)
365 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 \textit{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 \textit{at least} 75 words.

366 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

367 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

368 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.

369 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

370 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

A.G.6: LINEAR INEQUALITIES

371 Which inequality is represented by the graph below?

1  \( y < 2x + 1 \)
2  \( y < -2x + 1 \)
3  \( y < \frac{1}{2} x + 1 \)
4  \( y < -\frac{1}{2} x + 1 \)
372 Which graph represents the solution of $3y - 9 \leq 6x$?

373 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.

374 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
375 Which graph represents the inequality \( y > 3 \)?

376 The diagram below shows the graph of which inequality?

\[
\begin{array}{cccc}
1 & y > x - 1 \\
2 & y \geq x - 1 \\
3 & y < x - 1 \\
4 & y \leq x - 1 \\
\end{array}
\]
377 Which graph represents the inequality \( y \geq x + 3 \)?

378 Which graph represents the solution of \( 2y + 6 > 4x \)?
ABSOLUTE VALUE

A.G.4: GRAPHING ABSOLUTE VALUE FUNCTIONS

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

380 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

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

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

1

2

3

4

382 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 \(-1 < a < 0\)?

1

2

3

4
383 Graph and label the following equations on the set of axes below.

\[ y = |x| \]
\[ y = \frac{1}{2} |x| \]

Explain how decreasing the coefficient of \( x \) affects the graph of the equation \( y = |x| \).

384 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.
385 The graph of \( y = |x + 2| \) is shown below.

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

386 Graph and label the functions \( y = |x| \) and \( y = |2x| \) on the set of axes below.

QUADRATICS
A.A.20: FACTORING POLYNOMIALS

387 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. \( 2(x - 2)(x - 3) \)

388 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. \( (3x + 6)(x - 3) \)
389 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 \((x - 4)\)

390 Factored completely, the expression \(3x^3 - 33x^2 + 90x\) is equivalent to
1. \(3x(x^2 - 33x + 90)\)
2. \(3x(x^2 - 11x + 30)\)
3. \(3x(x + 5)(x + 6)\)
4. \(3x(x - 5)(x - 6)\)

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

392 The greatest common factor of \(3m^2n + 12mn^2\) is?
1. \(3n\)
2. \(3m\)
3. \(3mn\)
4. \(3mn^2\)

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

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

394 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. \((8x - 5y)(8x - 5y)\)

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

396 Factor completely: \(4x^3 - 36x\)

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

398 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. \((2y - 5)(y - 5)\)

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

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

401 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. \((x + 18y)(x - 18y)\)
402 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. $(18x + 50y^3)(18x - 50y^3)$

**A.A.28: ROOTS OF QUADRATICS**

408 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 $-7$

409 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 $6$

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

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

412 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. $x^2 - 2x + 15 = 0$

413 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 $-3$

414 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 $-3$

403 Which expression is equivalent to $64 - x^2$?

1. $(8 - x)(8 + x)$
2. $(x - 8)(x + 8)$
3. $(x - 8)(x - 8)$
4. $(x - 8)(x + 8)$

404 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. $(3a - 8b)(3a - 8b)$

405 The expression $100n^2 - 1$ is equivalent to

1. $(10n + 1)(10n - 1)$
2. $(10n - 1)(10n - 1)$
3. $(50n + 1)(50n - 1)$
4. $(50n - 1)(50n - 1)$

**A.A.27: SOLVING QUADRATICS BY FACTORING**

406 The solution to the equation $x^2 - 6x = 0$ is

1. $0$, only
2. $6$, only
3. $0$ and $6$
4. $\pm \sqrt{6}$

407 The solutions of $x^2 = 16x - 28$ are

1. $-2$ and $-14$
2. $2$ and $14$
3. $-4$ and $-7$
4. $4$ and $7$
415 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 $8$

416 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. $(x - 2)(x - 3) = 0$

417 The roots of the equation $2x^2 - 8x = 0$ are
1. $-2$ and $2$
2. $0$, $-2$, and $2$
3. $0$ and $-4$
4. $0$ and $4$

A.G.5: GRAPHING QUADRATIC FUNCTIONS

418 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.

419 The diagram below shows the graph of $y = -x^2 - c$.

Which diagram shows the graph of $y = x^2 - c$?
420 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.

421 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

422 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.

423 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. \( y = \frac{1}{2} x^2 \)

A.G.8: SOLVING QUADRATICS BY GRAPHING

424 Graph the equation \( y = x^2 - 2x - 3 \) on the accompanying set of axes. Using the graph, determine the roots of the equation \( x^2 - 2x - 3 = 0 \).
425 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 $-18$

426 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 $-2$

427 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 $3$
428 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

430 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.]

431 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

432 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

433 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

A.A.8: GEOMETRIC APPLICATIONS OF QUADRATICS

434 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.

435 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
436  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

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

437  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 \( x = −2 \).

438  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  \( y = 23 \)

439  Which equation represents the axis of symmetry of the graph of the parabola below?

1  \( y = −3 \)
2  \( x = −3 \)
3  \( y = −25 \)
4  \( x = −25 \)
440 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 \( x = 13 \)

441 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: \( x = -4 \)

442 State the equation of the axis of symmetry and the coordinates of the vertex of the parabola graphed 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: \( x = 1 \)

443 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: \( x = 1 \)
444 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 \( x = -2 \)

A.A.41: IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN EQUATION

445 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: \( x = -8 \)

446 Find algebraically the equation of the axis of symmetry and the coordinates of the vertex of the parabola whose equation is \( y = -2x^2 - 8x + 3 \).

447 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. \( x = -5 \)

448 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. \( y = 6 \)

449 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. \( y = \frac{3}{2} \)

450 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. \( (-6, -316) \)

451 The vertex of the parabola \( y = x^2 + 8x + 10 \) lies in Quadrant
1. I
2. II
3. III
4. IV
452 What is the vertex of the graph of the equation 
\( y = 3x^2 + 6x + 1 \)?
1. \((-1, -2)\)
2. \((-1, 10)\)
3. \((1, -2)\)
4. \((1, 10)\)

**SYSTEMS**

**A.A.10: SOLVING LINEAR SYSTEMS**

453 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

454 Solve the following system of equations algebraically:
\[
\begin{align*}
3x + 2y &= 4 \\
4x + 3y &= 7
\end{align*}
\]
[Only an algebraic solution can receive full credit.]

455 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

456 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

457 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. \(c = 14, d = -2\)

458 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

459 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. \((3, 1)\)

460 Solve the following system of equations algebraically for \(y\):
\[
\begin{align*}
2x + 2y &= 9 \\
2x - y &= 3
\end{align*}
\]

461 Using the substitution method, Ken solves the following system of equations algebraically.
\[
\begin{align*}
2x - y &= 5 \\
3x + 2y &= -3
\end{align*}
\]
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. \(3 \left( \frac{5}{2} - y \right) + 2y = -3\)
462 What is the solution of the system of equations below?

\[
\begin{align*}
2x + 3y &= 7 \\
x + y &= 3
\end{align*}
\]

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

A.G.7: SOLVING LINEAR SYSTEMS

463 On the grid below, solve the system of equations graphically for \(x\) and \(y\).

\[
\begin{align*}
4x - 2y &= 10 \\
y &= -2x - 1
\end{align*}
\]

464 On the set of axes below, solve the following system of equations graphically. State the coordinates of the solution.

\[
\begin{align*}
y &= 4x - 1 \\
2x + y &= 5
\end{align*}
\]
465 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)

466 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)

467 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

468 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

469 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

470 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.

471 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
472 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

473 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

474 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

475 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

476 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

477 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

478 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.]

479 The difference between two numbers is 28. The larger number is 8 less than twice the smaller number. Find both numbers. [Only an algebraic solution can receive full credit.]

A.A.40: SYSTEMS OF LINEAR INEQUALITIES

480 Which ordered pair is in the solution set of the following system of inequalities?
\[
y < \frac{1}{2} x + 4
\]
\[
y \geq -x + 1
\]
1 (−5, 3)
2 (0, 4)
3 (3, −5)
4 (4, 0)

481 Which ordered pair is in the solution set of the following system of linear inequalities?
\[
y < 2x + 2
\]
\[
y \geq -x - 1
\]
1 (0, 3)
2 (2, 0)
3 (−1, 0)
4 (−1, −4)
482 Which ordered pair is in the solution set of the system of linear inequalities graphed below?

1. (1, -4)
2. (-5, 7)
3. (5, 3)
4. (-7, -2)

483 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)

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

\[ y \leq \frac{1}{2} x + 13 \]
\[ 4x + 2y > 3 \]

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

485 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

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

\[2x - y \geq 6\]
\[x > 2\]

487 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.
488 Graph the following systems of inequalities on the set of axes shown below and label the solution set \( S \):

\[
\begin{align*}
  y &> -x + 2 \\
  y &\leq \frac{2}{3} x + 5
\end{align*}
\]

489 Solve the following system of inequalities graphically on the set of axes below.

\[
\begin{align*}
  3x + y &< 7 \\
  y &\geq \frac{2}{3} x - 4
\end{align*}
\]

State the coordinates of a point in the solution set.
490 On the set of axes below, graph the following system of inequalities.

\[
\begin{align*}
y + x & \geq 3 \\
5x - 2y & > 10
\end{align*}
\]
State the coordinates of one point that satisfies \( y + x \geq 3 \), but does not satisfy \( 5x - 2y > 10 \).

\[
\begin{array}{c}
\text{A.A.11: QUADRATIC-LINEAR SYSTEMS}
\end{array}
\]

491 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. \((2, 2)\)

492 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. \((5, 2)\)

493 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. \((5, -1)\)

494 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. \((2, 5)\)

495 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)\}

496 Solve the following system of equations algebraically for all values of \( x \) and \( y \).

\[
\begin{align*}
y &= x^2 + 2x - 8 \\
y &= 2x + 1
\end{align*}
\]
A.G.9: QUADRATIC-LINEAR SYSTEMS

497 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.

\[ y = x^2 - 6x + 5 \]
\[ 2x + y = 5 \]

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

\[ y = x^2 + 4x - 5 \]
\[ y = x - 1 \]
499 On the set of axes below, solve the following system of equations graphically for all values of $x$ and $y$:

\[ y = x^2 - 6x + 1 \]
\[ y + 2x = 6 \]

500 Which ordered pair is a solution of the system of equations shown in the graph below?

1. $(-3, 1)$
2. $(-3, 5)$
3. $(0, -1)$
4. $(0, -4)$
501 On the set of axes below, solve the following system of equations graphically for all values of $x$ and $y$.

\[
\begin{align*}
y &= -x^2 - 4x + 12 \\
y &= -2x + 4
\end{align*}
\]

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

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

1  
2  
3  
4

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

$y = -x^2 + 6x - 3$
$x + y = 7$

505 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)
506 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.

507 How many solutions are there for the following system of equations?
\[ y = x^2 - 5x + 3 \]
\[ y = x - 6 \]

508 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.
\[ y = -x^2 - 2x + 3 \]
\[ y + 1 = -2x \]
509 On the set of axes below, solve the following system of equations graphically for all values of $x$ and $y$. State the coordinates of all solutions.

\[
\begin{align*}
y &= x^2 + 4x - 5 \\
y &= 2x + 3
\end{align*}
\]

A.A.13: ADDITION AND SUBTRACTION OF POLYNOMIALS

511 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. $10g^2 + g + 1$

512 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. $-5x^2 + 9x - 8$

POWERS

A.A.13: ADDITION AND SUBTRACTION OF MONOMIALS

510 Which expression is equivalent to $-3x(x - 4) - 2x(x + 3)$?

1. $-x^2 - 1$
2. $-x^2 + 18x$
3. $-5x^2 - 6x$
4. $-5x^2 + 6x$

513 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. $7x^6 + 9x^4 - 3x^2 - 8$

514 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. $x^2 - 4xy - 4$

515 When $5x + 4y$ is subtracted from $5x - 4y$, the difference is

1. $0$
2. $10x$
3. $8y$
4. $-8y$
516 **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 $-8x^2 - 13x + 13$
4 $-8x^2 - 13x^2 + 13$

517 **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 $x^2 - 6x - 6$

518 **The sum of** $3x^2 + 5x - 6$ **and** $-x^2 + 3x + 9$ **is**
1 $2x^2 + 8x - 15$
2 $2x^2 + 8x + 3$
3 $2x^4 + 8x^2 + 3$
4 $4x^2 + 2x - 15$

519 **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 $2x^2 - 8x + 4$

520 **The sum of** $8n^2 - 3n + 10$ **and** $-3n^2 - 6n - 7$ **is**
1 $5n^2 - 9n + 3$
2 $5n^2 - 3n - 17$
3 $-11n^2 - 9n - 17$
4 $-11n^2 - 3n + 3$

521 **What is the result when** $4x^2 - 17x + 36$ **is subtracted from** $2x^2 - 5x + 25$?
1 $6x^2 - 22x + 61$
2 $2x^2 - 12x + 11$
3 $-2x^2 - 22x + 61$
4 $-2x^2 + 12x - 11$

---

**A.A.13: MULTIPLICATION OF POLYNOMIALS**

522 **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 $-15x^3y^3 + xy$

523 **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**

524 **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 $10x^2 - 4x + 1$

525 **Express in simplest form:** $\frac{45a^4b^3 - 90a^3b}{15a^2b}$

526 **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 $4x^4 - x^6 + 2x^5 - 3x^4$
3 $4x^3 - x^2 + 2x - 3$
4 $4x^3 - x^2 + 2x - 3$

---

90
527 What is \(24x^2y^6 - 16x^6y^2 + 4xy^2\) divided by \(4xy^2\)?
1. \(6xy^4 - 4x^3\)
2. \(6xy^4 - 4x^5 + 1\)
3. \(6x^3y^3 - 4x^6y\)
4. \(6x^2y^3 - 4x^6y + 1\)

528 When \(16x^3 - 12x^2 + 4x\) is divided by \(4x\), the quotient is
1. \(12x^2 - 8x\)
2. \(12x^2 - 8x + 1\)
3. \(4x^2 - 3x\)
4. \(4x^2 - 3x + 1\)

A.A.12: MULTIPLICATION OF POWERS

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

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

A.A.12: DIVISION OF POWERS

531 Which expression represents \(\frac{(2x^3)(8x^5)}{4x^6}\) in simplest form?
1. \(x^2\)
2. \(x^9\)
3. \(4x^2\)
4. \(4x^9\)

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

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

534 Which expression represents \(\frac{27x^{18}y^5}{9x^6y}\) in simplest form?
1. \(3x^{12}y^4\)
2. \(3x^3y^5\)
3. \(18x^{12}y^4\)
4. \(18x^3y^5\)

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

536 The expression \(\frac{12w^9y^3}{-3w^3y^3}\) is equivalent to
1. \(-4w^6\)
2. \(-4w^3y\)
3. \(9w^6\)
4. \(9w^3y\)
537 What is one-third of $3^6$?
1  $1^2$
2  $3^2$
3  $3^5$
4  $9^6$

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

A.A.12: POWERS OF POWERS

539 Which expression is equivalent to $(3x^2)^3$?
1  $9x^5$
2  $9x^6$
3  $27x^5$
4  $27x^6$

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

541 The expression $\frac{(4x^3)^2}{2x}$ is equivalent to
1  $4x^4$
2  $4x^5$
3  $8x^4$
4  $8x^5$

542 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

543 Which equation is true?
1  $\frac{c^5}{d^3} + \frac{d^3}{c} = \frac{c^4}{d^4}$
2  $(-2m^2p)^3 = -8m^6p^3$
3  $\left(\frac{s^3t^8}{s^4t^5}\right)^2 = \frac{t^5}{s^2}$
4  $(-2a^2b^3)(3ab^2) = a^3b^5$

A.N.4: OPERATIONS WITH SCIENTIFIC NOTATION

544 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  $2.3 \times 10^{12}$

545 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  $3.528 \times 10^{12}$
546 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 $\times 10^7$

547 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 $\times 10^4$

548 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 5.52 $\times 10^7$
4 5.52 $\times 10^{10}$

549 State the value of the expression

$$\frac{(4.1 \times 10^2)(2.4 \times 10^3)}{(1.5 \times 10^7)}$$

in scientific notation.

550 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 $2 \times 10^{-10}$

A.A.9: EXPONENTIAL FUNCTIONS

551 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 $27,082.33$

552 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 $v = 21,000(0.86)^3$

553 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 $t = 64(0.5)^r$

554 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.
555 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

558 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.

1) $12,800.00  
2) $13,629.44  
3) $17,600.00  
4) $28,098.56

556 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>1/2</td>
</tr>
<tr>
<td>3</td>
<td>1/4</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
</tr>
</tbody>
</table>

Which fractional part of the rock will remain at noon on day 7?

1) 1/128  
2) 1/64  
3) 1/14  
4) 1/12

559 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

557 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

560 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

561 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) $2500(1 + 0.4)^3$

562 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) $V = 12,500(1.45)^5$
563 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%

564 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 $P = 10,000(1.8)^t$

565 Adrianne invested $2000 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.

566 Kirsten invested $1000 in an account at an annual interest rate of 3%. She made no deposits or withdrawals on the account for 5 years. The interest was compounded annually. Find the balance in the account, to the nearest cent, at the end of 5 years.

A.G.4: GRAPHING EXPONENTIAL FUNCTIONS

567 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.
569. Which graph represents the exponential decay of a radioactive element?

![Graph options](image1)

1. 
2. 
3. 
4.

