Dear Sir

I have to acknowledge the receipt of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.
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Integrated Algebra Regents Exam Questions by Performance Indicator: Topic
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NUMBERS, OPERATIONS AND PROPERTIES

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 $-12$

A.N.1: IDENTIFYING PROPERTIES

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

7 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

8 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.

A.N.1: PROPERTIES OF REALS

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

10 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 $(x + y) + z = x + (y + z)$
11 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 \( 3 + (x + y) = (x + y) + 3 \)

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

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

17 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 \([-6, 14)^{\text{a}}\)
3 \((-6, 14)^{\text{b}}\)
4 \([-6, 14)\)

18 Which interval notation describes the set \(S = \{x| 1 \leq x < 10\}\)?
1 \([1, 10]\)
2 \((1, 10]\)
3 \([1, 10)\)
4 \((1,10)\)

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

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

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

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

A.A.30: SET THEORY

24 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 \(\{H, P, S\}\)

25 Given: \(U = \{1, 2, 3, 4, 5, 6, 7, 8\}\) 
Set \(B = \{2, 3, 5, 6\}\) 
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 \(\{1, 2, 3, 4, 5, 6, 7, 8\}\)

26 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 \(\{2, 4, 6, 8, 20\}\)

27 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\}

28 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 \(-2, -1, 0, 1, 2, 3, 4, 5, 6\)

29 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.

A.A.31: SET THEORY

30 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)\}

31 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 \(\{0, 1, 2, 3, 4, 6\}\)
32 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 \( \{1, 2, 3, 4, 5, 6\} \)

33 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 \( \{0\} \)

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

![Venn diagram](image)

1 \( \{3, 4, 5, 6, 7\} \)
2 \( \{2\} \)
3 \( \{2, 3, 4, 5, 6, 7\} \)
4 \( \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \)

35 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 \( \{2, 3, 4, 6, 8, 9, 10, 12, 15\} \)

36 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 \( \{2, 3, 4, 5, 7, 8, 9\} \)

37 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 \( A \cap C = \{3, 5, 7\} \)

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

![Temperature ranges](image)

Express the intersection of the three sets as an inequality in terms of temperature, \( t \).
39 Ms. Hopkins recorded her students’ final exam scores in the frequency table below.

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<th>Frequency</th>
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<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>
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</table>

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

40 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.
41 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.

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

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

Complete the cumulative frequency table below using these data.

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

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

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

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

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

44 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  

45 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.
46 The following cumulative frequency histogram shows the distances swimmers completed in a recent swim test.

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

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

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

48 The test scores from Mrs. Gray’s math class are shown below.

72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92

Construct a box-and-whisker plot to display these data.

49 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

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8.5</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
</tr>
</tbody>
</table>

51 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.

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

What is the value of the upper quartile?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>76</td>
</tr>
<tr>
<td>3</td>
<td>84</td>
</tr>
<tr>
<td>4</td>
<td>94</td>
</tr>
</tbody>
</table>

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

What percentage of the test scores are less than 72?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

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

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The median is 7.</td>
</tr>
<tr>
<td>2</td>
<td>The range is 12.</td>
</tr>
<tr>
<td>3</td>
<td>The first quartile is 4.</td>
</tr>
<tr>
<td>4</td>
<td>The third quartile is 11.</td>
</tr>
</tbody>
</table>
56 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

A.S.11: QUARTILES AND PERCENTILES

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

<table>
<thead>
<tr>
<th>Week</th>
<th>Number of Cans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
</tr>
<tr>
<td>5</td>
<td>58</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>62</td>
</tr>
</tbody>
</table>

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

58 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

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

Which scatter plot shows Romero’s data graphically?
60. 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 (in dollars)</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. 

61. 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?

1. 

2. 

3. 

4.
A.S.8: SCATTER PLOTS

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

63 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. \( y = 5x + 25 \)
64. The table below shows the number of prom tickets sold over a ten-day period.

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

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

A.S.12: SCATTER PLOTS

65. 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?
66. 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?

67. 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
68 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.

69 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
70 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

A.S.17: SCATTER PLOTS

71 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
72 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

73 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.

Draw a reasonable line of best fit. Using the line of best fit, predict whether Megan and Bryce will reach their goal in the 18th month of their business. Justify your answer.
A.S.4: CENTRAL TENDENCY

74 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

75 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

76 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

77 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.

78 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.

A.S.16: CENTRAL TENDENCY

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

<table>
<thead>
<tr>
<th>Student</th>
<th>Student 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.
80 Given the following list of students' scores on a quiz:

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

Determine the median of these scores. Determine the mode of these scores. The teacher decides to adjust these scores by adding three points to each score. Explain the effect, if any, that this will have on the median and mode of these scores.

A.S.16: AVERAGE KNOWN WITH MISSING DATA

81 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

82 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

83 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

84 Which data set describes a situation that could be classified as quantitative?
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

85 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

86 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

87 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

88 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.
89 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

90 Which data table represents univariate data?

91 Which table does not show bivariate data?

A.S.3: ANALYSIS OF DATA

92 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
93 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

94 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.

95 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.

96 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

97 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
A.S.13: ANALYSIS OF DATA

98 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

99 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.

A.S.14: ANALYSIS OF DATA

100 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

101 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

A.M.3: ERROR

104 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 \( \frac{(130)(60) - (120)(54)}{(120)(54)} \)
3 \( \frac{(130)(60) - (120)(54)}{(130)(60)} \)
4 \( \frac{(130)(60) - (120)(54)}{(130)(60)} \)

102 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

103 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.
105 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

106 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

107 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

108 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

109 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

110 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

111 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

112 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.