**RADICALS**

A.N.2: SIMPLIFYING RADICALS

570. Express \(\sqrt[5]{72}\) in simplest radical form.

571. What is \(\frac{\sqrt[3]{32}}{4}\) expressed in simplest radical form?
   1. \(\sqrt{2}\)
   2. \(4\sqrt{2}\)
   3. \(\sqrt{8}\)
   4. \(\frac{\sqrt{8}}{2}\)

572. What is \(\sqrt[7]{72}\) expressed in simplest radical form?
   1. \(2\sqrt{18}\)
   2. \(3\sqrt{8}\)
   3. \(6\sqrt{2}\)
   4. \(8\sqrt{3}\)

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

574. 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

575. Express \(-3\sqrt{48}\) in simplest radical form.

576. What is \(3\sqrt{250}\) expressed in simplest radical form?
   1. \(5\sqrt{10}\)
   2. \(8\sqrt{10}\)
   3. \(15\sqrt{10}\)
   4. \(75\sqrt{10}\)
577 What is $2\sqrt{45}$ expressed in simplest radical form?
1. $3\sqrt{5}$
2. $5\sqrt{5}$
3. $6\sqrt{5}$
4. $18\sqrt{5}$

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

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

A.N.3: OPERATIONS WITH RADICALS

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

581 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. $36\sqrt{2}$

582 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. $\sqrt{6}$

583 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. $7\sqrt{2}$

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

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

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

587 Express $\frac{\sqrt{84}}{2\sqrt{3}}$ in simplest radical form.

RATIONALS

A.A.16: RATIONAL EXPRESSIONS

588 The expression $\frac{9x^4 - 27x^6}{3x^3}$ is equivalent to
1. $3x(1 - 3x)$
2. $3x(1 - 3x^2)$
3. $3x(1 - 9x^5)$
4. $9x^3(1 - x)$

589 Which expression represents $\frac{2x^2 - 12x}{x - 6}$ in simplest form?
1. $0$
2. $2x$
3. $4x$
4. $2x + 2$

590 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. $\frac{25}{x + 5}$
591 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. \( \frac{-2x - 15}{3x} \)

592 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

593 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.

594 Express in simplest form: \( \frac{x^2 - 1}{x^2 + 3x + 2} \)

595 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. \( \frac{-3x - 10}{-25} \)

596 Which expression is equivalent to \( \frac{2x^6 - 18x^4 + 2x^2}{2x^4} \)?
1. \( x^3 - 9x^2 \)
2. \( x^4 - 9x^2 \)
3. \( x^3 - 9x^2 + 1' \)
4. \( x^4 - 9x^2 + 1 \)

597 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. \( \frac{x + 5}{2} \)

598 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. \( x^2 + 7x + 10 \)

599 Which fraction represents \( \frac{x^2 - 25}{x^2 - x - 20} \) expressed in simplest form?
1. \( \frac{5}{4} \)
2. \( \frac{x - 5}{x - 4} \)
3. \( \frac{x + 5}{x + 4} \)
4. \( \frac{25}{x + 20} \)
A.A.15: UNDEFINED RATIONALS

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

601 Which value of $x$ makes the expression $\frac{x + 4}{x - 3}$ undefined?
1  −4
2  −3
3  3
4  0

602 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

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

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

605 The algebraic expression $\frac{x - 2}{x^2 - 9}$ is undefined when $x$ is
1  0
2  2
3  3
4  9

606 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  $\{-4, 2\}$
4  $\{-2, 6\}$

607 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 $-1$

608 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

609 The expression $\frac{x - 3}{x + 2}$ is undefined when the value of $x$ is
1  −2, only
2  −2 and 3
3  3, only
4  −3 and 2
610 A value of $x$ that makes the expression undefined is:

\[ \frac{x^2 + 4x - 12}{x^2 - 2x - 15} \]

1. $-6$
2. $-2$
3. $3$
4. $5$

A.A.18: MULTIPLICATION AND DIVISION OF RATIONALS

611 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. $\frac{x + 3}{3}$

612 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. $\frac{4(x + 1)}{3}$

613 Perform the indicated operation and simplify:

\[ \frac{3x + 6}{4x + 12} \div \frac{x^2 - 4}{x + 3} \]

614 Express in simplest form:

\[ \frac{2x^2 - 8x - 42}{6x^2} \div \frac{x^2 - 9}{x^2 - 3x} \]

A.A.17: ADDITION AND SUBTRACTION OF RATIONALS

615 Express in simplest form:

\[ \frac{x^2 + 9x + 14}{x^2 - 49} \div \frac{3x + 6}{x^2 + x - 56} \]

616 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. $\frac{x - 4}{2}$

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

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

A.A.17: ADDITION AND SUBTRACTION OF RATIONALS

619 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. $\frac{7d}{6}$
620  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. \( \frac{4}{2x} \)

621  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. \( \frac{10}{12a} \)

622  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. \( \frac{17}{12x} \)

623  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. \( \frac{4x^2}{x-2} \)

624  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. \( \frac{3x + 12}{4x + 8} \)

625  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. \( \frac{2x + 4}{5x} \)

626  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. \( \frac{13}{8x} \)

627  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. \( \frac{7x - 2y}{12x^2} \)
628 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 \( \frac{2y+10}{y+5} \)

629 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 \( \frac{5x+7}{4x+12} \)

630 Which fraction is equivalent to \( \frac{4}{3a} - \frac{5}{2a} \)?

1 \( \frac{1}{a} \)
2 \( \frac{-1}{3a} \)
3 \( \frac{-7}{6a} \)
4 \( \frac{-7}{6a^2} \)

631 The expression \( \frac{2n}{5} + \frac{3n}{2} \) is equivalent to

1 \( \frac{5n}{7} \)
2 \( \frac{6n^2}{10} \)
3 \( \frac{19n}{10} \)
4 \( \frac{7n}{10} \)

632 Solve for \( x \): \( \frac{x+1}{x} = \frac{-7}{x-12} \)

633 Which value of \( x \) is a solution of \( \frac{5}{x} = \frac{x+13}{6} \)?

1 -2
2 -3
3 -10
4 -15

634 What is the solution of \( \frac{k+4}{2} = \frac{k+9}{3} \)?

1 1
2 5
3 6
4 14

635 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

636 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 \}

637 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
638 Solve algebraically for $x$: \[ \frac{x + 2}{6} = \frac{3}{x - 1} \]

639 Solve algebraically for $x$: \[ \frac{3}{4} = \frac{-(x + 11)}{4x} + \frac{1}{2x} \]

640 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 $3$

641 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 $4$

642 Solve algebraically: \[ \frac{2}{3x} + \frac{4}{x} = \frac{7}{x + 1} \]
[Only an algebraic solution can receive full credit.]

643 Solve algebraically for all values of $x$:
\[ \frac{3}{x + 5} = \frac{2x}{x^2 - 8} \]

FUNCTIONS
A.G.4: FAMILIES OF FUNCTIONS

644 Which type of graph is shown in the diagram below?

1. absolute value
2. exponential
3. linear
4. quadratic
645 Which graph represents a linear function?

646 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?
647 Which graph represents an exponential equation?

648 Which type of function is represented by the graph shown below?

649 Which equation represents a quadratic function?

650 Which type of function is graphed below?
A.G.4: IDENTIFYING THE EQUATION OF A GRAPH

651 Which equation is represented by the graph below?

1  $y = x^2 - 3$
2  $y = (x - 3)^2$
3  $y = |x| - 3$
4  $y = |x - 3|$

652 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

653 Which graph represents a function?
654 Which graph represents a function?

1

2

3

4

655 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.

656 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)\}

657 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)\}
658 Which graph represents a function?

1

2

3

4

659 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)\}

660 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)\}

661 Which graph does not represent a function?
662 Which graph represents a function?

663 Which graph represents a function?
664 Which graph does *not* represent the graph of a function?

1.  
2.  
3.  
4.  

665 Which relation is *not* a function?

1.  
2.  
3.  
4.  

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**TRIANGLES**

**A.A.45: PYTHAGOREAN THEOREM**

666 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
667 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. \( x = \sqrt{20^2 + 19.5^2} \)

668 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

669 What is the value of \( x \), in inches, in the right triangle below?

1. \( \sqrt{15} \)
2. 8
3. \( \sqrt{34} \)
4. 4

670 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. \( \sqrt{529} \)
671 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

672 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

673 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

674 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

675 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

676 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 \( 7\sqrt{2} \)

677 In right triangle \( ABC \), \( m\angle C = 90 \), \( AC = 7 \), and \( AB = 13 \). What is the length of \( BC \)?
1 6
2 20
3 \( \sqrt{120} \)
4 \( \sqrt{218} \)
678 The length and width of a rectangle are 48 inches and 40 inches. To the nearest inch, what is the length of its diagonal?

1  27  
2  62  
3  88  
4  90

TRIGONOMETRY
A.A.42: TRIGONOMETRIC RATIOS

679 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  $\frac{84}{13}$

680 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  $\frac{8}{17}$

681 Which equation shows a correct trigonometric ratio for angle $A$ in the right triangle below?

1  $\sin A = \frac{15}{17}$  
2  $\tan A = \frac{8}{17}$  
3  $\cos A = \frac{15}{17}$  
4  $\tan A = \frac{5}{8}$

682 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  $\frac{48}{14}$
683 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

684 Which ratio represents $\sin x$ in the right triangle shown below?

1. $\frac{28}{53}$
2. $\frac{28}{45}$
3. $\frac{45}{53}$
4. $\frac{53}{28}$

685 The diagram below shows right triangle $ABC$.

Which ratio represents the tangent of $\angle ABC$?
1. $\frac{5}{13}$
2. $\frac{5}{12}$
3. $\frac{12}{13}$
4. $\frac{12}{5}$

686 The diagram below shows right triangle $LMP$.

Which ratio represents the tangent of $\angle PLM$?
1. $\frac{3}{4}$
2. $\frac{3}{5}$
3. $\frac{4}{3}$
4. $\frac{5}{4}$
687 In \( \triangle ABC \), \( m \angle C = 90 \). 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. \( \tan B = \frac{5}{3} \)

688 In right triangle \( ABC \) shown below, what is the value of \( \cos A \)?

1. \( \frac{12}{20} \)
2. \( \frac{16}{20} \)
3. \( \frac{20}{12} \)
4. \( \frac{20}{16} \)

689 Which ratio represents the cosine of angle \( A \) in the right triangle below?

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

A.A.44: USING TRIGONOMETRY TO FIND A SIDE

690 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
691 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?

692 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

693 A hot-air balloon is tied to the ground with two taut (straight) ropes, as shown in the diagram below. One rope is directly under the balloon and makes a right angle with the ground. The other rope forms an angle of 50° with the ground.

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.

694 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.
695 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

696 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

697 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.

698 From the top of an apartment building, the angle of depression to a car parked on the street below is 38 degrees, as shown in the diagram below. The car is parked 80 feet from the base of the building. Find the height of the building, to the nearest tenth of a foot.
699 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

700 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. $\tan B = \frac{4}{5}$

701 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

702 In right triangle $ABC$, $AB = 20$, $AC = 12$, $BC = 16$, and $\angle C = 90$. Find, to the nearest degree, the measure of $\angle A$.

703 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.
704 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 

705 A trapezoid is shown below. 

Calculate the measure of angle $x$, to the nearest tenth of a degree. 

706 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. 

707 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. 

708 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. $\sin D = \frac{12}{13}$ 

709 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

710 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.

Calculate the length of fence Serena needs to the nearest tenth of a foot.

711 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.

712 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. $80 + 64\pi$

713 A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.

To the nearest foot, what is the length of the string of lights that Tess will need to decorate the window?
714 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 \( ABCD \).

715 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. \( 30\pi + 80 \)

716 A figure is made up of a rectangle and a semicircle as shown in the diagram below.

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

717 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
718 The figure shown below is composed of two rectangles and a quarter circle.

![Figure](image)

What is the area of this figure, to the nearest square centimeter?

1. 33
2. 37
3. 44
4. 58

719 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.

![Garden Diagram](image)

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. $15 + 12\pi$

720 In the diagram below, circle $O$ is inscribed in square $ABCD$. The square has an area of 36.

![Circle in Square Diagram](image)

What is the area of the circle?

1. 9?
2. 6?
3. 3?
4. 36?

721 What is the perimeter of the figure shown below, which consists of an isosceles trapezoid and a semicircle?

![Trapezoid and Semicircle Diagram](image)

Which expression represents the length of fencing, in meters, that will be needed?

1. $20 + 3\pi$
2. $20 + 6\pi$
3. $26 + 3\pi$
4. $26 + 6\pi$
722 In the figure below, $ABCD$ is a square and semicircle $O$ has a radius of 6.

![Diagram of a square and a semicircle]

What is the area of the figure?
1. $36 + 6\pi$
2. $36 + 18\pi$
3. $144 + 18\pi$
4. $144 + 36\pi$

723 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.

![Diagram of a rectangle and a semicircle]

724 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.

![Diagram of a garden with fencing]

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. $100 + 25\pi$

725 A figure consists of a square and a semicircle, as shown in the diagram below.

![Diagram of a square and a semicircle]

If the length of a side of the square is 6, what is the area of the shaded region?
1. $36 - 3\pi$
2. $36 - 4.5\pi$
3. $36 - 6\pi$
4. $36 - 9\pi$
A.G.2: VOLUME

726 A cylindrical container has a diameter of 12 inches and a height of 15 inches, as illustrated in the diagram below.

![Diagram of a cylindrical container](image)

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

727 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

728 A soup can is in the shape of a cylinder. The can has a volume of 342 cm³ 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.

729 The diagram below represents Joe's two fish tanks.

![Diagram of two fish tanks](image)

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.

730 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

731 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.

732 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

733 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
734 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 π, the volume of the cylinder, in cubic centimeters.

A.G.2: SURFACE AREA

735 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

736 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

737 Find the volume, in cubic centimeters, and the surface area, in square centimeters, of the rectangular prism shown below.

738 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 \(x\).

739 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.

740 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

741 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: 3
\[-5(5) + 12 = |-13| = 13\]

PTS: 2 REF: 080923ia STA: A.N.6 TOP: Evaluating Expressions

2 ANS: 1
\[-|a - b| = -|7 - (-3)| = -|10| = -10\]

PTS: 2 REF: 011010ia STA: A.N.6 TOP: Evaluating Expressions

3 ANS: -1 |
\[3 ANS: 2 PTS: 2 REF: 011110ia STA: A.N.6 TOP: Evaluating Expressions\]

4 ANS: 1
\[-3(-4)^2(2) + 4(-4) = -96 - 16 = -112\]

PTS: 2 REF: 081113ia STA: A.N.6 TOP: Evaluating Expressions

5 ANS: 1
\[\left|\frac{4(-6) + 18}{4!}\right| = \frac{6}{24} = \frac{1}{4}\]

PTS: 2 REF: 081220ia STA: A.N.6 TOP: Evaluating Expressions

6 ANS: 2
\[|-3 - 4| - (-3)^2 = 7 - 9 = -2\]

PTS: 2 REF: 011321ia STA: A.N.6 TOP: Evaluating Expressions

7 ANS: 3
\[6! + \frac{5!(3!)}{4!} - 10 = 720 + 5(6) - 10 = 740\]

PTS: 2 REF: 061309ia STA: A.N.6 TOP: Evaluating Expressions

8 ANS: 3
\[2(4)^0 + (4)! = 2 + 24 = 26\]

PTS: 2 REF: 011421ia STA: A.N.6 TOP: Evaluating Expressions

9 ANS: 3 PTS: 2 REF: fall0705ia STA: A.N.1 TOP: Identifying Properties

10 ANS: 2 PTS: 2 REF: 080802ia 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: 1 PTS: 2 REF: 081319ia STA: A.N.1 TOP: Identifying Properties
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 $\{1, 5\}$. The complement of this subset is $\{-1, 0, 2, 3, 4\}$. 

PTS: 2 REF: 060818ia STA: A.A.30 TOP: Set Theory
33 ANS: 
\{1,2,4,5,9,10,12\} 

PTS: 2 REF: 080833ia 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: 4 
\(A = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}\) 

PTS: 2 REF: 061001ia STA: A.A.30 TOP: Set Theory

36 ANS: 3 
\(A = \{4, 9, 16, 25, 36, 49, 64, 81, 100\}\) 

PTS: 2 REF: 081009ia STA: A.A.30 TOP: Set Theory

37 ANS: 3 
\(A = \{4, 9, 16, 25, 36, 49, 64, 81, 100\}\) 

PTS: 2 REF: 081103ia STA: A.A.30 TOP: Set Theory

38 ANS: 2 
\(A = \{4, 9, 16, 25, 36, 49, 64, 81, 100\}\) 

PTS: 2 REF: 011326ia STA: A.A.30 TOP: Set Theory

39 ANS: 4 
\(A = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\}\) 

PTS: 2 REF: 081306ia STA: A.A.30 TOP: Set Theory

40 ANS: 4 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 011426ia STA: A.A.30 TOP: Set Theory

41 ANS: 3 
\(0 \leq t \leq 40\) 

PTS: 2 REF: fall0710ia STA: A.A.31 TOP: Set Theory

42 ANS: 1 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 011004ia STA: A.A.31 TOP: Set Theory

43 ANS: 2 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 081003ia STA: A.A.31 TOP: Set Theory

44 ANS: 1 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 011101ia STA: A.A.31 TOP: Set Theory

45 ANS: 4 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 061123ia STA: A.A.31 TOP: Set Theory

46 ANS: 4 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 011225ia STA: A.A.31 TOP: Set Theory

47 ANS: 3 
\(0 \leq t \leq 40\) 

PTS: 2 REF: 061208ia STA: A.A.31 TOP: Set Theory

48 ANS: 3 
\(A \cup C = \{1, 2, 3, 5, 7, 9\}\) 

PTS: 2 REF: 081221ia STA: A.A.31 TOP: Set Theory

49 ANS: 3 
\(A \cup C = \{1, 2, 3, 5, 7, 9\}\) 

PTS: 2 REF: 081221ia STA: A.A.31 TOP: Set Theory
50 ANS: 3 PTS: 2 REF: 061324ia STA: A.A.31
TOP: Set Theory

51 ANS:

PTS: 4 REF: 080838ia STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables

KEY: cumulative frequency histograms

52 ANS:

PTS: 4 REF: 060938ia STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables

KEY: frequency histograms
53  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>
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<tr>
<td>71–80</td>
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<td>81–90</td>
<td></td>
<td></td>
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<tr>
<td>91–100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PTS: 3  REF: 011135ia  STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables  KEY: frequency histograms

54  ANS:

PTS: 2  REF: 081132ia  STA: A.S.5
TOP: Frequency Histograms, Bar Graphs and Tables  KEY: frequency histograms

55  ANS: 3
25 – 18 = 7

PTS: 2  REF: 060822ia  STA: A.S.9
TOP: Frequency Histograms, Bar Graphs and Tables

56  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

57  ANS: 3  PTS: 2  REF: 061230ia  STA: A.S.9
TOP: Frequency Histograms, Bar Graphs and Tables
58 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

59 ANS:
If there are 31 students, the 16th student’s time represents the median. The 16th time is in the 41-80 interval on the cumulative frequency table and the 71-80 interval on the related frequency table.