113 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.
114 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.

115 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.

116 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.

117 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.

118 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.

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

120 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.

121 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>Main Course</td>
</tr>
<tr>
<td>hamburger</td>
</tr>
<tr>
<td>chicken nuggets</td>
</tr>
<tr>
<td>turkey sandwich</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.

122 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.
123 A sandwich consists of one type of bread, one type of meat, and one type of cheese. The possible choices are listed below.
   Bread: white, rye
   Meat: ham, turkey, beef
   Cheese: American, Swiss

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

124 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.

A.S.21: EXPERIMENTAL PROBABILITY

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

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

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

1 \[\frac{8}{30}\]
2 \[\frac{6}{30}\]
3 \[\frac{5}{30}\]
4 \[\frac{1}{30}\]
126  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  \( \frac{1}{3} \)
2  \( \frac{3}{5} \)
3  \( \frac{3}{8} \)
4  \( \frac{5}{8} \)

127  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  \( \frac{14}{20} \)

128  Casey purchased a pack of assorted flower seeds and planted them in her garden. When the first 25 flowers bloomed, 11 were white, 5 were red, 3 were blue, and the rest were yellow. Find the empirical probability that a flower that blooms will be yellow.
A.S.20: THEORETICAL PROBABILITY

129 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

130 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

131 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

132 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.

A.S.23: THEORETICAL PROBABILITY

133 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.

Hat A
Hat B
Hat C

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.

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

A.S.23: THEORETICAL PROBABILITY

135 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 \( \frac{6}{8} \)
136 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. \( \frac{1}{6} \)

137 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. \( 2 \)
3. \( \frac{1}{2} \)
4. \( \frac{9}{10} \)

138 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. \( \frac{2}{3} \)

139 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. \( \frac{1}{2} \times \frac{2}{5} \)

140 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.
A.S.20: GEOMETRIC PROBABILITY

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

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

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

3 \[\frac{5}{8}\]

4 \[\frac{7}{8}\]

142 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 \[\frac{49}{81}\]
143 The square dart board shown below has a side that measures 40 inches. The shaded portion in the center is a square whose side is 15 inches. A dart thrown at the board is equally likely to land on any point on the dartboard.

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

A.S.22: GEOMETRIC PROBABILITY

144 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.

145 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

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

---

147 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

148 Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

A.N.7: MULTIPLICATION COUNTING PRINCIPLE

149 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 \[ 18 \]
150. 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

A.N.8: PERMUTATIONS

151. 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. $\binom{10}{3}$
2. $\binom{10}{2}$
3. $\binom{10}{3}$
4. $\binom{10}{7}$

152. 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

153. 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

154. 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

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

1. 5
2. 15
3. 25
4. 120

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

157. 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.

158. 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.
EXPRESSIONS AND EQUATIONS

A.A.1: EXPRESSIONS

159 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. \(25x - 75\)

160 The length of a rectangular room is 7 less than three times the width, \(w\), of the room. Which expression represents the area of the room?
1. \(3w - 4\)
2. \(3w - 7\)
3. \(3w^2 - 4w\)
4. \(3w^2 - 7w\)

161 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. \(58 + s + w\)

162 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. \(5x + 20\)

163 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. \(4(x + 2)\)

164 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. \(15 - 9x\)

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

166 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. \(4 - 3x\)

167 A correct translation of “six less than twice the value of \(x\)” is
1. \(2x < 6\)
2. \(2x - 6\)
3. \(6 < 2x\)
4. \(6 - 2x\)
A.A.2: EXPRESSIONS

168 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 $n$

169 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

170 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

A.A.3: EXPRESSIONS

171 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 $x = 2$

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

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

174 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

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

A.A.22: SOLVING EQUATIONS

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

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

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

- [Line 1] \(3(x + 4) - 2 = 16\)
- [Line 2] \(3(x + 4) = 18\)
- [Line 3] \(3x + 4 = 18\)
- [Line 4] \(3x = 14\)
- [Line 5] \(x = 4\frac{2}{3}\)

She made an error between lines

1. 1 and 2  
2. 2 and 3  
3. 3 and 4  
4. 4 and 5

179 Solve for \( g \):
\[ 3 + 2g = 5g - 9\]

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

182 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

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

1. 8  
2. 13  
3. 15  
4. 23

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

1. 1  
2. -1  
3. 3  
4. -3

185 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. \(\frac{3}{2}\)

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

187 The value of \( y \) in the equation
\[ 0.06y + 200 = 0.03y + 350\]
is

1. 500  
2. 1,666.\(\bar{6}\)  
3. 5,000  
4. 18,333.\(\bar{3}\)

A.A.25: SOLVING EQUATIONS WITH FRACTIONAL EXPRESSIONS

A.A.25: SOLVING EQUATIONS WITH DECIMALS
A.A.4: MODELING EQUATIONS

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

A.A.5: MODELING EQUATIONS

189 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 $w^2 + 5w - 36 = 0$

190 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 $0.15(x + 6) = 1.35$

191 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 $x(2x - 3) = 43$

192 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

193 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

194 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.23: TRANSFORMING FORMULAS

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

196 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 $w = \frac{P - 2w}{2l}$
197 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. \( \frac{1 + b}{r + b} \)

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

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

200 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. \( y = \frac{n(t - k)}{e} \)

201 If \( s = \frac{2x + t}{r} \), then \( x \) equals

1. \( \frac{rs - t}{2} \)
2. \( \frac{rs + 1}{2} \)
3. \( 2rs - t \)
4. \( rs - 2t \)

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

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

203 The formula for the volume of a pyramid is \( V = \frac{1}{3} Bh \). What is \( h \) expressed in terms of \( B \) and \( V \)?