PTS: 2  REF: 011432ia  STA: A.S.9  TOP: Frequency Histograms, Bar Graphs and Tables

60 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

61 ANS:

PTS: 4  REF: 080939ia  STA: A.S.5  TOP: Box-and-Whisker Plots

62 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

63 ANS:

PTS: 4  REF: 011337ia  STA: A.S.5  TOP: Box-and-Whisker Plots

64 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

65 ANS: 4  PTS: 2  REF: 010929ia  STA: A.S.6  TOP: Box-and-Whisker Plots

66 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

67 ANS: 1  PTS: 2  REF: 011001ia  STA: A.S.6  TOP: Box-and-Whisker Plots

68 ANS: 3
$75 - 15 = 60$

PTS: 2  REF: 011113ia  STA: A.S.6  TOP: Box-and-Whisker Plots
69 ANS: 2 PTS: 2 REF: 081106ia STA: A.S.6
TOP: Box-and-Whisker Plots

70 ANS: 3 PTS: 2 REF: 011220ia STA: A.S.6
TOP: Box-and-Whisker Plots

71 ANS: 2 PTS: 2 REF: 061314ia STA: A.S.6
TOP: Box-and-Whisker Plots

72 ANS: 4 PTS: 2 REF: 081312ia STA: A.S.6
TOP: Box-and-Whisker Plots

73 ANS: 3 PTS: 2 REF: 011408ia STA: A.S.6
TOP: Box-and-Whisker Plots

74 ANS: 3 PTS: 2 REF: 061017ia STA: A.S.11
TOP: Quartiles and Percentiles

75 ANS: 4
\[
\frac{95000}{125000} = .76
\]
PTS: 2 REF: 061207ia STA: A.S.11 TOP: Quartiles and Percentiles

76 ANS: 2 PTS: 2 REF: fall0701ia STA: A.S.7
TOP: Scatter Plots

77 ANS: 3 PTS: 2 REF: 081001ia STA: A.S.7
TOP: Scatter Plots

78 ANS: 2 PTS: 2 REF: 061115ia STA: A.S.7
TOP: Scatter Plots

79 ANS: 4

80 ANS: 2 PTS: 2 REF: 080822ia STA: A.S.8 TOP: Scatter Plots

81 ANS: 4 PTS: 2 REF: 011229ia STA: A.S.8
TOP: Scatter Plots
82 ANS: 4 PTS: 2 REF: 060805ia STA: A.S.12 TOP: Scatter Plots
83 ANS: 2 PTS: 2 REF: 011019ia STA: A.S.12 TOP: Scatter Plots
84 ANS: 3 PTS: 2 REF: 011103ia STA: A.S.12 TOP: Scatter Plots
85 ANS: 1 PTS: 2 REF: 081102ia STA: A.S.12 TOP: Scatter Plots
86 ANS: 2 PTS: 2 REF: 061205ia STA: A.S.12 TOP: Scatter Plots
87 ANS: 1 PTS: 2 REF: 081204ia STA: A.S.12 TOP: Scatter Plots
88 ANS: 1 PTS: 2 REF: 011301ia STA: A.S.12 TOP: Scatter Plots
89 ANS: 1 PTS: 2 REF: 081301ia STA: A.S.12 TOP: Scatter Plots
90 ANS: 2 PTS: 2 REF: 080930ia STA: A.S.17 TOP: Scatter Plots
91 ANS:

They will not reach their goal in 18 months.

PTS: 3 REF: 061036ia STA: A.S.17 TOP: Scatter Plots
92 ANS: 3 PTS: 2 REF: 081208ia STA: A.S.17 TOP: Scatter Plots
93 ANS: 3 PTS: 2 REF: 061303ia STA: A.S.17 TOP: Scatter Plots
94 ANS: 2 PTS: 2 REF: 011411ia STA: A.S.17 TOP: Scatter Plots
95 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
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

97  ANS: 3
    mean = 6, median = 6 and mode = 7

PTS: 2  REF: 080804ia  STA: A.S.4  TOP: Central Tendency

98  ANS: 4
    The mean is 80.6, the median is 84.5 and the mode is 87.

PTS: 2  REF: 010907ia  STA: A.S.4  TOP: Central Tendency

99  ANS: 3
    mean = 81 7/11, median = 81 and mode = 76

PTS: 2  REF: 011118ia  STA: A.S.4  TOP: Central Tendency

100  ANS: 2
    mean = 7, median = 6 and mode = 6

PTS: 2  REF: 011329ia  STA: A.S.4  TOP: Central Tendency

101  ANS: 81.3, 80, both increase

PTS: 3  REF: 011035ia  STA: A.S.16  TOP: Central Tendency

102  ANS: 12, 7. Both the median and the mode will increase.

PTS: 3  REF: 061134ia  STA: A.S.16  TOP: Central Tendency

103  ANS: 2
    PTS: 2  REF: 081327ia  STA: A.S.16  TOP: Central Tendency

104  ANS: 4
    \[
    \frac{2 + 3 + 0 + 1 + 3 + 2 + 4 + 0 + 2 + 3}{10} = \frac{20}{10} = 2 + \frac{x}{10} = 2 + 0.5 \\
    \therefore x = 25
    \]

PTS: 2  REF: 081020ia  STA: A.S.16  TOP: Average Known with Missing Data

105  ANS: 3
    The other situations are quantitative.

PTS: 2  REF: 060819ia  STA: A.S.1  TOP: Analysis of Data

106  ANS: 3
    The other situations are quantitative.

PTS: 2  REF: 060905ia  STA: A.S.1  TOP: Analysis of Data
107 ANS: 4
The other sets of data are qualitative.

PTS: 2  REF: 011116ia  STA: A.S.1  TOP: Analysis of Data

108 ANS: 4
The other situations are quantitative.

PTS: 2  REF: 081122ia  STA: A.S.1  TOP: Analysis of Data

109 ANS: 2
The other sets of data are qualitative.

PTS: 2  REF: 011211ia  STA: A.S.1  TOP: Analysis of Data

110 ANS: 3
The other situations are qualitative.

PTS: 2  REF: 081213ia  STA: A.S.1  TOP: Analysis of Data

111 ANS: 1
The other situations are quantitative.

PTS: 2  REF: 061308ia  STA: A.S.1  TOP: Analysis of Data

112 ANS: 3
The other situations are quantitative.

PTS: 2  REF: 081313ia  STA: A.S.1  TOP: Analysis of Data

113 ANS: 3
The other situations are qualitative.

PTS: 2  REF: 011414ia  STA: A.S.1  TOP: Analysis of Data

114 ANS: 2
The two values are shoe size and height.

PTS: 2  REF: fall0714ia  STA: A.S.2  TOP: Analysis of Data

115 ANS: 3
Frequency is not a variable.

PTS: 2  REF: 011014ia  STA: A.S.2  TOP: Analysis of Data

116 ANS: 3
PTS: 2  REF: 061011ia  STA: A.S.2  TOP: Analysis of Data

117 ANS: 3
PTS: 2  REF: 061206ia  STA: A.S.2  TOP: Analysis of Data

118 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

119 ANS: 1
To determine student interest, survey the widest range of students.

PTS: 2  REF: 060803ia  STA: A.S.3  TOP: Analysis of Data
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.

PTS: 2 REF: 080910ia STA: A.S.3 TOP: Analysis of Data

Asking school district employees about a school board candidate produces the most bias.

PTS: 2 REF: 061107ia STA: A.S.3 TOP: Analysis of Data

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

To determine student opinion, survey the widest range of students.

PTS: 2 REF: 011313ia STA: A.S.3 TOP: Analysis of Data

The number of correct answers on a test causes the test score.

PTS: 2 REF: 080908ia STA: A.S.13 TOP: Analysis of Data

A rooster crows before sunrise, not because of the sun.

PTS: 2 REF: fall0707ia STA: A.S.14 TOP: Analysis of Data

The age of a child does not cause the number of siblings he has, or vice versa.

PTS: 2 REF: 011030ia STA: A.S.14 TOP: Analysis of Data

The number of correct answers on a test causes the test score.

PTS: 2 REF: 011404ia STA: A.S.3 TOP: Analysis of Data

The age of a child does not cause the number of siblings he has, or vice versa.

PTS: 2 REF: 081017a STA: A.S.14 TOP: Analysis of Data

The age of a child does not cause the number of siblings he has, or vice versa.

PTS: 2 REF: 061122ia STA: A.S.14 TOP: Analysis of Data

The age of a child does not cause the number of siblings he has, or vice versa.

PTS: 2 REF: fall0723ia STA: A.M.3 TOP: Error KEY: area
134 ANS: 
618.45, 613.44, 0.008. 21.7 × 28.5 = 618.45. 21.6 × 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

135 ANS: 1
\[ \left| \frac{289 - 282}{289} \right| = 0.024 \]

PTS: 2  REF: 080828ia  STA: A.M.3  TOP: Error
KEY: volume and surface area

136 ANS:
1,512, 1,551.25, 0.025. 36 × 42 = 1512. 36.5 × 42.5 = 1551.25. \[ RE = \left| \frac{1512 - 1551.25}{1551.25} \right| \approx 0.025. \]

PTS: 3  REF: 010934ia  STA: A.M.3  TOP: Error
KEY: area

137 ANS: 2
The volume of the cube using Ezra’s measurements is 8 (2³). The actual volume is 9.261 (2.1³). 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

138 ANS: 2
\[ \left| \frac{149.6 - 174.2}{149.6} \right| \approx 0.1644 \]

PTS: 2  REF: 080926ia  STA: A.M.3  TOP: Error
KEY: area

139 ANS:
\[ 0.102. \frac{(5.3 \times 8.2 \times 4.1) - (5 \times 8 \times 4)}{5.3 \times 8.2 \times 4.1} = \frac{178.16 - 160}{178.16} = 0.102 \]

PTS: 3  REF: 011036ia  STA: A.M.3  TOP: Error
KEY: volume and surface area

140 ANS:
\[ \frac{600 - 592}{592} \approx 0.014 \]

PTS: 2  REF: 061031ia  STA: A.M.3  TOP: Error
KEY: volume and surface area
ANS: 2
\[
\left| \frac{55.42 - 50.27}{55.42} \right| \approx 0.093
\]

PTS: 2  
REF: 081023ia  
STA: A.M.3  
TOP: Error  
KEY: area

142 ANS:
\[
0.029 \cdot \frac{[2\pi(5.1)^2 + 2\pi(5.1)(15.1)] - [2\pi(5)^2 + 2\pi(5)(15)]}{2\pi(5.1)^2 + 2\pi(5.1)(15.1)} \approx \frac{647.294 - 628.319}{647.294} \approx 0.029
\]

PTS: 4  
REF: 011137ia  
STA: A.M.3  
TOP: Error  
KEY: volume and surface area

143 ANS: 3
\[
\frac{(12.3 \times 11.9) - (12.2 \times 11.8)}{12.3 \times 11.9} \approx 0.0165
\]

PTS: 2  
REF: 061120ia  
STA: A.M.3  
TOP: Error  
KEY: area

144 ANS: 2
\[
\left| \frac{13.5 - 12.8}{13.5} \right| \approx 0.093
\]

PTS: 2  
REF: 081123ia  
STA: A.M.3  
TOP: Error  
KEY: area

145 ANS: 2
\[
\left| \frac{(2.6 \times 6.9) - (2.5 \times 6.8)}{(2.6 \times 6.9)} \right| \approx 0.052
\]

PTS: 2  
REF: 011209ia  
STA: A.M.3  
TOP: Error  
KEY: area

146 ANS:
\[
\frac{8100 - 7678.5}{7678.5} \approx 0.055
\]

PTS: 2  
REF: 061233ia  
STA: A.M.3  
TOP: Error  
KEY: area

147 ANS:
\[
\frac{(5.9 \times 10.3 \times 1.7) - (6 \times 10 \times 1.5)}{5.9 \times 10.3 \times 1.7} \approx 0.129
\]

PTS: 3  
REF: 081235ia  
STA: A.M.3  
TOP: Error  
KEY: volume and surface area
148 \( \text{ANS:} \quad \frac{(24.2 \times 14.1) - (24 \times 14)}{(24.2 \times 14.1)} = \frac{5.22}{341.22} \approx 0.015 \)

PTS: 3  
REF: 011336ia  
STA: A.M.3  
TOP: Error  
KEY: area

149 \( \text{ANS:} \quad \frac{(10.75)(12.5) - (10.5)(12.25)}{(10.75)(12.5)} \approx 0.043 \)

PTS: 3  
REF: 081336ia  
STA: A.M.3  
TOP: Error  
KEY: area

150 \( \text{ANS:} \quad \frac{6(5.2)^2 - 6(5)^2}{6(5.2)^2} \approx 0.075 \)

PTS: 3  
REF: 011435ia  
STA: A.M.3  
TOP: Error  
KEY: volume and surface area

151 \( \text{ANS:} \quad (S,S), (S,K), (S,D), (K,S), (K,D), (D,S), (D,K), (D,D), \frac{4}{9} \)

PTS: 3  
REF: fall0736ia  
STA: A.S.19  
TOP: Sample Space

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

153 \( \text{ANS:} \quad \frac{3}{8}, (H,H,H), (H,H,T), (H,T,H), (H,T,T), (T,H,H), (T,H,T), (T,T,H), (T,T,T) \)

PTS: 2  
REF: 080933ia  
STA: A.S.19  
TOP: Sample Space

154 \( \text{ANS:} \quad (T,J,F), (T,J,N), (T,K,F), (T,K,N), (T,C,F), (T,C,N), (B,J,F), (B,J,N), (B,K,F), (B,K,N), (B,C,F), (B,C,N), (S,J,F), (S,J,N), (S,K,F), (S,K,N), (S,C,F), (S,C,N). \quad 3, 12. \)

PTS: 4  
REF: 061138ia  
STA: A.S.19  
TOP: Sample Space

155 \( \text{ANS:} \quad (W,H,A), (W,H,S), (W,T,A), (W,T,S), (W,B,A), (W,B,S), (R,H,A), (R,H,S), (R,T,A), (R,T,S), (R,B,A), (R,B,S). \quad 8, 3 \)

PTS: 4  
REF: 011238ia  
STA: A.S.19  
TOP: Sample Space
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

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

ANS: 3 
(2, T), (4, T), (6, T)

PTS: 2  REF: 081324ia  STA: A.S.19  TOP: Sample Space

ANS: 

PTS: 4  REF: 011439ia  STA: A.S.19  TOP: Sample Space

ANS: 2  PTS: 2  REF: 060908ia  STA: A.S.21
TOP: Empirical Probability

ANS: 3 
\[
\frac{15}{15 + 13 + 12} = \frac{15}{40} = \frac{3}{8}
\]

PTS: 2  REF: 061006ia  STA: A.S.21  TOP: Experimental Probability

ANS: 3 
\[
\frac{3 + 2 + 4 + 3}{20} = \frac{12}{20}
\]

PTS: 2  REF: 011129ia  STA: A.S.21  TOP: Experimental Probability

ANS: 
\[
\frac{6}{25} \cdot \frac{25 - (11 + 5 + 3)}{25}
\]

PTS: 2  REF: 011232ia  STA: A.S.21  TOP: Experimental Probability

ANS: 2  PTS: 2  REF: 011415ia  STA: A.S.21
TOP: Empirical Probability

ANS: 2  PTS: 2  REF: 011002ia  STA: A.S.20
TOP: Theoretical Probability

ANS: 4 
\[
P(O) = \frac{3}{6}, P(E) = \frac{3}{6}, P(<6) = \frac{5}{6}, P(>4) = \frac{2}{6}
\]

PTS: 2  REF: 010903ia  STA: A.S.22  TOP: Theoretical Probability

ANS: 
orchestra: \[
\frac{3}{26} > \frac{4}{36}
\]

PTS: 2  REF: 011033ia  STA: A.S.22  TOP: Theoretical Probability
168 ANS:
Hat A, add 1 not green to Hat A, add 11 green to Hat B, and add none to Hat C.