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

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

A.M.1: USING RATE

205 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. 90
2. 160
3. 5,400
4. 7,200
206 A cell phone can receive 120 messages per minute. At this rate, how many messages can the phone receive in 150 seconds?
1 48
2 75
3 300
4 18,000

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

208 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.

A.M.1: SPEED

209 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

210 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

211 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

212 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

213 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

214 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.

215 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.

216 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.
217 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?

A.M.2: CONVERSIONS

218 On a certain day in Toronto, Canada, the temperature was 15°C 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

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

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

220 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 1/4
2 1 3/4
3 3 3/4
4 5 3/4

221 Peter walked 8,900 feet from home to school. How far, to the nearest tenth of a mile, did he walk?

1 0.5
2 0.6
3 1.6
4 1.7

222 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.

223 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.
224 Mrs. Chen owns two pieces of property. The areas of the properties are 77,120 square feet and 33,500 square feet.

\[
\text{43,560 square feet} = 1 \text{ acre}
\]

Find the total number of acres Mrs. Chen owns, to the nearest hundredth of an acre.

A.N.5: PERCENTS

225 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

A.N.5: DIRECT VARIATION

229 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

230 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.

LINEAR EQUATIONS

A.A.32: SLOPE

231 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
232 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

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

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

The rate of change represented in this table can be described as
1 negative
2 positive
3 undefined
4 zero

A.A.33: SLOPE

234 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 \( \frac{-3}{2} \)

235 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 \( \frac{1}{2} \)

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

237 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

238 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
239 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. \(\frac{5}{2}\)

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

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

241 In the diagram below, what is the slope of the line passing through points \(A\) and \(B\)?

A.A.37: SLOPE

242 What is the slope of the line passing through the points \(A\) and \(B\), as shown on the graph below?

243 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. \(\frac{7}{3}\)

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

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

245 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

246 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. \(y = -3x + 14\)

247 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. \(y = 2x - 7\)

248 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. \(y = 2x + 3\)

249 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. \(4y = 3x + 5\)

250 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.
251 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. \( y = -\frac{2}{3}x - 2 \)

252 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. \( x = y \)

253 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. \( y = -\frac{2}{3}x + 9 \)

254 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. \( y + 5 = \frac{2}{7}(x - 8) \)

255 Write an equation that represents the line that passes through the points (5, 4) and (−5, 0).
A.A.36: PARALLEL AND PERPENDICULAR LINES

261 Which equation represents a line parallel to the x-axis?
1  x = 5
2  y = 10
3  x = 1/3 y
4  y = 5x + 17

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

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

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

265 Which equation represents a line that is parallel to the line y = −4x + 5?
1  y = −4x + 3
2  y = −1/4 x + 5
3  y = 1/4 x + 3
4  y = 4x + 5

266 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

267 Which equation represents a line parallel to the graph of 2x − 4y = 16?
1  y = 1/2 x − 5
2  y = −1/2 x + 4
3  y = −2x + 6
4  y = 2x + 8

268 The graphs of the equations y = 2x − 7 and y − kx = 7 are parallel when k equals
1  −2
2  2
3  −7
4  7

INEQUALITIES
A.A.24: SOLVING INEQUALITIES

269 What is the solution of 3(2m − 1) ≤ 4m + 7?
1  m ≤ 5
2  m ≥ 5
3  m ≤ 4
4  m ≥ 4

270 What is the solution of the inequality −6x − 17 ≥ 8x + 25?
1  x ≥ 3
2  x ≤ 3
3  x ≥ −3
4  x ≤ −3

271 Solve algebraically for x: 2(x − 4) ≥ 1/2 (5 − 3x)
A.A.21: INTERPRETING SOLUTIONS

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

1.  -8
2.  -6
3.  -4
4.  12

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

1.  -2
2.  2
3.  3
4.  -4

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

1.  8
2.  9
3.  12
4.  16

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

1.  0
2.  2
3.  3
4.  5

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

A.A.4: MODELING INEQUALITIES

277 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.  \(8 - 3x < 15\)

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

[Image of a sign that says "All riders MUST be at least 48 inches tall."]

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

279 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.  \(75d + 30c \geq 255\)

280 Students in a ninth grade class measured their heights, \(h\), in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?

1.  \(155 < h < 190\)
2.  \(155 \leq h \leq 190\)
3.  \(h \geq 155\) or \(h \leq 190\)
4.  \(h > 155\) or \(h < 190\)
281 Roger is having a picnic for 78 guests. He plans to serve each guest at least one hot dog. If each package, \( p \), contains eight hot dogs, which inequality could be used to determine how many packages of hot dogs Roger will need to buy?
1. \( p \geq 78 \)
2. \( 8p \geq 78 \)
3. \( 8 + p \geq 78 \)
4. \( 78 - p \geq 8 \)

282 The ninth grade class at a local high school needs to purchase a park permit for $250.00 for their upcoming class picnic. Each ninth grader attending the picnic pays $0.75. Each guest pays $1.25. If 200 ninth graders attend the picnic, which inequality can be used to determine the number of guests, \( x \), needed to cover the cost of the permit?
1. \( 0.75x - (1.25)(200) \geq 250.00 \)
2. \( 0.75x + (1.25)(200) \geq 250.00 \)
3. \( (0.75)(200) - 1.25x \geq 250.00 \)
4. \( (0.75)(200) + 1.25x \geq 250.00 \)

283 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. \( 30 + 2w \geq 50 \)

284 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

285 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

286 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

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

288 Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day. Write an inequality that can be used to determine how many days, \( d \), it takes Peter to be able to spell at least 75 words. Use this inequality to determine the minimum number of whole days it will take for him to be able to spell at least 75 words.
290 Chelsea has $45 to spend at the fair. She spends $20 on admission and $15 on snacks. She wants to play a game that costs $0.65 per game. Write an inequality to find the maximum number of times, $x$, Chelsea can play the game. Using this inequality, determine the maximum number of times she can play the game.