PTS: 4 REF: 081038ia STA: A.S.22 TOP: Theoretical Probability

169 ANS: 3
\[ P(O) = \frac{5}{10}, \quad P(\leq 5) = \frac{6}{10}, \quad P(3) = \frac{4}{10} \]

PTS: 2 REF: 081125ia STA: A.S.22 TOP: Theoretical Probability

170 ANS:
White. There are 31 white blocks, 30 red blocks and 29 blue blocks.

PTS: 2 REF: 061232ia STA: A.S.22 TOP: Theoretical Probability

171 ANS: 4
\[ P(\text{odd}) = \frac{7 + 14 + 20}{75} = \frac{41}{75}, \quad P(\text{even}) = \frac{22 + 6 + 6}{75} = \frac{34}{75}, \quad P(\text{3 or less}) = \frac{14 + 22 + 7}{75} = \frac{43}{75}. \]
\[ P(2 \text{ or 4}) = \frac{22 + 6}{75} = \frac{28}{75} \]

PTS: 2 REF: 011325ia STA: A.S.22 TOP: Theoretical Probability

172 ANS: 4 PTS: 2 REF: 081303ia STA: A.S.22
TOP: Theoretical Probability

173 ANS: 3 PTS: 2 REF: fall0702ia STA: A.S.23
TOP: Theoretical Probability KEY: mutually exclusive events

174 ANS: 2
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

175 ANS: 3
\[ P(S) \cdot P(M) = P(S \text{ and } M) \]
\[ \frac{3}{5} \cdot P(M) = \frac{3}{10} \]
\[ P(M) = \frac{1}{2} \]

PTS: 2 REF: 081024ia STA: A.S.23 TOP: Theoretical Probability KEY: independent events

176 ANS:
\[ \frac{4}{12} \times \frac{2}{11} \times \frac{1}{10} = \frac{8}{1320}, \quad \frac{6}{12} \times \frac{5}{11} \times \frac{4}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10} = \frac{120}{1320} + \frac{24}{1320} = \frac{144}{1320} \]

PTS: 4 REF: 081137ia STA: A.S.23 TOP: Theoretical Probability KEY: dependent events
177 ANS: 2 PTS: 2 REF: 011212ia STA: A.S.23
TOP: Theoretical Probability KEY: independent events

178 ANS: 4 PTS: 2 REF: 081229ia STA: A.S.23
TOP: Theoretical Probability KEY: independent events

179 ANS:
\[
\frac{5}{8} \times \frac{3}{7} = \frac{15}{56}, \quad \frac{5}{8} \times \frac{4}{7} = \frac{20}{56}, \quad \frac{20}{56} + \frac{3}{8} \times \frac{2}{7} = \frac{26}{56}
\]

PTS: 4 REF: 061338ia STA: A.S.23 TOP: Theoretical Probability KEY: dependent events

180 ANS:
\[
\frac{12}{20} \times \frac{8}{19} + \frac{8}{20} \times \frac{12}{19} = \frac{192}{380} \quad 1 - P(BB) = 1 - \left( \frac{8}{20} \times \frac{7}{19} \right) = \frac{380}{380} - \frac{56}{380} = \frac{324}{380}
\]

PTS: 4 REF: 081339ia STA: A.S.23 TOP: Theoretical Probability KEY: dependent events

181 ANS: 3 PTS: 2 REF: 080907ia STA: A.S.20
TOP: Geometric Probability

182 ANS:
\[
\frac{1375}{1600} \cdot \frac{40^2 - 15^2}{40^2} = \frac{1375}{1600}
\]

PTS: 2 REF: 011132ia STA: A.S.20 TOP: Geometric Probability

183 ANS: 3 PTS: 2 REF: 061218ia STA: A.S.20
TOP: Geometric Probability

184 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

185 ANS: 3
\[
P(\text{odd}) = \frac{3}{6}, \quad P(\text{prime}) = \frac{3}{6}, \quad P(\text{perfect square}) = \frac{2}{6}, \quad P(\text{even}) = \frac{3}{6}
\]

PTS: 2 REF: 061104ia STA: A.S.22 TOP: Geometric Probability

186 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

187 ANS: 1
\[
\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}
\]

PTS: 2 REF: 010928ia STA: A.S.23 TOP: Geometric Probability
After the English and social studies books are taken, 8 books are left and 1 is an English book.

\[ \frac{20 - 6}{(20 - 6) + 15 + 7 + 8} = \frac{14}{44} \]

\[ (3 - 1) \times 2 \times 3 = 12 \]

\[ 5 \times 2 \times 3 = 30 \]

\[ 5 \times 3 \times 5 \times 3 = 225. \ 1 \times 3 \times 5 \times 3 = 45. \ 1 \times 2 \times 5 \times 3 = 30 \]

\[ \frac{15,600,000, 4,368,000. \ 10 \times 10 \times 10 \times 26 \times 25 \times 24 = 15,600,000. \ 10 \times 9 \times 8 \times 26 \times 25 \times 24 = 11,232,000. \ 15,600,000 - 11,232,000 = 4,368,000.}{5 \times 3 \times 5 \times 3 = 225. \ 1 \times 3 \times 5 \times 3 = 45. \ 1 \times 2 \times 5 \times 3 = 30} \]

\[ 4 \times 3 \times 2 \times 1 = 24 \]

\[ 60. \ 5 \times 3 \times 5 \times 3 = 60 \]

\[ 4 \times 3 \times 2 \times 1 = 24 \]

\[ 5 \times 3 \times 5 \times 3 = 225. \ 1 \times 3 \times 5 \times 3 = 45. \ 1 \times 2 \times 5 \times 3 = 30 \]

\[ 4 \times 3 \times 2 \times 1 = 24 \]

\[ 5 \times 3 \times 5 \times 3 = 225. \ 1 \times 3 \times 5 \times 3 = 45. \ 1 \times 2 \times 5 \times 3 = 30 \]

\[ 4 \times 3 \times 2 \times 1 = 24 \]

\[ 5 \times 3 \times 5 \times 3 = 225. \ 1 \times 3 \times 5 \times 3 = 45. \ 1 \times 2 \times 5 \times 3 = 30 \]

\[ 4 \times 3 \times 2 \times 1 = 24 \]
$P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120$

PTS: 2  REF: 061109ia  STA: A.N.8  TOP: Permutations

201  ANS:

$26 \times 25 \times 24 \times 23 = 358,800. \ 10^6 = 1,000,000. \ Use \ the \ numeric \ password \ since \ there \ are \ over \ 500,000 \ employees$

PTS: 4  REF: 061239ia  STA: A.N.8  TOP: Permutations

202  ANS: 3

$P_3 = 4896$

PTS: 2  REF: 061328ia  STA: A.N.8  TOP: Permutations

203  ANS: 4

$25(x - 3) = 25x - 75$

PTS: 2  REF: 060823ia  STA: A.A.1  TOP: Expressions

204  ANS: 4

$A = lw = (3w - 7)(w) = 3w^2 - 7w$

PTS: 2  REF: 010924ia  STA: A.A.1  TOP: Expressions

205  ANS: 2

PTS: 2  REF: 060904ia  STA: A.A.1  TOP: Expressions

206  ANS: 4

$5(x + 4) = 5x + 20$

PTS: 2  REF: 081013ia  STA: A.A.1  TOP: Expressions

207  ANS: 3

PTS: 2  REF: 011104ia  STA: A.A.1  TOP: Expressions

208  ANS: 1

PTS: 2  REF: 081110ia  STA: A.A.1  TOP: Expressions

209  ANS: 3

PTS: 2  REF: 011205ia  STA: A.A.1  TOP: Expressions

210  ANS: 1

PTS: 2  REF: 061204ia  STA: A.A.1  TOP: Expressions

211  ANS: 2

PTS: 2  REF: 081215ia  STA: A.A.1  TOP: Expressions

212  ANS: 1

PTS: 2  REF: 011303ia  STA: A.A.1  TOP: Expressions

213  ANS: 1

PTS: 2  REF: 061301ia  STA: A.A.1  TOP: Expressions

214  ANS: 3

PTS: 2  REF: 061323ia  STA: A.A.1  TOP: Expressions

215  ANS: 2

PTS: 2  REF: 081305ia  STA: A.A.1  TOP: Expressions
216 ANS: 4
\[ x + x + 2 + x + 4 = 3x + 6 \]

PTS: 2 REF: 011430ia STA: A.A.1 TOP: Expressions

217 ANS: 4
TOP: Expressions

218 ANS: 4
PTS: 2 REF: fall0729ia STA: A.A.2
TOP: Expressions

219 ANS: 3
PTS: 2 REF: 061119ia STA: A.A.2
TOP: Expressions

220 ANS: 1
PTS: 2 REF: 011311ia STA: A.A.2
TOP: Expressions

221 ANS:
Not all of the homework problems are equations. The first problem is an expression.

PTS: 2 REF: 080931ia STA: A.A.3 TOP: Expressions

222 ANS: 2
PTS: 2 REF: 011027ia STA: A.A.3
TOP: Expressions

223 ANS: 1
PTS: 2 REF: 081030ia STA: A.A.3
TOP: Expressions

224 ANS: 2
PTS: 2 REF: 061121ia STA: A.A.3
TOP: Expressions

225 ANS: 2
PTS: 2 REF: 011227ia STA: A.A.3
TOP: Expressions

226 ANS: 4
PTS: 2 REF: 011401ia STA: A.A.3
TOP: Expressions

227 ANS:

4. \[ 3 + 2g = 5g - 9 \]

\[ 12 = 3g \]

\[ g = 4 \]

PTS: 2 REF: fall0732ia STA: A.A.22 TOP: Solving Equations
228 ANS: 4

\[ 5p - 1 = 2p + 20 \]

\[ 3p = 21 \]

\[ p = 7 \]

PTS: 2 

REF: 080801ia 

STA: A.A.22 

TOP: Solving Equations

229 ANS: 2

Debbie failed to distribute the 3 properly.

PTS: 2 

REF: 011009ia 

STA: A.A.22 

TOP: Solving Equations

230 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

231 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

232 ANS: 4

\[ 5 - 2x = -4x - 7 \]

\[ 2x = -12 \]

\[ x = -6 \]

PTS: 2 

REF: 011305ia 

STA: A.A.22 

TOP: Solving Equations
233 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

234 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

235 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
236 ANS: 3
\[
\frac{x}{3} + \frac{x + 1}{2} = x
\]
\[
\frac{2x + 3(x + 1)}{6} = x
\]
\[
5x + 3 = 6x
\]
\[
3 = x
\]

PTS: 2 REF: 061019ia STA: A.A.25
TOP: Solving Equations with Fractional Expressions

237 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

238 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

239 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
240 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

241 ANS: 2 PTS: 2 REF: 080901ia STA: A.A.4 TOP: Modeling Equations

242 ANS: 3 PTS: 2 REF: 011413ia STA: A.A.4 TOP: Modeling Equations

243 ANS: 4
w(w + 5) = 36
w^2 + 5w - 36 = 0

PTS: 2 REF: fall0726ia STA: A.A.5 TOP: Modeling Equations

244 ANS: 2 PTS: 2 REF: 010915ia STA: A.A.5 TOP: Modeling Equations

245 ANS: 4 PTS: 2 REF: 081011ia STA: A.A.5 TOP: Modeling Equations

246 ANS: 3 PTS: 2 REF: 061225ia STA: A.A.5 TOP: Modeling Equations

247 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

248 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

249 ANS: 4
3 + 2 - 1 = 4

PTS: 2 REF: 081320ia STA: A.A.6 TOP: Venn Diagrams
250 ANS: 3

\[3ax + b = c\]

\[3ax = c - b\]

\[x = \frac{c - b}{3a}\]
251 ANS: 2
\[ P = 2l + 2w \]
\[ P - 2l = 2w \]
\[ \frac{P - 2l}{2} = w \]
PTS: 2 REF: 010911ia STA: A.A.23 TOP: Transforming Formulas

252 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

253 ANS: 4 PTS: 2 REF: 011016ia STA: A.A.23 TOP: Transforming Formulas

254 ANS: 2 PTS: 2 REF: 061023ia STA: A.A.23 TOP: Transforming Formulas

255 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

256 ANS:
\[ bc + ac = ab \]
\[ c(b + a) = ab \]
\[ c = \frac{ab}{b + a} \]
PTS: 2 REF: 081131ia STA: A.A.23 TOP: Transforming Formulas
\[
s = \frac{2x + t}{r}
\]

\[
rs = 2x + t
\]

\[
rs - t = 2x
\]

\[
\frac{rs - t}{2} = x
\]

PTS: 2  
REF: 011228ia  
STA: A.A.23  
TOP: Transforming Formulas

258 ANS: 1

\[
k = am + 3mx
\]

\[
k = m(a + 3x)
\]

\[
\frac{k}{a + 3x} = m
\]

PTS: 2  
REF: 061215ia  
STA: A.A.23  
TOP: Transforming Formulas

259 ANS: 3  
PTS: 2  
REF: 081230ia  
STA: A.A.23

TOP: Transforming Formulas

260 ANS: 1

\[
rx - st = r
\]

\[
rx = r + st
\]

\[
x = \frac{r + st}{r}
\]

PTS: 2  
REF: 061316ia  
STA: A.A.23  
TOP: Transforming Formulas

261 ANS: 2

\[
2y + 2w = x
\]

\[
2w = x - 2y
\]

\[
w = \frac{x - 2y}{2}
\]

PTS: 2  
REF: 061330ia  
STA: A.A.23  
TOP: Transforming Formulas

262 ANS: 1

\[
abx - 5 = 0
\]

\[
abx = 5
\]

\[
x = \frac{5}{ab}
\]

PTS: 2  
REF: 011425ia  
STA: A.A.23  
TOP: Transforming Formulas

263 ANS:

Ann’s. \[
\frac{225}{15} = 15 \text{ mpg is greater than } \frac{290}{23.2} = 12.5 \text{ mpg}
\]

PTS: 2  
REF: 060831ia  
STA: A.M.1  
TOP: Using Rate
0.75 hours = 45 minutes. \( \frac{120}{1} = \frac{x}{45} \)

\[ x = 5400 \]

PTS: 2  
REF: 080814ia  
STA: A.M.1  
TOP: Using Rate

\[ \frac{1,200}{25} = \frac{x}{45} \]

\[ 25x = 54,000 \]

\[ x = 2,160 \]

PTS: 2  
REF: 081032ia  
STA: A.M.1  
TOP: Using Rate

\[ \frac{120}{60} = \frac{m}{150} \]

\[ m = 300 \]

PTS: 2  
REF: 081202ia  
STA: A.M.1  
TOP: Using Rate

\[ \frac{20}{3.98} = \frac{180}{x} \]

\[ 20x = 716.4 \]

\[ x = 35.82 \approx 36 \]

PTS: 2  
REF: 011302ia  
STA: A.M.1  
TOP: Using Rate

\[ \frac{50}{1.2} = \frac{60}{1.5} = 50. \quad \frac{60}{40} = 1.5. \] speed \times time = 55 \times 2 = 110. \quad 120 - 110 = 10 \]

PTS: 3  
REF: fall0734ia  
STA: A.M.1  
TOP: Speed

\[ \frac{89}{0.8} = 111.25 \]

PTS: 2  
REF: 080831ia  
STA: A.M.1  
TOP: Speed

\[ \frac{24}{6} = 4 \]

PTS: 2  
REF: 010902ia  
STA: A.M.1  
TOP: Speed
271 ANS: 4
\[
\frac{\frac{5}{45}}{x} = \frac{8}{x}
\]
\[5x = 360\]
\[x = 72\]

PTS: 2  REF: 060901ia  STA: A.M.1  TOP: Speed

272 ANS:
Greg’s rate of 5.5 is faster than Dave’s rate of 5.3. \[
\frac{\text{distance}}{\text{time}} = \frac{\frac{11}{2}}{\frac{16}{3}} = 5.5, \quad \frac{16}{3} = 5.3
\]

PTS: 3  REF: 080936ia  STA: A.M.1  TOP: Speed

273 ANS: 4
\[
s = \frac{d}{t} = \frac{150 \text{ m}}{1.5 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 6,000 \text{ m/hr}
\]

PTS: 2  REF: 061025ia  STA: A.M.1  TOP: Speed

274 ANS: 1
\[
\frac{12.8 + 17.2}{3 + 5} = 3.75
\]

PTS: 2  REF: 061117ia  STA: A.M.1  TOP: Speed

275 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

276 ANS: 1
\[
\frac{\text{distance}}{\text{time}} = \frac{350.7}{4.2} = 83.5
\]

PTS: 2  REF: 061201ia  STA: A.M.1  TOP: Speed

277 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

278 ANS: 2
\[
d = st = 45 \times 3 = 135 \text{ miles}. \quad t = \frac{d}{s} = \frac{135}{55} \approx 2.5 \text{ hours}
\]

PTS: 2  REF: 011419ia  STA: A.M.1  TOP: Speed
279 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

280 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

281 ANS:
16. 12 feet equals 4 yards. \( 4 \times 4 = 16 \).

PTS: 2 REF: 011031ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

282 ANS:
5. 48 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

283 ANS:
\[ 77120 \div 33500 = 110620 \text{ sq. ft.} \times \frac{1 \text{ acre}}{43560 \text{ sq. ft.}} \approx 2.54 \text{ acres} \]

PTS: 2 REF: 081133ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis

284 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

285 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

286 ANS: 3
PTS: 2 REF: 011317ia STA: A.M.2 TOP: Conversions
KEY: dimensional analysis
287 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

288 ANS:

\[ \frac{5.4 \, \text{miles}}{\text{hour}} \times \frac{5280 \, \text{feet}}{\text{mile}} \times \frac{1 \, \text{hour}}{60 \, \text{min}} = 475.2 \, \text{ft/min} \]

PTS: 2 REF: 081331ia STA: A.M.2 TOP: Conversions

KEY: dimensional analysis

289 ANS:

\[ \frac{1}{6}, \, 16.67\%, \, \$13.50. \quad \frac{18 - 15}{18} = \frac{1}{6}. \quad 18 \times 0.75 = 13.5 \]