**A.G.6: LINEAR INEQUALITIES**

291 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

292 Which inequality is represented by the graph below?

![Graph](image)

1. $y < 2x + 1$
2. $y < -2x + 1$
3. $y < \frac{1}{2}x + 1$
4. $y < -\frac{1}{2}x + 1$

293 Which graph represents the solution of $3y - 9 \leq 6x$?

![Graph](image)
294 Which graph represents the inequality \( y > 3? \)

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

**A.G.4: GRAPHING ABSOLUTE VALUE FUNCTIONS**

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

**A.G.5: GRAPHING ABSOLUTE VALUE FUNCTIONS**

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

Which diagram shows the graph of \( y = -|x - 3| \)?
298 The graph of \( y = |x + 2| \) is shown below.

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

299 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 \(-1 < a < 0\)?
300 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 \( y = |x| \).

301 On the set of axes below, graph and label the equations \( y = |x| \) and \( y = 3|x| \) for the interval \(-3 \leq x \leq 3\).

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

**QUADRATICS**

A.A.20: FACTORING POLYNOMIALS

302 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. \( 2(x - 2)(x - 3) \)

303 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. \( (3x + 6)(x - 3) \)
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 $(x - 4)$

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. $3x(x - 5)(x - 6)$

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

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. $(8x - 5y)(8x - 5y)$

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

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

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. $(2y - 5)(y - 5)$

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

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

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. $(x + 18y)(x - 18y)$

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

Which expression is equivalent to $64 - x^2$?
1. $(8 - x)(8 + x)$
2. $(8 - x)(8 - x)$
3. $(x - 8)(x - 8)$
4. $(x - 8)(x + 8)$
316 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 $(3a - 8b)(3a - 8b)$

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

A.A.27: SOLVING QUADRATICS BY FACTORING

318 The solution to the equation $x^2 - 6x = 0$ is
1 0, only
2 6, only
3 0 and 6
4 $\pm\sqrt{6}$

A.A.28: ROOTS OF QUADRATICS

319 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 $-7$

320 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

321 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 $x^2 - 2x + 15 = 0$

322 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 $-3$

323 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 $-3$

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

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

A.G.5: GRAPHING QUADRATIC FUNCTIONS

326 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.

327 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.
328 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

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

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

330 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
331 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

332 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

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

334 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

335 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

336 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

337 Find three consecutive positive even integers such that the product of the second and third integers is twenty more than ten times the first integer. [Only an algebraic solution can receive full credit.]

A.A.8: GEOMETRIC APPLICATIONS OF QUADRATICS

338 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

339 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

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

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

341 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 \(x = −2\).
342 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 $y = 23$

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

1 $y = -3$
2 $x = -3$
3 $y = -25$
4 $x = -25$

344 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 $x = 13$

345 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: $x = -4$
346 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: \( x = 1 \)

347 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 \( x = -2 \)

348 State the equation of the axis of symmetry and the coordinates of the vertex of the parabola graphed below.
A.A.41: IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN EQUATION

349 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: \( x = -8 \)

350 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 \( x = -5 \)

351 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 \( y = 6 \)

352 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 \( y = \frac{3}{2} \)

353 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 \((-6, -316)\)

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

SYSTEMS

A.A.10: SOLVING LINEAR SYSTEMS

355 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

356 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

357 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

358 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 \( c = 14, d = -2 \)
359. 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. $-3$

360. 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. $(3, 1)$

361. Solve the following system of equations algebraically for $y$:

\[
\begin{align*}
2x + 2y &= 9 \\
2x - y &= 3
\end{align*}
\]

362. 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.]

A.G.7: SOLVING LINEAR SYSTEMS

363. 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. $(8, 0)$
364 On the grid below, solve the system of equations graphically for $x$ and $y$.

$$4x - 2y = 10$$
$$y = -2x - 1$$

365 On the grid below, solve the following system of equations graphically. State the coordinates of the solution.

$$y = 4x - 1$$
$$2x + y = 5$$

A.A.7: WRITING LINEAR SYSTEMS

366 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

367 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
368 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

369 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

370 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

371 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

372 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

373 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

374 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

375 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

376 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.
A.A.40: SYSTEMS OF LINEAR INEQUALITIES

377 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)

378 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)

379 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)

380 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)
381 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)

A.G.7: SYSTEMS OF LINEAR INEQUALITIES

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

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

383 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.
384  Graph the following systems of inequalities on the set of axes shown below and label the solution set \( S \):

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

385  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.
386 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 \( 5x - 2y > 10 \).

389 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. \((5, -1)\)

390 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. \((2, 5)\)

391 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)\}

392 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

393 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)

394 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)
395 Which graph could be used to find the solution of the system of equations \( y = 2x + 6 \) and \( y = x^2 + 4x + 3 \)?