PTS: 3 REF: 060835ia STA: A.N.5 TOP: Percents

290 ANS:

\[ 30.4\%; \, \text{no,} \, 23.3\%. \quad \frac{7.50 - 5.75}{5.75} = 30.4\%. \quad \frac{7.50 - 5.75}{7.50} = 23.3\% \]

PTS: 3 REF: 080935ia STA: A.N.5 TOP: Percents

291 ANS: 2

Candidate B received 45%. 45% \times 1860 = 837

PTS: 2 REF: 081007ia STA: A.N.5 TOP: Percents

292 ANS:

\[ 259.99 \times 1.07 - 259.99(1 - 0.3) \times 1.07 = 83.46 \]

PTS: 4 REF: 011239ia STA: A.N.5 TOP: Percents

293 ANS:

\[ 800 - (895)(0.75)(1.08) = 75.05 \]

PTS: 3 REF: 081334ia STA: A.N.5 TOP: Percents

294 ANS:

\[ d = 6.25h, \, 250. \quad d = 6.25(40) = 250 \]

PTS: 2 REF: 010933ia STA: A.N.5 TOP: Direct Variation

295 ANS: 4

\[ \frac{150}{20} = \frac{x}{30} \]

\[ 20x = 4500 \]

\[ x = 225 \]

PTS: 2 REF: 081101ia STA: A.N.5 TOP: Direct Variation

296 ANS: 2

PTS: 2 REF: 080823ia STA: A.A.32 TOP: Slope
297 ANS: 1  PTS: 2  REF: 081115ia  STA: A.A.32
TOP: Slope
298 ANS: 2  PTS: 2  REF: 081223ia  STA: A.A.32
TOP: Slope
299 ANS: 3
\[ m = \frac{4 - 10}{3 - (-6)} = -\frac{2}{3} \]
PTS: 2  REF: fall0716ia  STA: A.A.33  TOP: Slope
300 ANS: 3
\[ m = \frac{1 - (-4)}{-6 - 4} = -\frac{1}{2} \]
PTS: 2  REF: 060820ia  STA: A.A.33  TOP: Slope
301 ANS: 2
\[ m = \frac{5 - 3}{2 - 7} = -\frac{2}{5} \]
PTS: 2  REF: 010913ia  STA: A.A.33  TOP: Slope
302 ANS: 1
\[ m = \frac{4 - (-4)}{-5 - 15} = -\frac{2}{5} \]
PTS: 2  REF: 080915ia  STA: A.A.33  TOP: Slope
303 ANS: 4
\[ A(-3, 4) \text{ and } B(5, 8). \ m = \frac{4 - 8}{-3 - 5} = -\frac{4}{-8} = \frac{1}{2} \]
PTS: 2  REF: 011007ia  STA: A.A.33  TOP: Slope
304 ANS: 2
\[ m = \frac{5 - 2}{3 - (-2)} = \frac{3}{5} \]
PTS: 2  REF: 061004ia  STA: A.A.33  TOP: Slope
305 ANS: 2
\[ A(-3, 8) \text{ and } B(3, 6). \ m = \frac{8 - 6}{-3 - 3} = \frac{2}{-6} = -\frac{1}{3} \]
PTS: 2  REF: 081005ia  STA: A.A.33  TOP: Slope
306 ANS: 3
\[ m = \frac{6 - 4}{3 - (-2)} = \frac{2}{5} \]
PTS: 2  REF: 061110ia  STA: A.A.33  TOP: Slope
307 ANS: 4
\[ m = \frac{-3 - 1}{2 - 5} = \frac{-4}{-3} = \frac{4}{3} \]

PTS: 2  REF: 011215ia  STA: A.A.33  TOP: Slope

308 ANS: 2
\[ m = \frac{-7 - 1}{4 - 9} = \frac{-8}{-5} = \frac{8}{5} \]

PTS: 2  REF: 081310ia  STA: A.A.33  TOP: Slope

309 ANS: 2
\[ m = \frac{-A}{B} = \frac{-3}{-7} = \frac{3}{7} \]

PTS: 2  REF: 011122ia  STA: A.A.37  TOP: Slope

310 ANS: 4
\[ m = \frac{-(-3)}{2} = \frac{3}{2} \]

PTS: 2  REF: 061212ia  STA: A.A.37  TOP: Slope

311 ANS: 4
\[ m = \frac{-A}{B} = \frac{-4}{3} \]

PTS: 2  REF: 061319ia  STA: A.A.37  TOP: Slope

312 ANS: 2
\[ y = \frac{1}{2}x - 2 \]

PTS: 2  REF: 011409ia  STA: A.A.37  TOP: Slope

313 ANS: 2
If the car can travel 75 miles on 4 gallons, it can travel 300 miles on 16 gallons. \[ \frac{75}{4} = \frac{x}{16} \]
\[ x = 300 \]

PTS: 2  REF: 080807ia  STA: A.G.4  TOP: Graphing Linear Functions

314 ANS: 1
\[ y = mx + b \]
\[ -6 = (-3)(4) + b \]
\[ b = 6 \]

PTS: 2  REF: 060922ia  STA: A.A.34  TOP: Writing Linear Equations
315 ANS: 4
\[ y = mx + b \]
\[ -1 = (2)(3) + b \]
\[ b = -7 \]

PTS: 2 REF: 080927ia STA: A.A.34 TOP: Writing Linear Equations

316 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

317 ANS: 1
\[ y = mx + b \]
\[ 5 = (-2)(1) + b \]
\[ b = 7 \]

PTS: 2 REF: 081108ia STA: A.A.34 TOP: Writing Linear Equations

318 ANS: 3
\[ y = mx + b \]
\[ y = \frac{3}{4}x - \frac{1}{2} \]
\[ 1 = \left( \frac{3}{4} \right)(2) + b \]
\[ 4y = 3x - 2 \]
\[ 1 = \frac{3}{2} + b \]
\[ b = -\frac{1}{2} \]

PTS: 2 REF: 081219ia STA: A.A.34 TOP: Writing Linear Equations

319 ANS: 1
\[ y = mx + b \]
\[ -8 = (3)(-2) + b \]
\[ b = -2 \]

PTS: 2 REF: 011406ia STA: A.A.34 TOP: Writing Linear Equations

320 ANS: 1
\[ m = \frac{\frac{3}{2} - 0}{0 - 2} = -\frac{3}{2} \] 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
ANS: 3
\[ y = \frac{2}{5}x + 2 \quad m = \frac{4 - 0}{5 - (-5)} = \frac{2}{5} \quad y = mx + b \quad 4 = \frac{2}{5}(5) + b \]
\[ b = 2 \]

PTS: 3  REF: 080836ia  STA: A.A.35  TOP: Writing Linear Equations

ANS: 3  PTS: 2  REF: 010910ia  STA: A.A.35
TOP: Writing Linear Equations

ANS: 3
\[ m = \frac{7 - 3}{-3 - 3} = \frac{4}{-6} = \frac{-2}{3} \quad y = mx + b \]
\[ 3 = \frac{-2}{3}(3) + b \]
\[ 5 = b \]

PTS: 2  REF: 011013ia  STA: A.A.35  TOP: Writing Linear Equations

ANS: 2
\[ m = \frac{5 - 3}{8 - 1} = \frac{2}{7} \quad y - y_1 = m(x - x_1) \]
\[ y - 5 = \frac{2}{7}(x - 8) \]

PTS: 2  REF: 081029ia  STA: A.A.35  TOP: Writing Linear Equations

ANS: 1
\[ 4y - 2x = 0 \]
\[ 4(-1) - 2(-2) = 0 \]
\[ -4 + 4 = 0 \]

PTS: 2  REF: 011021ia  STA: A.A.39  TOP: Identifying Points on a Line

ANS: 3
\[ 2(1) + 3 = 5 \]

PTS: 2  REF: 061007ia  STA: A.A.39  TOP: Linear Equations

ANS: 4
\[ 2x - 3y = 9 \]
\[ 2(0) - 3(-3) = 9 \]
\[ 0 + 9 = 9 \]

PTS: 2  REF: 081016ia  STA: A.A.39  TOP: Identifying Points on a Line
328 ANS: 4
3y + 2x = 8
3(-2) + 2(7) = 8
-6 + 14 = 8

PTS: 2 REF: 011218ia STA: A.A.39 TOP: Identifying Points on a Line

329 ANS: 4
2(2) - (-7) = 11

PTS: 2 REF: 081217ia STA: A.A.39 TOP: Identifying Points on a Line

330 ANS: 3
2(5) + k = 9
10 + k = 9
k = -1

PTS: 2 REF: 061304ia STA: A.A.39 TOP: Identifying Points on a Line

331 ANS: 2
PTS: 2 REF: 080810ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

332 ANS: 1
PTS: 2 REF: 080911ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

333 ANS: 2
PTS: 2 REF: 081014ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

334 ANS: 4
PTS: 2 REF: 061112ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

335 ANS: 3
PTS: 2 REF: 011324ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

336 ANS: 2
PTS: 2 REF: 061327ia STA: A.A.36
TOP: Parallel and Perpendicular Lines

337 ANS: 1
The slope of both is -4.

PTS: 2 REF: 060814ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

338 ANS: 1
The slope of y = 3 - 2x is -2. Using $m = \frac{-A}{B}$, the slope of 4x + 2y = 5 is $\frac{-4}{2} = -2$.

PTS: 2 REF: 010926ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

339 ANS: 1
The slope of 2x - 4y = 16 is $\frac{-A}{B} = \frac{-2}{-4} = \frac{1}{2}$

PTS: 2 REF: 011026ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

340 ANS: 2
y - kx = 7 may be rewritten as y = kx + 7

PTS: 2 REF: 061015ia STA: A.A.38 TOP: Parallel and Perpendicular Lines
Using \( m = -\frac{A}{B} \), the slope of \( 2x - 3y = 9 \) is \( \frac{2}{3} \).

\[
\begin{align*}
341 \quad \text{ANS: } & 1 \\
\text{PTS: } & 2 \\
\text{REF: } & 011322\text{ia} \\
\text{STA: } & A.A.38 \\
\text{TOP: } & \text{Parallel and Perpendicular Lines}
\end{align*}
\]

\[
\begin{align*}
342 \quad \text{ANS: } & 1 \\
m & = -3 \\
\text{PTS: } & 2 \\
\text{REF: } & 081307\text{ia} \\
\text{STA: } & A.A.38 \\
\text{TOP: } & \text{Parallel and Perpendicular Lines}
\end{align*}
\]

\[
\begin{align*}
343 \quad \text{ANS: } & 1 \\
3(2m - 1) & \leq 4m + 7 \\
6m - 3 & \leq 4m + 7 \\
2m & \leq 10 \\
m & \leq 5 \\
\text{PTS: } & 2 \\
\text{REF: } & 081002\text{ia} \\
\text{STA: } & A.A.24 \\
\text{TOP: } & \text{Solving Inequalities}
\end{align*}
\]

\[
\begin{align*}
344 \quad \text{ANS: } & 4 \\
-6x - 17 & \geq 8x + 25 \\
-42 & \geq 14x \\
-3 & \geq x \\
\text{PTS: } & 2 \\
\text{REF: } & 081121\text{ia} \\
\text{STA: } & A.A.24 \\
\text{TOP: } & \text{Solving Inequalities}
\end{align*}
\]

\[
\begin{align*}
345 \quad \text{ANS: } & \frac{-5(x - 7)}{1} < 15 \\
x - 7 & > -3 \\
x & > 4 \\
\text{PTS: } & 2 \\
\text{REF: } & 061331\text{ia} \\
\text{STA: } & A.A.24 \\
\text{TOP: } & \text{Solving Inequalities}
\end{align*}
\]

\[
\begin{align*}
346 \quad \text{ANS: } & 1 \\
\text{PTS: } & 2 \\
\text{REF: } & 011418\text{ia} \\
\text{STA: } & A.A.24 \\
\text{TOP: } & \text{Solving Inequalities}
\end{align*}
\]

12
348 ANS: 1
\[-2x + 5 > 17\]
\[-2x > 12\]
\[x < -6\]

PTS: 2 REF: fall0724ia STA: A.A.21 TOP: Interpreting Solutions

349 ANS: 4
\[-4x + 2 > 10\]
\[-4x > 8\]
\[x < -2\]

PTS: 2 REF: 080805ia STA: A.A.21 TOP: Interpreting Solutions

350 ANS: 1
\[\frac{4}{3}x + 5 < 17\]
\[\frac{4}{3}x < 12\]
\[4x < 36\]
\[x < 9\]

PTS: 2 REF: 060914ia STA: A.A.21 TOP: Interpreting Solutions

351 ANS: 4
\[-2(x - 5) < 4\]
\[-2x + 10 < 4\]
\[-2x < -6\]
\[x > 3\]

PTS: 2 REF: 080913ia STA: A.A.21 TOP: Interpreting Solutions

352 ANS:
\[-12. 3\left(\frac{2}{3}x + 3 < -2x - 7\right)\]
\[x + 9 < -6x - 21\]
\[7x < -30\]
\[x < \frac{-30}{7}\]

PTS: 3 REF: 061034ia STA: A.A.21 TOP: Interpreting Solutions
\[ -3x + 8 \geq 14 \]
\[ -3x \geq 6 \]
\[ x \leq -2 \]

ANS: 1
PTS: 2
REF: 081309ia
STA: A.A.21
TOP: Interpreting Solutions

\[ 7 \cdot 15x + 22 \geq 120 \]
\[ x \geq 6.53 \]

ANS: 7
PTS: 3
REF: fall0735ia
STA: A.A.6
TOP: Modeling Inequalities

\[ 10 + 2d \geq 75, \quad 33 \cdot 10 + 2d \geq 75 \]
\[ d \geq 32.5 \]

ANS: 3
PTS: 3
REF: 060834ia
STA: A.A.6
TOP: Modeling Inequalities

\[ 0.07m + 19 \leq 29.50 \]
\[ 0.07m \leq 10.50 \]
\[ m \leq 150 \]

ANS: 1
PTS: 2
REF: 010904ia
STA: A.A.6
TOP: Modeling Inequalities
367 ANS: 1
13.95 + 0.49s ≤ 50.00
  0.49s ≤ 36.05
   s ≤ 73.57

PTS: 2  REF: 080904ia  STA: A.A.6  TOP: Modeling Inequalities

368 ANS:
0.65x + 35 ≤ 45
  0.65x ≤ 10
   x ≤ 15

PTS: 3  REF: 061135ia  STA: A.A.6  TOP: Modeling Inequalities

369 ANS: 3
5x < 55
  x < 11

PTS: 2  REF: 061211ia  STA: A.A.6  TOP: Modeling Inequalities

370 ANS: 4
375 + 155w ≥ 900
  155w ≥ 525
   w ≥ 3.4

PTS: 2  REF: 081206ia  STA: A.A.6  TOP: Modeling Inequalities

371 ANS: 2
The slope of the inequality is $-\frac{1}{2}$.

PTS: 2  REF: fall0720ia  STA: A.G.6  TOP: Linear Inequalities

372 ANS: 1  PTS: 2  REF: 060920ia  STA: A.G.6  TOP: Linear Inequalities
(1, -3) is in the solution set. $4(1) - 3(-3) > 9$

$4 + 9 > 9$

374 ANS: 4
PTS: 4
REF: 011038ia
STA: A.G.6
TOP: Linear Inequalities

375 ANS: 1
PTS: 2
REF: 011210ia
STA: A.G.6
TOP: Linear Inequalities

376 ANS: 4
PTS: 2
REF: 061320ia
STA: A.G.6
TOP: Linear Inequalities

377 ANS: 2
PTS: 2
REF: 081314ia
STA: A.G.6
TOP: Linear Inequalities

378 ANS: 3
$y > 2x - 3$

379 ANS: 3
PTS: 2
REF: 011117ia
STA: A.G.4
TOP: Graphing Absolute Value Functions

380 ANS:

381 ANS: 4
The transformation is a reflection in the x-axis.

PTS: 2
REF: fall0722ia
STA: A.G.5
TOP: Graphing Absolute Value Functions
382 ANS: 3 PTS: 2 REF: 011017ia STA: A.G.5
TOP: Graphing Absolute Value Functions

383 ANS:

Graph becomes wider as the coefficient approaches 0.

384 ANS:

The graph becomes steeper.

385 ANS: 4

The transformation is a reflection in the \( x \)-axis.
Graph becomes narrower as the coefficient increases.

\[2x^2 + 10x - 12 = 2(x^2 + 5x - 6) = 2(x + 6)(x - 1)\]

\[3x^3 - 33x^2 + 90x = 3x(x^2 - 11x + 30) = 3x(x - 5)(x - 6)\]

\[5x^3 - 20x^2 - 60x\]
\[5x(x^2 - 4x - 12)\]
\[5x(x + 2)(x - 6)\]
400 ANS: 2
\[ a^3 - 4a = a(a^2 - 4) = a(a - 2)(a + 2) \]

401 ANS: 3
\[ 36x^2 - 100y^6 = 4(9x^2 - 25y^6) = 4(3x + 5y^3)(3x - 5y^3) \]

403 ANS: 2
\[ x^2 - 6x = 0 \]
\[ x(x - 6) = 0 \]
\[ x = 0, x = 6 \]

407 ANS: 2
\[ x^2 - 16x + 28 = 0 \]
\[ (x - 14)(x - 2) = 0 \]
\[ x = 14, 2 \]

408 ANS: 3
\[ x^2 - 10x + 21 = 0 \]
\[ (x - 7)(x - 3) = 0 \]
\[ x = 7, x = 3 \]
409  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

410  ANS:
\[ -2, 3. \quad x^2 - x = 6 \]
\[ x^2 - x - 6 = 0 \]
\[ (x - 3)(x + 2) = 0 \]
\[ x = 3 \text{ or } -2 \]

PTS: 3  REF: 011034ia  STA: A.A.28  TOP: Roots of Quadratics

411  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

412  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

413  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

414  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
415 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

416 ANS: 2 PTS: 2 REF: 061326ia STA: A.A.28
TOP: Roots of Quadratics

417 ANS: 4
\[ 2x^2 - 8x = 0 \]
\[ 2x(x - 4) = 0 \]
\[ x = 0, 4 \]

PTS: 2 REF: 011427ia STA: A.A.28 TOP: Roots of Quadratics

418 ANS: 4 PTS: 2 REF: 060829ia STA: A.G.5
TOP: Graphing Quadratic Functions

419 ANS: 1 PTS: 2 REF: 081015ia STA: A.G.5
TOP: Graphing Quadratic Functions

420 ANS: 2 PTS: 2 REF: 061131ia STA: A.G.5
TOP: Graphing Quadratic Functions

421 ANS: 2 PTS: 2 REF: 081218ia STA: A.G.5
TOP: Graphing Quadratic Functions

422 ANS: 2 PTS: 2 REF: 011330ia STA: A.G.5
TOP: Graphing Quadratic Functions

423 ANS: 4 PTS: 2 REF: 081322ia STA: A.G.5
TOP: Graphing Quadratic Functions

424 ANS:

PTS: 3 REF: 060836ia STA: A.G.8 TOP: Solving Quadratics by Graphing

425 ANS: 3 PTS: 2 REF: 060924ia STA: A.G.8
TOP: Solving Quadratics by Graphing

426 ANS: 2 PTS: 2 REF: 080916ia STA: A.G.8
TOP: Solving Quadratics by Graphing

427 ANS: 4 PTS: 2 REF: 011111ia STA: A.G.8
TOP: Solving Quadratics by Graphing
428 ANS: 

![Graph](image)

PTS: 3 REF: 061234ia STA: A.G.8 TOP: Solving Quadratics by Graphing

429 ANS: 3 PTS: 2 REF: 061306ia STA: A.G.8 TOP: Solving Quadratics by Graphing

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

431 ANS: 1

\[x^2 - 36 = 5x\]
\[x^2 - 5x - 36 = 0\]
\[(x - 9)(x + 4) = 0\]
\[x = 9\]

PTS: 2 REF: 061020ia STA: A.A.8 TOP: Writing Quadratics

432 ANS: 3

\[b = 3 + d\]
\[b(3 + d) = 40\]
\[bd = 40\]
\[d^2 + 3d - 40 = 0\]
\[(d + 8)(d - 5) = 0\]
\[d = 5\]

PTS: 2 REF: 011208ia STA: A.A.8 TOP: Writing Quadratics
433 ANS: 3
\[N = 5 + J\]
\[N(N - 5) = 84\]
\[J = N - 5\]
\[J^2 - 5N - 84 = 0\]
\[NJ = 84\]
\[(N - 12)(N + 7) = 0\]
\[N = 12\]

PTS: 2 | REF: 081304ia | STA: A.A.8 | TOP: Writing Quadratics

434 ANS:
\[w(w + 15) = 54, 3, 18.\]
\[w(w + 15) = 54\]
\[w^2 + 15w - 54 = 0\]
\[(w + 18)(w - 3) = 0\]
\[w = 3\]

PTS: 4 | REF: 060837ia | STA: A.A.8 | TOP: Geometric Applications of Quadratics

435 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

436 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

437 ANS: 1 | PTS: 2 | REF: 060811ia | STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

438 ANS: 1 | PTS: 2 | REF: 080813ia | STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

439 ANS: 2 | PTS: 2 | REF: 010916ia | STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

440 ANS: 2 | PTS: 2 | REF: 011015ia | STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

441 ANS: 1 | PTS: 2 | REF: 061005ia | STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph
\[ x = \frac{-b}{2a} = \frac{16}{2(1)} = 8. \quad y = (8)^2 - 16(8) + 63 = -1 \]

\[ x = \frac{-b}{2a} = \frac{-10}{2(-1)} = 5. \]

\[ x = \frac{-b}{2a} = \frac{-6}{2(-1)} = 3. \]

\[ x = \frac{-b}{2a} = \frac{3}{4}. \]

\[ x = \frac{-b}{2a} = \frac{-24}{2(-2)} = 6. \quad y = -2(6)^2 + 24(6) - 100 = -28 \]
451 ANS: 3

\[ x = \frac{-b}{2a} = \frac{-8}{2(1)} = -4.\ y = (-4)^2 + 8(-4) + 10 = -6.\ (-4, -6) \]

PTS: 2  REF: 011314ia  STA: A.A.41  TOP: Identifying the Vertex of a Quadratic Given Equation

452 ANS: 1

\[ x = \frac{-b}{2a} = \frac{-6}{2(3)} = -1.\ y = 3(-1)^2 + 6(-1) + 1 = -2 \]

PTS: 2  REF: 011416ia  STA: A.A.41  TOP: Identifying the Vertex of a Quadratic Given Equation

453 ANS: 3

\[ 5x + 2y = 48 \]
\[ 3x + 2y = 32 \]
\[ 2x = 16 \]
\[ x = 8 \]

PTS: 2  REF: fall0708ia  STA: A.A.10  TOP: Solving Linear Systems

454 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

455 ANS: 2

\[ x + 2y = 9 \]
\[ x - y = 3 \]
\[ 3y = 6 \]
\[ y = 2 \]

PTS: 2  REF: 060925ia  STA: A.A.10  TOP: Solving Linear Systems

456 ANS: 1

\[ x - 2y = 1 \]
\[ x + 4y = 7 \]
\[ -6y = -6 \]
\[ y = 1 \]

PTS: 2  REF: 080920ia  STA: A.A.10  TOP: Solving Linear Systems
457 ANS: 3
\[\begin{align*}
c + 3d &= 8 & c &= 4d - 6 \\
4d - 6 + 3d &= 8 & c &= 4(2) - 6 \\
7d &= 14 & c &= 2 \\
d &= 2
\end{align*}\]

PTS: 2 REF: 061012ia STA: A.A.10 TOP: Solving Linear Systems

458 ANS: 2
\[\begin{align*}
2(x - 3y &= -3) \\
2x + y &= 8 \\
2x - 6y &= -6 \\
7y &= 14 \\
y &= 2
\end{align*}\]

PTS: 2 REF: 081021ia STA: A.A.10 TOP: Solving Linear Systems

459 ANS: 3
\[\begin{align*}
2x - 5y &= 11 & 2x - 5(-1) &= 11 \\
-2x + 3y &= -9 & 2x &= 6 \\
-2y &= 2 & x &= 3 \\
y &= -1
\end{align*}\]

PTS: 2 REF: 081109ia STA: A.A.10 TOP: Solving Linear Systems

460 ANS:
2. Subtracting the equations: \(3y = 6\)
\[y = 2\]

PTS: 2 REF: 061231ia STA: A.A.10 TOP: Solving Linear Systems

461 ANS: 1

PTS: 2 REF: 081315ia STA: A.A.10 TOP: Solving Linear Systems

462 ANS: 2
\[\begin{align*}
2x + 3y &= 7 \\
3x + 3y &= 9 \\
x &= 2
\end{align*}\]

PTS: 2 REF: 011410ia STA: A.A.10 TOP: Solving Linear Systems
463 ANS:

PTS: 4        REF: 080938ia       STA: A.G.7       TOP: Solving Linear Systems

464 ANS:

PTS: 3        REF: 011235ia       STA: A.G.7       TOP: Solving Linear Systems

465 ANS: 3        PTS: 2        REF: 081201ia       STA: A.G.7       TOP: Solving Linear Systems

466 ANS: 3        PTS: 2        REF: 011304ia       STA: A.G.7       TOP: Solving Linear Systems

467 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

468 ANS: 3
b = 42 − r    r = 2b + 3
r = 2b + 3    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
469 ANS: 2
  \[ s + o = 126, \ s + 2s = 126 \]
  \[ o = 2s \quad s = 42 \]

PTS: 2        REF: 080811ia    STA: A.A.7    TOP: Writing Linear Systems

470 ANS:
  \[ m = 50\epsilon, \ p = 15\epsilon. \ 3m + 2p = 1.80. \ 9m + 6p = 5.40. \ 4(0.50) + 6p = 2.90 \]
  \[ 4m + 6p = 2.90 \quad 4m + 6p = 2.90 \quad 6p = .90 \]
  \[ 5m = 2.50 \quad p = \$0.15 \]
  \[ m = \$0.50 \]

PTS: 4        REF: 080837ia    STA: A.A.7    TOP: Writing Linear Systems

471 ANS: 2
  \[ L + S = 47 \]
  \[ L - S = 15 \]
  \[ 2L = 62 \]
  \[ L = 31 \]

PTS: 2        REF: 060912ia    STA: A.A.7    TOP: Writing Linear Systems

472 ANS: 1
  \[ so = f + 60 \quad j = 2f - 50 \quad se = 3f. \ f + (f + 60) + (2f - 50) + 3f = 1424 \]
  \[ 7f + 10 = 1424 \]
  \[ f = 202 \]

PTS: 2        REF: 060917ia    STA: A.A.7    TOP: Writing Linear Systems

473 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

474 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
f + m = 53
f - m = 25
2m = 28
m = 14

PTS: 2  REF: 061126ia  STA: A.A.7  TOP: Writing Linear Systems

b = 2j + 4  2j + 4 = 31 - j
b + j = 31  3j = 27
b = 31 - j  j = 9

PTS: 2  REF: 081119ia  STA: A.A.7  TOP: Writing Linear Systems

W + L = 72
W - L = 12
2W = 84
W = 42

PTS: 2  REF: 081227ia  STA: A.A.7  TOP: Writing Linear Systems

3n + 4p = 8.50  3(2.50) + 4p = 8.50
5n + 8p = 14.50  4p = 1
6n + 8p = 17  p = 0.25
n = 2.50

PTS: 3  REF: 011335ia  STA: A.A.7  TOP: Writing Linear Systems

L - S = 28  2S - 8 = S + 28
L = 2S - 8  S = 36
L = S + 28  L = 36 + 28 = 64

PTS: 3  REF: 081335ia  STA: A.A.7  TOP: Writing Linear Systems

L - S = 28  2S - 8 = S + 28
L = 2S - 8  S = 36
L = S + 28  L = 36 + 28 = 64

PTS: 3  REF: 081335ia  STA: A.A.7  TOP: Writing Linear Systems

TOP: Systems of Linear Inequalities
484 ANS: 4 PTS: 2 REF: 061222ia STA: A.A.40
TOP: Systems of Linear Inequalities

485 ANS: 2
\[-1 \leq 3(2) + 1, \ 2 - (-1) > 1\]
\[-1 \leq 7, \ 3 > 1\]

PTS: 2 REF: 011323ia STA: A.A.40 TOP: Systems of Linear Inequalities

486 ANS:

PTS: 4 REF: 010938ia STA: A.G.7 TOP: Systems of Linear Inequalities

487 ANS:

PTS: 4 REF: 081037ia STA: A.G.7 TOP: Systems of Linear Inequalities
488 ANS:

PTS: 4        REF: 011139ia        STA: A.G.7        TOP: Systems of Linear Inequalities

489 ANS:

PTS: 4        REF: 061139ia        STA: A.G.7        TOP: Systems of Linear Inequalities

490 ANS:

PTS: 4        REF: 081239ia        STA: A.G.7        TOP: Systems of Linear Inequalities
491 ANS: 4

\[ x^2 - 2 = x \quad \text{Since } y = x, \text{ the solutions are } (2, 2) \text{ and } (-1, -1). \]

\[ x^2 - x - 2 = 0 \]
\[ (x - 2)(x + 1) = 0 \]
\[ x = 2 \text{ or } -1 \]

PTS: 2 REF: 060810ia STA: A.A.11 TOP: Quadratic-Linear Systems

492 ANS: 2

\[ x^2 + 5x + 6 = -x + 1 \quad y = -x + 1 \]

\[ x^2 + 6x + 5 = 0 \quad = (-5) + 1 \]
\[ (x + 5)(x + 1) = 0 \quad = 6 \]
\[ x = -5 \text{ or } -1 \]

PTS: 2 REF: 080812ia STA: A.A.11 TOP: Quadratic-Linear Systems

493 ANS: 2

\[ x^2 - x - 20 = 3x - 15 \quad y = 3x - 15 \]

\[ x^2 - 4x - 6 = 0 \quad = 3(-1) - 15 \]
\[ (x = 5)(x + 1) = 0 \quad = -18 \]
\[ x = 5 \text{ or } -1 \]

PTS: 2 REF: 010922ia STA: A.A.11 TOP: Quadratic-Linear Systems

494 ANS: 2

\[ x^2 - x = x + 3 \quad \text{Since } y = x + 3, \text{ the solutions are } (3, 6) \text{ and } (-1, 2). \]

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

PTS: 2 REF: 061118ia STA: A.A.11 TOP: Quadratic-Linear Systems
\[ y = -x + 5. \quad -x + 5 = x^2 - 25 \quad \therefore \ y = -(6) + 5 = 11. \]
\[ 0 = x^2 + x - 30 \quad \therefore \ y = -5 + 5 = 0 \]
\[ 0 = (x + 6)(x - 5) \]
\[ x = -6, 5 \]

\[ \text{PTS: 2} \quad \text{REF: 061213ia} \quad \text{STA: A.A.11} \quad \text{TOP: Quadratic-Linear Systems} \]

\[ y = -x + 5. \quad -x + 5 = x^2 - 25 \quad \therefore \ y = -(6) + 5 = 11. \]
\[ x^2 + x - 30 \quad \therefore \ y = -5 + 5 = 0 \]
\[ 0 = (x + 6)(x - 5) \]
\[ x = -6, 5 \]

\[ \text{PTS: 2} \quad \text{REF: 061213ia} \quad \text{STA: A.A.11} \quad \text{TOP: Quadratic-Linear Systems} \]
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic
Answer Section

497 ANS:

PTS: 4  REF: fall0738ia  STA: A.G.9  TOP: Quadratic-Linear Systems

498 ANS:

PTS: 4  REF: 080839ia  STA: A.G.9  TOP: Quadratic-Linear Systems

499 ANS:

PTS: 4  REF: 060939ia  STA: A.G.9  TOP: Quadratic-Linear Systems

500 ANS: 2  PTS: 2  REF: 011012ia  STA: A.G.9  TOP: Quadratic-Linear Systems
2. ANS: 

\[ 2y - 2x = 10 \]
\[ 2y = 2x + 10 \]
\[ y = x + 5 \]

5. ANS: 

\[ y = x + 5 \]

7. ANS: 

\[ y = x + 5 \]

9. ANS: 

\[ y = x + 5 \]
507 ANS: 1

\[ x^2 - 5x + 3 = x - 6 \quad y = 3 - 6 = -3 \quad (3, -3) \]

\[ x^2 - 6x + 9 = 0 \]

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

\[ x = 3 \]

508 ANS:

\[ -3x(x - 4) - 2x(x + 3) = -3x^2 + 12x - 2x^2 - 6x = -5x^2 + 6x \]

509 ANS:

\[ -3x(x - 4) - 2x(x + 3) = -3x^2 + 12x - 2x^2 - 6x = -5x^2 + 6x \]

510 ANS: 4

\[ -3x(x - 4) - 2x(x + 3) = -3x^2 + 12x - 2x^2 - 6x = -5x^2 + 6x \]

511 ANS: 3

\[ 3 + x \]

TOP: Addition and Subtraction of Polynomials

KEY: subtraction
512 ANS: 2  PTS: 2  REF: 060923ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
513 ANS: 3  PTS: 2  REF: 061003ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: addition
514 ANS: 1  PTS: 2  REF: 011126ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
515 ANS: 4  PTS: 2  REF: 061130ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
516 ANS: 1  PTS: 2  REF: 011213ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: addition
517 ANS: 4  PTS: 2  REF: 061226ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
518 ANS: 2  PTS: 2  REF: 081205ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
519 ANS: 1  PTS: 2  REF: 061322ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
520 ANS: 1  PTS: 2  REF: 081302ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: addition
521 ANS: 4  PTS: 2  REF: 011429ia  STA: A.A.13
TOP: Addition and Subtraction of Polynomials  KEY: subtraction
522 ANS: 1  PTS: 2  REF: 060807ia  STA: A.A.13
TOP: Multiplication of Polynomials
523 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
524 ANS: 3

\[
\frac{12x^3 - 6x^2 + 2x}{2x} = \frac{2x(6x^2 - 3x + 1)}{2x} = 6x^2 - 3x + 1
\]

PTS: 2  REF: 011011ia  STA: A.A.14  TOP: Division of Polynomials
525 ANS:

\[
3a^2b^2 - 6a \cdot \frac{45a^4b^3 - 90a^3b^2}{15a^2b} = \frac{45a^4b^3}{15a^2b} - \frac{90a^3b^2}{15a^2b} = 3a^2b^2 - 6a
\]

PTS: 2  REF: 081031ia  STA: A.A.14  TOP: Division of Polynomials
526 ANS: 4  PTS: 2  REF: 061203ia  STA: A.A.14
TOP: Division of Polynomials
527 ANS: 2  PTS: 2  REF: 011316ia  STA: A.A.14
TOP: Division of Polynomials
528 ANS: 4  PTS: 2  REF: 011412ia  STA: A.A.14
TOP: Division of Polynomials
529 ANS: 4  PTS: 2  REF: 080903ia  STA: A.A.12
TOP: Multiplication of Powers
530 ANS: 4  PTS: 2  REF: 011020ia  STA: A.A.12
TOP: Multiplication of Powers
\[
\frac{(2x^3)(8x^5)}{4x^6} = \frac{16x^8}{4x^6} = 4x^2
\]