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

\[
\begin{align*}
y &= x^2 + 2x + 3 \\
2y - 2x &= 10
\end{align*}
\]
397 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.

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

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

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

\[
\begin{align*}
  y &= x^2 - 6x + 1 \\
  y + 2x &= 6
\end{align*}
\]

400 On the set of axes below, solve the following system of equations graphically for all values of $x$ and $y$:

\[
\begin{align*}
  y &= -x^2 - 4x + 12 \\
  y &= -2x + 4
\end{align*}
\]
401. On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

\[ y = -x^2 + 6x - 3 \]
\[ x + y = 7 \]

A.A.13: ADDITION AND SUBTRACTION OF MONOMIALS

402. Which expression is equivalent to \(-3x(x - 4) - 2x(x + 3)\)?
1. \(-x^2 - 1\)
2. \(-x^2 + 18x\)
3. \(-5x^2 - 6x\)
4. \(-5x^2 + 6x\)

A.A.13: ADDITION AND SUBTRACTION OF POLYNOMIALS

403. 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. \(10g^2 + g + 1\)

404. 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. \(-5x^2 + 9x - 8\)

405. 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. \(7x^6 + 9x^4 - 3x^2 - 8\)

406. 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. \(x^2 - 4xy - 4\)

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

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

410 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. $4x^2 + 2x - 15$

A.A.13: MULTIPLICATION OF POLYNOMIALS

411 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. $-15x^2y^2 - 3x^2y$^3
4. $-15x^3y^3 + xy$

412 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

413 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. $10x^2 - 4x + 1$

414 The quotient of $\frac{8x^5 - 2x^4 + 4x^3 - 6x^2}{2x^2}$ is
1. $16x^7 - 4x^6 + 8x^5 - 12x^4$
2. $4x^7 - x^6 + 2x^5 - 3x^4$
3. $4x^3 - x^2 + 2x - 3$
4. $4x^3 - x^2 + 2x - 3$

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

A.A.12: MULTIPLICATION OF POWERS

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

417 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

418 What is one-third of $3^6$?
1. $1^2$
2. $3^2$
3. $3^5$
4. $9^6$

419 What is half of $2^6$?
1. $1^3$
2. $1^6$
3. $2^3$
4. $2^5$
420 Which expression represents \( \frac{27x^{18}y^5}{9x^6y^2} \) in simplest form?
1. \( 3x^{12}y^4 \)
2. \( 3x^3y^5 \)
3. \( 18x^{12}y^4 \)
4. \( 18x^3y^5 \)

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

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

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

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

A.A.12: POWERS OF POWERS

425 Which expression is equivalent to \((3x^2)^3\)?
1. \( 9x^5 \)
2. \( 9x^6 \)
3. \( 27x^5 \)
4. \( 27x^6 \)

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

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

A.N.4: OPERATIONS WITH SCIENTIFIC NOTATION

428 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. \( 2.3 \times 10^{12} \)

429 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. \( 3.528 \times 10^{12} \)
430 What is the product of 12 and \(4.2 \times 10^6\) expressed in scientific notation?

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

431 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 \(4 \times 10^4\)

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

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

433 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.

434 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

435 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 \(v = 21,000(0.86)(3)\)

436 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 \(t = 64(0.5)^r\)

437 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

A.A.9: EXPONENTIAL FUNCTIONS
438 In a science fiction novel, the main character found a mysterious rock that decreased in size each day. The table below shows the part of the rock that remained at noon on successive days.

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

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

1. \(\frac{1}{128}\)
2. \(\frac{1}{64}\)
3. \(\frac{1}{14}\)
4. \(\frac{1}{12}\)

439 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

440 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

441 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

442 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. \(2500(1 + 0.4)^3\)

443 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. \(V = 12,500(1.45)^5\)

444 Is the equation \(A = 21000(1 + 0.12)\) 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%
445 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.

446 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.

A.G.4: GRAPHING EXPONENTIAL FUNCTIONS

447 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.

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

RADICALS
A.N.2: SIMPLIFYING RADICALS

449 What is $\frac{\sqrt{32}}{4}$ expressed in simplest radical form?

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

450 What is $\sqrt{72}$ expressed in simplest radical form?

1 $2\sqrt{18}$
2 $3\sqrt{8}$
3 $6\sqrt{2}$
4 $8\sqrt{3}$
451 What is \( \sqrt{32} \) expressed in simplest radical form?
1. \( 16\sqrt{2} \)
2. \( 4\sqrt{2} \)
3. \( 4\sqrt{8} \)
4. \( 2\sqrt{8} \)

452 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. \( 4 \)

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

454 What is \( 2\sqrt{45} \) expressed in simplest radical form?
1. \( 3\sqrt{5} \)
2. \( 5\sqrt{5} \)
3. \( 6\sqrt{5} \)
4. \( 18\sqrt{5} \)

455 Express \( 5\sqrt{72} \) in simplest radical form.

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

A.N.3: OPERATIONS WITH RADICALS

457 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. \( 36\sqrt{2} \)

458 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. \( \sqrt{6} \)

459 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. \( 7\sqrt{2} \)

460 Express \( \frac{16\sqrt{21}}{2\sqrt{7}} - 5\sqrt{12} \) in simplest radical form.

461 Express \( \frac{3\sqrt{75} + \sqrt{27}}{3} \) in simplest radical form.

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

RATIONALS

A.A.16: RATIONAL EXPRESSIONS

463 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. \( 9x^3(1 - x) \)
464 Which expression represents \(\frac{2x^2 - 12x}{x - 6}\) in simplest form?
1. 0
2. 2x
3. 4x
4. 2x + 2

465 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. \(\frac{25}{x + 5}\)

466 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. \(-\frac{2x - 15}{3x}\)

467 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

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

469 Which expression is equivalent to \(2x^6 - 18x^4 + 2x^2\)?
1. \(x^3 - 9x^2\)
2. \(x^4 - 9x^2\)
3. \(x^3 - 9x^2 + 1\)
4. \(x^4 - 9x^2 + 1\)

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

471 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.