PTS: 2   REF: fall0703ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{2^6}{2^1} = 2^5
\]

PTS: 2   REF: 060813ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3k^2m^6}{4}
\]

PTS: 2   REF: 010932ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3^6}{3^1} = 3^5
\]

PTS: 2   REF: 061219ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{(10w^3)^2}{5w} = \frac{100w^6}{5w} = 20w^5
\]

PTS: 2   REF: 011124ia   STA: A.A.12   TOP: Powers of Powers

\[
\frac{(4x^3)^2}{2x} = \frac{16x^6}{2x} = 8x^5
\]

PTS: 2   REF: 011216ia   STA: A.A.12   TOP: Powers of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 061312ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{36}{31} = \frac{35}{31}
\]

PTS: 2   REF: 081311ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{4x^3}{2x} = \frac{16x^6}{2x} = 8x^5
\]

PTS: 2   REF: 080827ia   STA: A.A.12   TOP: Powers of Powers

\[
\frac{4x^3}{2x} = \frac{16x^6}{2x} = 8x^5
\]

PTS: 2   REF: 081318ia   STA: A.A.12   TOP: Powers of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 061103ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 061018ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 060903ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 060903ia   STA: A.A.12   TOP: Division of Powers

\[
\frac{3^4}{3^1} = 3^3
\]

PTS: 2   REF: 060903ia   STA: A.A.12   TOP: Division of Powers
544 ANS: 2  PTS: 2  REF: fall0725ia  STA: A.N.4
top: Operations with Scientific Notation

545 ANS: 4  PTS: 2  REF: 010927ia  STA: A.N.4
TOP: Operations with Scientific Notation

546 ANS: 4  PTS: 2  REF: 060927ia  STA: A.N.4
TOP: Operations with Scientific Notation

547 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

548 ANS: 2  PTS: 2  REF: 061127ia  STA: A.N.4
TOP: Operations with Scientific Notation

549 ANS:
\[
6.56 \times 10^{-2}
\]

PTS: 2  REF: 081231ia  STA: A.N.4  TOP: Operations with Scientific Notation

550 ANS: 3  PTS: 2  REF: 011319ia  STA: A.N.4
TOP: Operations with Scientific Notation

551 ANS: 3
\[
35000(1 - 0.05)^4 \approx 28507.72
\]

PTS: 2  REF: fall0719ia  STA: A.A.9  TOP: Exponential Functions

552 ANS: 2  PTS: 2  REF: 060830ia  STA: A.A.9
TOP: Exponential Functions

553 ANS: 4  PTS: 2  REF: 010908ia  STA: A.A.9
TOP: Exponential Functions

554 ANS:
\[
5583.86. A = P(1 + R)^t = 5000(1 + 0.0375)^3 \approx 5583.86
\]

PTS: 3  REF: 060935ia  STA: A.A.9  TOP: Exponential Functions

555 ANS: 3
\[
500(1 + 0.06)^3 \approx 596
\]

PTS: 2  REF: 080929ia  STA: A.A.9  TOP: Exponential Functions

556 ANS: 2
\[
R = 0.5^{d-1}
\]

PTS: 2  REF: 011006ia  STA: A.A.9  TOP: Exponential Functions

557 ANS: 1
\[
15000(1.2)^{\frac{6}{3}} = 21,600. 21,600 - 15,000 = 6,600
\]

PTS: 2  REF: 061030ia  STA: A.A.9  TOP: Exponential Functions
558 ANS: 
24,435.19. \(30000(0.95)^4 \approx 24435.19\)

PTS: 4 REF: 011138ia STA: A.A.9 TOP: Exponential Functions

559 ANS: 2
\[20000(0.88)^3 = 13629.44\]

PTS: 2 REF: 061124ia STA: A.A.9 TOP: Exponential Functions

560 ANS: 2
\[2000(1 + 0.04)^3 \approx 2249\]

PTS: 2 REF: 081124ia STA: A.A.9 TOP: Exponential Functions

561 ANS: 1 PTS: 2 REF: 011202ia STA: A.A.9 TOP: Exponential Functions

562 ANS: 2 PTS: 2 REF: 061229ia STA: A.A.9 TOP: Exponential Functions

563 ANS: 3 PTS: 2 REF: 081211ia STA: A.A.9 TOP: Exponential Functions

564 ANS: 3 PTS: 2 REF: 011310ia STA: A.A.9 TOP: Exponential Functions

565 ANS:
\[A = P(1 + R)^t = 2000(1 + 0.035)^4 \approx 2295\]

PTS: 2 REF: 081333ia STA: A.A.9 TOP: Exponential Functions

566 ANS:
\[1000(1.03)^5 \approx 1159.27\]

PTS: 3 REF: 011433ia STA: A.A.9 TOP: Exponential Functions

567 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
568 ANS:

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{PTS: 2} & \text{REF: 081233ia} & \text{STA: A.G.4} & \text{TOP: Graphing Exponential Functions} \\
\hline
\text{ANS: 4} & \text{PTS: 2} & \text{REF: 011423ia} & \text{STA: A.G.4} & \\
\text{TOP: Graphing Exponential Functions} \\
\hline
\end{array}
\]

569 ANS: 4

\[30\sqrt{2} \cdot 5\sqrt{72} = 5\sqrt{36 \cdot 2} = 30\sqrt{2}\]

570 ANS: 3

\[\frac{\sqrt{32}}{4} = \frac{\sqrt{16 \cdot 2}}{4} = \sqrt{2}\]

571 ANS: 1

\[\sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2}\]

572 ANS: 2

\[\sqrt{32} = \sqrt{16 \cdot 2} = 4\sqrt{2}\]

573 ANS: 2

\[5\sqrt{20} = 5\sqrt{4 \cdot 5} = 10\sqrt{5}\]

574 ANS: 2

\[-3\sqrt{48} = -3\sqrt{16 \cdot 3} = -12\sqrt{3}\]

575 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]

576 ANS: 3

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577 ANS: 3

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578 ANS: 3

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579 ANS: 3

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580 ANS: 3

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581 ANS: 3

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582 ANS: 3

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583 ANS: 3

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584 ANS: 3

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585 ANS: 3

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587 ANS: 3

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588 ANS: 3

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590 ANS: 3

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591 ANS: 3

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593 ANS: 3

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594 ANS: 3

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595 ANS: 3

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596 ANS: 3

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598 ANS: 3

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599 ANS: 3

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601 ANS: 3

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602 ANS: 3

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603 ANS: 3

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604 ANS: 3

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605 ANS: 3

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606 ANS: 3

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607 ANS: 3

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608 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]

609 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]

610 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]

611 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]

612 ANS: 3

\[3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10}\]
577  ANS: 3  
\[2\sqrt{45} = 2\sqrt{9} \cdot \sqrt{5} = 6\sqrt{5}\]

PTS: 2  REF: 011203ia  STA: A.N.2  TOP: Simplifying Radicals

578  ANS:  
\[4\sqrt{75} = 4\sqrt{25} \cdot \sqrt{3} = 20\sqrt{3}\]

PTS: 2  REF: 011331ia  STA: A.N.2  TOP: Simplifying Radicals

579  ANS:  
\[2\sqrt{108} = 2\sqrt{36} \cdot \sqrt{3} = 12\sqrt{3}\]

PTS: 2  REF: 081332ia  STA: A.N.2  TOP: Simplifying Radicals

580  ANS:  
\[60 - 42\sqrt{5} \cdot 3\sqrt{20} = 6\sqrt{100} - 21\sqrt{20} = 60 - 21\sqrt{4 \cdot \sqrt{5}} = 60 - 42\sqrt{5}\]

PTS: 3  REF: 080834ia  STA: A.N.3  TOP: Operations with Radicals  
KEY: multiplication

581  ANS: 4  
\[6\sqrt{50} + 6\sqrt{2} = 6\sqrt{25} \cdot \sqrt{2} + 6\sqrt{2} = 30\sqrt{2} + 6\sqrt{2} = 36\sqrt{2}\]

PTS: 2  REF: 011024ia  STA: A.N.3  TOP: Operations with Radicals  
KEY: addition

582  ANS: 3  
\[\sqrt{72} - 3\sqrt{2} = \sqrt{36} \cdot \sqrt{2} - 3\sqrt{2} = 6\sqrt{2} - 3\sqrt{2} = 3\sqrt{2}\]

PTS: 2  REF: 061008ia  STA: A.N.3  TOP: Operations with Radicals  
KEY: subtraction

583  ANS: 3  
\[3\sqrt{2} + \sqrt{8} = 3\sqrt{2} + \sqrt{4} \cdot \sqrt{2} = 3\sqrt{2} + 2\sqrt{2} = 5\sqrt{2}\]

PTS: 2  REF: 011121ia  STA: A.N.3  TOP: Operations with Radicals  
KEY: addition

584  ANS:  
\[-2\sqrt{3} \cdot \frac{16\sqrt{21}}{2\sqrt{7}} - 5\sqrt{12} = 8\sqrt{3} - 5\sqrt{4} \cdot \sqrt{3} = 8\sqrt{3} - 10\sqrt{3} = -2\sqrt{3}\]

PTS: 3  REF: 081136ia  STA: A.N.3  TOP: Operations with Radicals

585  ANS:  
\[6\sqrt{3} \cdot \frac{3\sqrt{75} + \sqrt{27}}{3} = \frac{3\sqrt{25} \cdot \sqrt{3} + \sqrt{9} \cdot \sqrt{3}}{3} = \frac{15\sqrt{3} + 3\sqrt{3}}{3} = \frac{18\sqrt{3}}{3} = 6\sqrt{3}\]

PTS: 3  REF: 061236ia  STA: A.N.3  TOP: Operations with Radicals
586 ANS: 
\[5 - 2\sqrt{3} + \sqrt{9} \cdot \sqrt{3} + 2(3) = 5 - 2\sqrt{3} + 3\sqrt{3} + 6 = 11 + \sqrt{3}\]

PTS: 3 REF: 061336ia STA: A.N.3 TOP: Operations with Radicals

587 ANS: 
\[\frac{\sqrt{84}}{2\sqrt{3}} = \frac{\sqrt{4} \cdot \sqrt{21}}{2\sqrt{3}} = \frac{2\sqrt{3}}{2\sqrt{3}} = \sqrt{7}\]

KEY: division

PTS: 2 REF: 011431ia STA: A.N.3 TOP: Operations with Radicals

588 ANS: 
\[\frac{9x^4 - 27x^6}{3x^3} = \frac{9x^4(1 - 3x^2)}{3x^3} = 3x(1 - 3x^2)\]

KEY: a > 0

PTS: 2 REF: fall0718ia STA: A.A.16 TOP: Rational Expressions

589 ANS: 
\[\frac{2x^2 - 12x}{x - 6} = \frac{2(x - 6)}{x - 6} = 2x\]

KEY: a > 0

PTS: 2 REF: 060824ia STA: A.A.16 TOP: Rational Expressions

590 ANS: 
\[\frac{25x - 125}{x^2 - 25} = \frac{25(x - 5)}{(x + 5)(x - 5)} = \frac{25}{x + 5}\]

KEY: a > 0

PTS: 2 REF: 080821ia STA: A.A.16 TOP: Rational Expressions

591 ANS: 
\[\frac{x^2 - 2x - 15}{x^2 + 3x} = \frac{(x - 5)(x + 3)}{x(x + 3)} = \frac{x - 5}{x}\]

KEY: a > 0

PTS: 2 REF: 060921ia STA: A.A.16 TOP: Rational Expressions

592 ANS: 
\[\frac{x^2 - x - 6}{x^2 - 5x + 6} = \frac{(x - 3)(x + 2)}{(x - 3)(x + 2)} = \frac{x + 2}{x - 2}\]

KEY: a > 0

PTS: 2 REF: 011130ia STA: A.A.16 TOP: Rational Expressions
593 ANS: \[
\frac{x^2 - 5x - 24}{x - 8} = \frac{(x - 8)(x + 3)}{x - 8} = x + 3
\]

PTS: 2  
REF: 061131ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

594 ANS: \[
\frac{x - 1}{x + 2} \cdot \frac{x^2 - 1}{x^2 + 3x + 2} = \frac{(x + 1)(x - 1)}{(x + 2)(x + 1)}
\]

PTS: 2  
REF: 011233ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

595 ANS: 2
\[
\frac{x^2 - 3x - 10}{x^2 - 25} = \frac{(x - 5)(x + 2)}{(x + 5)(x - 5)} = \frac{x + 2}{x + 5}
\]

PTS: 2  
REF: 061216ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

596 ANS: 4
\[
\frac{2x^2(x^4 - 9x^2 + 1)}{2x^2}
\]

PTS: 2  
REF: 081222ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

597 ANS: 1
\[
\frac{2x^2 + 10x - 28}{4x + 28} = \frac{2(x^2 + 5x - 14)}{4x + 28} = \frac{2(x + 7)(x - 2)}{4(x + 7)} = \frac{x - 2}{2}
\]

PTS: 2  
REF: 011327ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

598 ANS: 1
\[
\frac{(x + 5)(x + 3)}{x + 5} = x + 3
\]

PTS: 2  
REF: 0613071a  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

599 ANS: 3
\[
\frac{x^2 - 25}{x^2 - x - 20} = \frac{(x + 5)(x - 5)}{(x + 4)(x - 5)} = \frac{x + 5}{x + 4}
\]

PTS: 2  
REF: 011424ia  
STA: A.A.16  
TOP: Rational Expressions

KEY: a > 0

600 ANS: 1

TOP: Undefined Rationals

PTS: 2  
REF: fall0728ia  
STA: A.A.15
601 ANS: 3 PTS: 2 REF: 060817ia STA: A.A.15
TOP: Undefined Rationals

602 ANS: 2 PTS: 2 REF: 010925ia STA: A.A.15
TOP: Undefined Rationals

603 ANS: 4 PTS: 2 REF: 060916ia STA: A.A.15
TOP: Undefined Rationals

604 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

605 ANS: 3
\[ x^2 - 9 = 0 \]
\[(x + 3)(x - 3) = 0 \]
\[ x = \pm 3 \]
PTS: 2 REF: 061014ia STA: A.A.15 TOP: Undefined Rationals

606 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

607 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

608 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

609 ANS: 1 PTS: 2 REF: 061315ia STA: A.A.15 TOP: Undefined Rationals
610 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

611 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

612 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

613 ANS:
\[ \frac{3}{4x - 8} \cdot \frac{3x + 6}{4x + 12} + \frac{x^2 - 4}{x + 3} = \frac{3(x + 2)}{4(x + 3)} \cdot \frac{x + 3}{(x + 2)(x - 2)} = \frac{3}{4(x - 2)} \]

PTS: 3    REF: 010935ia    STA: A.A.18    TOP: Multiplication and Division of Rationals

KEY: division

614 ANS:
\[ \frac{x - 7}{3x} \cdot \frac{2x^2 - 8x - 42}{6x^2} \div \frac{x^2 - 9}{x^2 - 3x} = \frac{2(x^2 - 4x - 21)}{6x^2} \cdot \frac{x(x - 3)}{(x + 3)(x - 3)} = \frac{(x - 7)(x + 3)}{3x} \cdot \frac{1}{x + 3} = \frac{x - 7}{3x} \]

PTS: 4    REF: 080937ia    STA: A.A.18    TOP: Multiplication and Division of Rationals

KEY: division

615 ANS:
\[ \frac{x^2 + 9x + 14}{x^2 - 49} \div \frac{3x + 6}{x^2 + x - 56} = \frac{(x + 7)(x + 2)}{(x + 7)(x - 7)} \cdot \frac{(x + 8)(x - 7)}{3(x + 2)} = \frac{x + 8}{3} \]

PTS: 4    REF: 061037ia    STA: A.A.18    TOP: Multiplication and Division of Rationals

KEY: division

616 ANS: 4
\[ \frac{x}{x + 4} + \frac{2x}{x^2 - 16} = \frac{x}{x + 4} \cdot \frac{x^2 - 16}{2x} = \frac{1}{x + 4} \cdot \frac{(x + 4)(x - 4)}{2} = \frac{x - 4}{2} \]

PTS: 2    REF: 081130ia    STA: A.A.18    TOP: Multiplication and Division of Rationals

KEY: division
617 ANS: \[
\frac{x+2}{2} \times \frac{4(x+5)}{(x+4)(x+2)} = \frac{2(x+5)}{x+4}
\]

PTS: 2 REF: 081232ia STA: A.A.18 TOP: Multiplication and Division of Rationals
KEY: multiplication

618 ANS: \[
\frac{3x(x+3)}{(x+3)(x+2)} \times \frac{(x-3)(x+2)}{(x+3)(x-3)} = \frac{3x}{x+3}
\]

PTS: 4 REF: 081338ia STA: A.A.18 TOP: Multiplication and Division of Rationals
KEY: division

619 ANS: 4

\[
\frac{(d \times 3) + (2 \times 2d)}{2 \times 3} = \frac{3d + 4d}{6} = \frac{7d}{6}
\]

PTS: 2 REF: fall0727ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

620 ANS: 2

\[
\frac{6}{5x} - \frac{2}{3x} = \frac{18x - 10x}{15x^2} = \frac{8x}{15x} = \frac{8}{15x}
\]

PTS: 2 REF: 010921ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

621 ANS: 2

\[
\frac{6}{4a} - \frac{2}{3a} = \frac{18a - 8a}{12a^2} = \frac{10a}{12a^2} = \frac{5}{6a}
\]

PTS: 2 REF: 060929ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

622 ANS: 2

\[
\frac{3}{2x} + \frac{4}{3x} = \frac{9x + 8x}{6x^2} = \frac{17x}{6x^2} = \frac{17}{6x}
\]

PTS: 2 REF: 080917ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

623 ANS: 4

PTS: 2 REF: 011025ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

624 ANS: 1

PTS: 2 REF: 061024ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

625 ANS: 3

\[
\frac{2+x}{5x} - \frac{x-2}{5x} = \frac{2+x-x+2}{5x} = \frac{4}{5x}
\]

PTS: 2 REF: 081027ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

626 ANS: 2

\[
\frac{3}{2x} + \frac{7}{4x} = \frac{12x + 14x}{8x^2} = \frac{26x}{8x^2} = \frac{13}{4x}
\]

PTS: 2 REF: 011120ia STA: A.A.17 TOP: Addition and Subtraction of Rationals
627 ANS: 4
\[
\frac{7}{12x} - \frac{y}{6x^2} = \frac{42x^2 - 12xy}{72x^3} = \frac{6x(7x - 2y)}{72x^3} = \frac{7x - 2y}{12x^2}
\]

PTS: 2
REF: 061129ia
STA: A.A.17
TOP: Addition and Subtraction of Rationals

628 ANS: 2
\[
\frac{2y}{y + 5} + \frac{10}{y + 5} = \frac{2y + 10}{y + 5} = \frac{2(y + 5)}{y + 5} = 2
\]

PTS: 2
REF: 011230ia
STA: A.A.17
TOP: Addition and Subtraction of Rationals

629 ANS: 1

PTS: 2
REF: 061220ia
STA: A.A.17
TOP: Addition and Subtraction of Rationals

630 ANS: 3
\[
\frac{4}{3a} - \frac{5}{2a} = \frac{8}{6a} - \frac{15}{6a} = \frac{-7}{6a}
\]

PTS: 2
REF: 081328ia
STA: A.A.17
TOP: Addition and Subtraction of Rationals

631 ANS: 3
\[
\frac{2n}{5} + \frac{3n}{2} = \frac{4n + 15n}{10} = \frac{19n}{10}
\]

PTS: 2
REF: 011420ia
STA: A.A.17
TOP: Addition and Subtraction of Rationals

632 ANS:

\[
6, -2. \quad \frac{x + 1}{x} = \frac{-7}{x - 12}
\]

\[(x + 1)(x - 12) = -7x\]
\[x^2 - 11x - 12 = -7x\]
\[x^2 - 4x - 12 = 0\]
\[(x - 6)(x + 2) = 0\]
\[x = 6 \text{ or } -2\]

PTS: 4
REF: fall0739ia
STA: A.A.26
TOP: Solving Rationals
\[
\frac{5}{x} = \frac{x + 13}{6}
\]

\[x^2 + 13x = 30\]

\[x^2 + 13x - 30 = 0\]

\[(x + 15)(x - 2) = 0\]

\[x = -15 \text{ or } 2\]

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
636 ANS: 4

\[
\frac{x + 2}{x - 2} = \frac{-3}{x}
\]

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

\[x^2 + 2x = -3x + 6\]

\[x^2 + 5x - 6 = 0\]

\[(x + 6)(x - 1) = 0\]

\[x = -6 \text{ or } 1\]

PTS: 2    REF: 011028ia    STA: A.A.26    TOP: Solving Rationals

637 ANS: 2

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

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

\[6x - 9 = 2x - 8\]

\[4x = 1\]

\[x = \frac{1}{4}\]

PTS: 2    REF: 081012ia    STA: A.A.26    TOP: Solving Rationals

638 ANS:

4, -5

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

\[(x + 2)(x - 1) = 18\]

\[x^2 - x + 2x - 2 = 18\]

\[x^2 + x - 20 = 0\]

\[(x + 5)(x - 4) = 0\]

\[x = -5 \text{ or } 4\]

PTS: 3    REF: 011136ia    STA: A.A.26    TOP: Solving Rationals
639 \ ANS:\ \begin{align*}
-\frac{9}{4} \cdot \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*}

PTS: 4 REF: 061137ia STA: A.A.26 TOP: Solving Rationals

640 \ ANS: \begin{align*}
\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
\end{align*}

PTS: 2 REF: 081226ia STA: A.A.26 TOP: Solving Rationals

641 \ ANS: \begin{align*}
\frac{x + 2}{2} &= \frac{4}{x} \\
x^2 + 2x &= 8 \\
x^2 + 2x - 8 &= 0 \\
(x + 4)(x - 2) &= 0 \\
x &= -4, 2
\end{align*}

PTS: 2 REF: 061317ia STA: A.A.26 TOP: Solving Rationals

642 \ ANS: \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*}

PTS: 4 REF: 061337ia STA: A.A.26 TOP: Solving Rationals
\[
\frac{3}{x + 5} = \frac{2x}{x^2 - 8}
\]

\[
3x^2 - 24 = 2x^2 + 10x
\]

\[
x^2 - 10x + 24 = 0
\]

\[
(x - 12)(x + 2) = 0
\]

\[
x = 12, -2
\]

643 ANS:  
\[
\frac{3}{x + 5} = \frac{2x}{x^2 - 8}
\]

\[
3x^2 - 24 = 2x^2 + 10x
\]

\[
x^2 - 10x + 24 = 0
\]

\[
(x - 12)(x + 2) = 0
\]

\[
x = 12, -2
\]

PTS: 4 REF: 011438ia STA: A.A.26 TOP: Solving Rationals

644 ANS: 4 PTS: 2 REF: fall0717ia STA: A.G.4
TOP: Families of Functions

645 ANS: 1 PTS: 2 REF: 060801ia STA: A.G.4
TOP: Families of Functions

646 ANS: 1 PTS: 2 REF: 010905ia STA: A.G.4
TOP: Families of Functions

647 ANS: 4 PTS: 2 REF: 081025ia STA: A.G.4
TOP: Families of Functions

648 ANS: 4 PTS: 2 REF: 061111ia STA: A.G.4
TOP: Families of Functions

649 ANS: 3 PTS: 2 REF: 081118ia STA: A.G.4
TOP: Families of Functions

650 ANS: 3 PTS: 2 REF: 061318ia STA: A.G.4
TOP: Families of Functions

651 ANS: 3 PTS: 2 REF: 080925ia STA: A.G.4
TOP: Identifying the Equation of a Graph

652 ANS: 4 PTS: 2 REF: 061221ia STA: A.G.4
TOP: Identifying the Equation of a Graph

653 ANS: 4 PTS: 2 REF: fall0730ia STA: A.G.3
TOP: Defining Functions KEY: graphs

654 ANS: 4 PTS: 2 REF: 010930ia STA: A.G.3
TOP: Defining Functions KEY: graphs

655 ANS: 3 PTS: 2 REF: 060919ia STA: A.G.3
TOP: Defining Functions KEY: graphs

656 ANS: 3

An element of the domain, 1, is paired with two different elements of the range, 3 and 7.

PTS: 2 REF: 080919ia STA: A.G.3 TOP: Defining Functions
KEY: ordered pairs

657 ANS: 4

In (4), each element in the domain corresponds to a unique element in the range.

PTS: 2 REF: 011018ia STA: A.G.3 TOP: Defining Functions
KEY: ordered pairs

658 ANS: 4 PTS: 2 REF: 061013ia STA: A.G.3
TOP: Defining Functions KEY: graphs
In (4), each element in the domain corresponds to a unique element in the range.

PTS: 2  REF: 011105ia  STA: A.G.3  TOP: Defining Functions
KEY: ordered pairs

In (2), each element in the domain corresponds to a unique element in the range.

PTS: 2  REF: 061116ia  STA: A.G.3  TOP: Defining Functions
KEY: ordered pairs

An element of the domain, 1, is paired with two different elements of the range, 1 and −1.

PTS: 2  REF: 011405ia  STA: A.G.3  TOP: Defining Functions
KEY: ordered pairs

30² + 40² = c². 30, 40, 50 is a multiple of 3, 4, 5.

\[ 2500 = c^2 \]
\[ 50 = c \]

PTS: 2  REF: fall0711ia  STA: A.A.45  TOP: Pythagorean Theorem

\[ 16^2 + b^2 = 34^2 \]
\[ b^2 = 900 \]
\[ b = 30 \]

PTS: 2  REF: 080809ia  STA: A.A.45  TOP: Pythagorean Theorem

\[ 3^2 + 5^2 = x^2 \]
\[ 34 = x^2 \]
\[ \sqrt{34} = x \]

PTS: 2  REF: 060909ia  STA: A.A.45  TOP: Pythagorean Theorem
670 ANS: 1
\[ 8^2 + 15^2 = c^2 \]
\[ c^2 = 289 \]
\[ c = 17 \]

PTS: 2 REF: 080906ia STA: A.A.45 TOP: Pythagorean Theorem

671 ANS: 2
\[ \sqrt{5^2 + 7^2} \approx 8.6 \]

PTS: 2 REF: 081004ia STA: A.A.45 TOP: Pythagorean Theorem

672 ANS: 2
\[ \sqrt{18.4^2 - 7^2} \approx 17 \]

PTS: 2 REF: 011107ia STA: A.A.45 TOP: Pythagorean Theorem

673 ANS: 3
\[ 10^2 + 10^2 = c^2 \]
\[ c^2 = 200 \]
\[ c \approx 14.1 \]

PTS: 2 REF: 061102ia STA: A.A.45 TOP: Pythagorean Theorem

674 ANS: 1
\[ \sqrt{1700^2 - 1300^2} \approx 1095 \]

PTS: 2 REF: 011221ia STA: A.A.45 TOP: Pythagorean Theorem

675 ANS: 2
\[ 13^2 + 13^2 = x^2 \]
\[ 338 = x^2 \]
\[ \sqrt{338} = x \]
\[ 18 \approx x \]

PTS: 2 REF: 061223ia STA: A.A.45 TOP: Pythagorean Theorem

676 ANS: 3
\[ \sqrt{8^2 - 6^2} = \sqrt{28} = \sqrt{4 \cdot 7} = 2\sqrt{7} \]

PTS: 2 REF: 061329ia STA: A.A.45 TOP: Pythagorean Theorem

677 ANS: 3
\[ \sqrt{13^2 - 7^2} = \sqrt{120} \]

PTS: 2 REF: 081323ia STA: A.A.45 TOP: Pythagorean Theorem
\[ \sqrt{48^2 + 40^2} = \sqrt{2304 + 1600} = \sqrt{3904} \approx 62 \]

PTS: 2  
REF: 011417ia  
STA: A.A.45  
TOP: Pythagorean Theorem

\[
\sin C = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{13}{85}
\]

PTS: 2  
REF: fall0721ia  
STA: A.A.42  
TOP: Trigonometric Ratios

\[
\sin U = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{15}{17}
\]

PTS: 2  
REF: 010919ia  
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

\[
\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{14}{48}
\]

PTS: 2  
REF: 061009ia  
STA: A.A.42  
TOP: Trigonometric Ratios

\[
\tan B = \frac{\text{opposite}}{\text{adjacent}} = \frac{8}{15} = 0.53
\]

PTS: 2  
REF: 081026ia  
STA: A.A.42  
TOP: Trigonometric Ratios

\[
\sin x = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{28}{53}
\]

PTS: 2  
REF: 011109ia  
STA: A.A.42  
TOP: Trigonometric Ratios

\[
\tan ABC = \frac{\text{opposite}}{\text{adjacent}} = \frac{5}{12}
\]

PTS: 2  
REF: 081112ia  
STA: A.A.42  
TOP: Trigonometric Ratios

\[
\tan PLM = \frac{\text{opposite}}{\text{adjacent}} = \frac{4}{3}
\]

PTS: 2  
REF: 011226ia  
STA: A.A.42  
TOP: Trigonometric Ratios
If $\angle C = 90$, then $AB$ is the hypotenuse, and the triangle is a 3-4-5 triangle.

\[
\cos x = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{16}{20}
\]

\[
\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{3}{5}
\]

\[
\cos 30 = \frac{x}{24} \quad x \approx 21
\]

\[
39, 63. \quad \tan 52 = \frac{50}{x}, \quad \sin 52 = \frac{50}{x} \quad x \approx 39, \quad x \approx 63
\]

\[
\tan 32 = \frac{x}{25} \quad x \approx 15.6
\]

\[
84, 71. \quad \sin 50 = \frac{x}{110}, \quad \cos 50 = \frac{y}{110} \quad x \approx 84, \quad y \approx 71
\]

\[
2.1. \quad \cos 65 = \frac{x}{5} \quad x \approx 2.1
\]
\[
\sin 57 = \frac{x}{8}, \quad x \approx 6.7
\]

PTS: 2  
REF: 061108ia  
STA: A.A.44  
TOP: Using Trigonometry to Find a Side

\[
\cos 38 = \frac{10}{x}, \quad x = \frac{10}{\cos 38} \approx 12.69
\]

PTS: 2  
REF: 081126ia  
STA: A.A.44  
TOP: Using Trigonometry to Find a Side

\[
\tan 48 = \frac{9}{x}, \quad \sin 48 = \frac{9}{y}, \quad x \approx 8, \quad y \approx 12
\]

PTS: 4  
REF: 011338ia  
STA: A.A.44  
TOP: Using Trigonometry to Find a Side

\[
\tan 38 = \frac{opp}{80}, \quad opp = 80 \tan 38 \approx 62.5
\]

PTS: 3  
REF: 011436ia  
STA: A.A.44  
TOP: Using Trigonometry to Find a Side

\[
\sin A = \frac{8}{12}, \quad A \approx 42
\]

PTS: 1  
REF: 060816ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

\[
\sin A = \frac{10}{16}, \quad B = 180 - (90 - 38.7) = 51.3. \quad \text{A 90º angle is not acute.}
\]

\[
A \approx 38.7
\]

PTS: 2  
REF: 080829ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle

\[
\sin A = \frac{16}{20}, \quad A \approx 53
\]

PTS: 2  
REF: 011032ia  
STA: A.A.43  
TOP: Using Trigonometry to Find an Angle
\[
\sin x = \frac{30}{50}
\]
\[
x = \sin^{-1} \frac{3}{5}
\]
\[
x \approx 37
\]

PTS: 2  REF: 061033ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

704 ANS: 1  PTS: 2  REF: 061114ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

705 ANS:

41.8. \( \sin x = \frac{8}{12} \)

\[A \approx 41.8\]

PTS: 3  REF: 081135ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

706 ANS:

78. \( \cos x = \frac{6}{28} \)

\[x \approx 78\]

PTS: 3  REF: 061235ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

707 ANS:

54, 23. \( \cos A = \frac{17}{29} \). \( \sqrt{29^2 - 17^2} \approx 23 \)

\[x \approx 54\]

PTS: 3  REF: 061235ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

708 ANS: 4  PTS: 4  REF: 081238ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

\[
\sin D = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{12}{13}
\]

PTS: 2  REF: 061325ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

709 ANS:

\[
\tan x = \frac{350}{1000}
\]

\[x \approx 19\]

PTS: 3  REF: 061335ia  STA: A.A.43  TOP: Using Trigonometry to Find an Angle

710 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
36 – 9π.  15.6. Area of square–area of 4 quarter circles. \((3 + 3)^2 - 3^2 \pi = 36 - 9\pi\)

PTS: 2  REF: 060832ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area

ANS: 2  PTS: 2  REF: 080815ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area

50. 12 + 10 + 12 + \(\frac{1}{2}(10\pi)\) ≈ 50

PTS: 2  REF: 010931ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: perimeter

ANS: 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 \(\frac{1}{2} \times 4(12 + 16) = 56\).

PTS: 3  REF: 060934ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area

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

ANS: 2

shaded = whole – unshaded
  = rectangle-triangle
  = \(lw - \frac{1}{2} bh\)
  = \(15 \times 6 - \frac{1}{2} \times 15 \times 4.6\)
  = 90 - 34.5
  = 55.5

PTS: 2  REF: 081019ia  STA: A.G.1  TOP: Compositions of Polygons and Circles  KEY: area
\[ A = lw + lw + \frac{\pi r^2}{4} = 5 \cdot 3 + 5 \cdot 3 + \frac{\pi \cdot 3^2}{4} \approx 37 \]
727 ANS: 2
1.5^3 = 3.375

PTS: 2 REF: 060809ia STA: A.G.2 TOP: Volume

728 ANS:
\[ V = \pi r^2 h \]
\[ \frac{38}{\pi}, 2. \]
\[ \frac{36}{38} \approx 2.97. \] 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

729 ANS:
5,112. \( (12 \times 30 \times 16) - (6 \times 12 \times 9) = 5112 \)

PTS: 2 REF: 080932ia STA: A.G.2 TOP: Volume

730 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

731 ANS:
Carol’s, by 14.9. \( V_M = 5 \times 3.5 \times 7 = 122.5 \). \( V_C = \pi \times 2.5^2 \times 7 \approx 137.4 \). 137.4 − 122.5 = 14.9

PTS: 4 REF: 061237ia STA: A.G.2 TOP: Volume

732 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

733 ANS: 3
\[ \frac{10^3}{5^3} = \frac{1000}{125} = 8 \]

PTS: 2 REF: 011312ia STA: A.G.2 TOP: Volume

734 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

28
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:
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(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:
147.75
2 \times 5.5 \times 3 + 2 \times 6.75 \times 3 + 2 \times 5.5 \times 6.75 = 147.75

PTS: 2 REF: 011231ia STA: A.G.2 TOP: Surface Area

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: 2
s^3 = 8\times (2 \times 2) = 24
s = 2

PTS: 2 REF: 081325ia STA: A.G.2 TOP: Surface Area