472 For which value of \(x\) is \(\frac{x - 3}{x^2 - 4}\) undefined?
1. -2
2. 0
3. 3
4. 4
473 Which value of \( x \) makes the expression \( \frac{x + 4}{x - 3} \) undefined?
1. \(-4\)
2. \(-3\)
3. 3
4. 0

474 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

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

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

477 The algebraic expression \( \frac{x - 2}{x^2 - 9} \) is undefined when \( x \) is
1. 0
2. 2
3. 3
4. 9

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

479 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 \(-1\)

480 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

A.A.18: MULTIPLICATION AND DIVISION OF RATIONALS

481 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. \(\frac{x + 3}{3}\)
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic

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

A.A.17: ADDITION AND SUBTRACTION OF RATIONALS

488 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. \( \frac{7d}{6} \)

483 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. \( \frac{x - 4}{2} \)

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

485 Perform the indicated operation and simplify:
\( \frac{3x + 6}{4x + 12} \div \frac{x^2 - 4}{x + 3} \)

486 Express in simplest form:
\( \frac{2x^2 - 8x - 42}{6x^2} \div \frac{x^2 - 9}{x^2 - 3x} \)

487 Express in simplest form:
\( \frac{x^2 + 9x + 14}{x^2 - 49} + \frac{3x + 6}{x^2 + x - 56} \)
491 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. $\frac{17}{12x}$

492 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. $\frac{4x^2}{x-2}$

493 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. $\frac{3x+12}{4x+8}$

494 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. $\frac{2x+4}{5x}$

495 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. $\frac{13}{8x}$

496 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. $\frac{7x-2y}{12x^2}$

497 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. $\frac{2y+10}{y+5}$

498 The expression $\frac{2x+13}{2x+6} - \frac{3x-6}{2x+6}$ is equivalent to

1. $\frac{-x+19}{2(x+3)}$
2. $\frac{-x+7}{2(x+3)}$
3. $\frac{5x+19}{2(x+3)}$
4. $\frac{5x+7}{4x+12}$
A.A.26: SOLVING RATIONALS

499 Which value of $x$ is a solution of $\frac{5}{x} = \frac{x + 13}{6}$?
1. $-2$
2. $-3$
3. $-10$
4. $-15$

500 What is the solution of $\frac{k + 4}{2} = \frac{k + 9}{3}$?
1. $1$
2. $5$
3. $6$
4. $14$

501 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. $8$

502 What is the solution set of $\frac{x + 2}{x - 2} = \frac{-3}{x}$?
1. $\{-2, 3\}$
2. $\{-3, -2\}$
3. $\{-1, 6\}$
4. $\{-6, 1\}$

503 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. $4$

504 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 $3$

505 Solve for $x$: $\frac{x + 1}{x} = \frac{-7}{x - 12}$

506 Solve algebraically for $x$: $\frac{x + 2}{6} = \frac{3}{x - 1}$

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

FUNCTIONS

A.G.4: FAMILIES OF FUNCTIONS

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

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

510. 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?
511 Which graph represents an exponential equation?

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

513 Which equation represents a quadratic function?

1 \( y = x + 2 \)
2 \( y = |x + 2| \)
3 \( y = x^2 \)
4 \( y = 2^x \)
A.G.4: IDENTIFYING THE EQUATION OF A GRAPH

514 Which equation is represented by the graph below?

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

A.G.3: DEFINING FUNCTIONS

516 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) \}

517 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) \}

518 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) \}

519 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) \}
520 Which graph represents a function?

521 Which graph represents a function?
522 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.

523 Which graph represents a function?
524 Which graph does not represent a function?

525 Which graph represents a function?
TRIANGLES
A.A.45: PYTHAGOREAN THEOREM

526 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

527 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 \( x = \sqrt{20^2 + 19.5^2} \)

528 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
529 What is the value of \( x \), in inches, in the right triangle below?

\[
\begin{array}{c}
3 \text{ inches} \\
5 \text{ inches} \\
x
\end{array}
\]

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

530 Nancy’s rectangular garden is represented in the diagram below.

\[
\begin{array}{c}
8 \text{ feet} \\
15 \text{ feet} \\
\text{Walkway}
\end{array}
\]

If a diagonal walkway crosses her garden, what is its length, in feet?

1. 17  
2. 22  
3. \( \sqrt{161} \)  
4. \( \sqrt{529} \)

531 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

532 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

533 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
534 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

535 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

536 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. $\frac{84}{13}$

537 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. $\frac{8}{17}$

538 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. $\tan A = \frac{5}{8}$
539 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. \( \frac{48}{14} \)

540 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

541 Which ratio represents \( \sin x \) in the right triangle shown below?

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

542 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. \( \frac{12}{5} \)
543 The diagram below shows right triangle \(LMP\).

![Triangle LMP](image)

Which ratio represents the tangent of \(\angle PLM\)?

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

544 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. \(\tan B = \frac{5}{3}\)

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

545 A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.

![Tree and Shadow](image)

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

546 An 8-foot rope is tied from the top of a pole to a stake in the ground, as shown in the diagram below.

![Rope to Pole](image)

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
547 A right triangle contains a $38^\circ$ 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
```

548 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
```

549 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 $52^\circ$.

```
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?
```

550 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 $50^\circ$ 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.
```

551 As shown in the diagram below, a ladder 5 feet long leans against a wall and makes an angle of $65^\circ$ with the ground. Find, to the nearest tenth of a foot, the distance from the wall to the base of the ladder.

```
```
A.A.43: USING TRIGONOMETRY TO FIND AN ANGLE

552. 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

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

554. 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

555. 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

556. In right triangle $ABC$, $AB = 20$, $AC = 12$, $BC = 16$, and $m\angle C = 90$. Find, to the nearest degree, the measure of $\angle A$. 
557 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.

558 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.

559 A trapezoid is shown below.

Calculate the measure of angle \( x \), to the nearest tenth of a degree.

560 In right triangle \( ABC \) shown below, \( AC = 29 \) inches, \( AB = 17 \) inches, and \( \angle ABC = 90 \). Find the number of degrees in the measure of angle \( BAC \), to the nearest degree.

Find the length of \( BC \) to the nearest inch.

MEASURING IN THE PLANE AND SPACE

A.G.1: COMPOSITIONS OF POLYGONS AND CIRCLES

561 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. \( 80 + 64\pi \)
562 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. $30\pi + 80$

563 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

564 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

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

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

1. 33
2. 37
3. 44
4. 58
566 A garden is in the shape of an isosceles trapezoid and a semicircle, as shown in the diagram below. A fence will be put around the perimeter of the entire garden.

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

1. $22 + 6\pi$
2. $22 + 12\pi$
3. $15 + 6\pi$
4. $15 + 12\pi$

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

What is the area of the circle?

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

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

1. $20 + 3\pi$
2. $20 + 6\pi$
3. $26 + 3\pi$
4. $26 + 6\pi$

569 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.
570 A designer created the logo shown below. The logo consists of a square and four quarter-circles of equal size.

Express, in terms of π, the exact area, in square inches, of the shaded region.

571 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?

572 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 $ABCD$.

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

What is the volume of this container to the nearest tenth of a cubic inch?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6,785.8</td>
<td>4,241.2</td>
<td>2,160.0</td>
<td>1,696.5</td>
</tr>
</tbody>
</table>
574 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

575 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

576 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

577 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.

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

Joe's larger tank is completely filled with water. He takes water from it to completely fill the small tank. Determine how many cubic inches of water will remain in the larger tank.

579 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.

A.G.2: SURFACE AREA

580 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

581 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
582 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

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

584 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 \(x\).

585 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.
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: 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
\[ \left| \frac{4(-6) + 18}{4!} \right| = \left| \frac{-6}{24} \right| = \frac{1}{4} \]

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

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

7 ANS: 2 PTS: 2 REF: 080802ia STA: A.N.1
TOP: Identifying Properties

8 ANS:
(1) Distributive; (2) Commutative

PTS: 2 REF: 061132ia STA: A.N.1 TOP: Identifying Properties

9 ANS: 3 PTS: 2 REF: 060926ia STA: A.N.1
TOP: Properties of Reals

10 ANS: 4 PTS: 2 REF: 011114ia STA: A.N.1
TOP: Properties of Reals

11 ANS: 3 PTS: 2 REF: 011224ia STA: A.N.1
TOP: Properties of Reals

12 ANS: 1 PTS: 2 REF: 081209ia STA: A.N.1
TOP: Properties of Reals

13 ANS:
\[-6a + 42. \text{ distributive} \]

PTS: 2 REF: 061032ia STA: A.N.1 TOP: Properties of Reals

14 ANS: 4 PTS: 2 REF: fall0704ia STA: A.A.29
TOP: Set Theory
26 ANS: 4
\[ A = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\} \]

PTS: 2 REF: 080912ia STA: A.A.30 TOP: Set Theory

27 ANS: 3

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

28 ANS: 2

The set of integers greater than -2 and less than 6 is \{-1, 0, 1, 2, 3, 4, 5\}. The subset of this set that is the positive factors of 5 is \{1, 5\}. The complement of this subset is \{-1, 0, 2, 3, 4\}.

PTS: 2 REF: 060818ia STA: A.A.30 TOP: Set Theory

29 ANS: \{1, 2, 4, 5, 9, 10, 12\}

PTS: 2 REF: 080833ia STA: A.A.30 TOP: Set Theory

30 ANS: 3

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

31 ANS: 1

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

32 ANS: 1

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

33 ANS: 3

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

34 ANS: 2

PTS: 2 REF: 081003ia STA: A.A.31 TOP: Set Theory
35 ANS: 4  PTS: 2  REF: 061123ia  STA: A.A.31  TOP: Set Theory
36 ANS: 4  PTS: 2  REF: 011225ia  STA: A.A.31  TOP: Set Theory
37 ANS: 3
\[ A \cup C = \{1, 2, 3, 5, 7, 9\} \]
PTS: 2  REF: 081221ia  STA: A.A.31  TOP: Set Theory
38 ANS:  
\[ 0 \leq t \leq 40 \]
PTS: 2  REF: 060833ia  STA: A.A.31  TOP: Set Theory
39 ANS: 
\[ \text{Frequency Histogram} \]

PTS: 2  REF: 081132ia  STA: A.S.5  TOP: Frequency Histograms, Bar Graphs and Tables  KEY: frequency histograms
40 ANS: 
\[ \text{Table and Bar Graph} \]

PTS: 4  REF: 060938ia  STA: A.S.5  TOP: Frequency Histograms, Bar Graphs and Tables  KEY: frequency histograms
41  ANS:

![Frequency Histogram](image)

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>51–60</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>61–70</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>71–80</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>81–90</td>
<td>III</td>
<td>6</td>
</tr>
<tr>
<td>91–100</td>
<td>IV</td>
<td>4</td>
</tr>
</tbody>
</table>

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

42  ANS:

![Cumulative Frequency Histogram](image)

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1</td>
<td>III</td>
<td>3</td>
</tr>
<tr>
<td>2–3</td>
<td>IIIII</td>
<td>7</td>
</tr>
<tr>
<td>4–5</td>
<td>IIIII</td>
<td>7</td>
</tr>
<tr>
<td>6–7</td>
<td>IIIII</td>
<td>3</td>
</tr>
</tbody>
</table>

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

43  ANS: 3

25 – 18 = 7

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

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

45  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
46 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

47 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

48 ANS:

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

49 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

50 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

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

52 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

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

54 ANS: 3
75 – 15 = 60

PTS: 2 REF: 011133ia STA: A.S.6 TOP: Box-and-Whisker Plots

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

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

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

58 ANS: 4
\[
\frac{95000}{125000} = .76
\]

PTS: 2 REF: 061207ia STA: A.S.11 TOP: Quartiles and Percentiles
59 ANS: 2 PTS: 2 REF: fall0701ia STA: A.S.7
TOP: Scatter Plots

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

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

62 ANS: 4 PTS: 2 REF: 080822ia STA: A.S.8
TOP: Scatter Plots

63 ANS: 4 PTS: 2 REF: 011229ia STA: A.S.8
TOP: Scatter Plots

64 ANS: 

65 ANS: 4 PTS: 2 REF: 060936ia STA: A.S.8
TOP: Scatter Plots

66 ANS: 2 PTS: 2 REF: 060805ia STA: A.S.12
TOP: Scatter Plots

67 ANS: 3 PTS: 2 REF: 011103ia STA: A.S.12
TOP: Scatter Plots

68 ANS: 1 PTS: 2 REF: 081102ia STA: A.S.12
TOP: Scatter Plots

69 ANS: 2 PTS: 2 REF: 061205ia STA: A.S.12
TOP: Scatter Plots

70 ANS: 1 PTS: 2 REF: 081204ia STA: A.S.12
TOP: Scatter Plots

71 ANS: 2 PTS: 2 REF: 080930ia STA: A.S.17
TOP: Scatter Plots

72 ANS: 3 PTS: 2 REF: 081208ia STA: A.S.17
TOP: Scatter Plots
They will not reach their goal in 18 months.

73 ANS:

![Donut Pit Profits Graph]

They will not reach their goal in 18 months.

PTS: 3 REF: 061036ia STA: A.S.17 TOP: Scatter Plots

74 ANS: 3

mean = 6, median = 6 and mode = 7

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

75 ANS: 3

mean = $81 \frac{7}{11}$, median = 81 and mode = 76

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

76 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

77 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

78 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

79 ANS:

81.3, 80, both increase

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

80 ANS:

12, 7. Both the median and the mode will increase.

PTS: 3 REF: 061134ia STA: A.S.16 TOP: Central Tendency
\[
\frac{2 + 3 + 0 + 1 + 3 + 2 + 4 + 0 + 2 + 3}{10} = \frac{20}{10} = 2 + \frac{x}{10} = 2 + 0.5
\]
\[x = 25\]

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

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

82 ANS: 3
The other situations are quantitative.

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

83 ANS: 3
The other situations are quantitative.

PTS: 2 REF: 060905ia STA: A.S.1 TOP: Analysis of Data

84 ANS: 4
The other sets of data are qualitative.

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

85 ANS: 4
The other situations are quantitative.

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

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

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

87 ANS: 3
The other situations are qualitative.

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

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

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

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

90 ANS: 3
Frequency is not a variable.

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

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

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

PTS: 2 REF: 060803ia STA: A.S.3 TOP: Analysis of Data
93 ANS: 1
Everyone eats, can shop in malls and wear clothes. People who work in a sporting goods store probably watch more sports television than most.

PTS: 2 REF: 010923ia STA: A.S.3 TOP: Analysis of Data

94 ANS: 4
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

95 ANS: 4 PTS: 2 REF: 061022ia STA: A.S.3 TOP: Analysis of Data

96 ANS: 1
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

97 ANS: 2
People at a gym or football game and members of a soccer team are more biased towards sports.

PTS: 2 REF: 061202ia STA: A.S.3 TOP: Analysis of Data

98 ANS: 3
The number of correct answers on a test causes the test score.

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

99 ANS: 1
A rooster crows before sunrise, not because of the sun.

PTS: 2 REF: fall0707ia STA: A.S.13 TOP: Analysis of Data

100 ANS: 3
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

101 ANS: 3 PTS: 2 REF: 081017a STA: A.S.14 TOP: Analysis of Data

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

103 ANS: 2 PTS: 2 REF: 081104ia STA: A.S.14 TOP: Analysis of Data

104 ANS: 1 PTS: 2 REF: fall0723ia STA: A.M.3 TOP: Error KEY: area

105 ANS: 1
\[ \frac{289 - 282}{289} \approx 0.024 \]

PTS: 2 REF: 080828ia STA: A.M.3 TOP: Error KEY: volume and surface area
The volume of the cube using Ezra’s measurements is 8 \(2^3\). The actual volume is 9.261 \(2.13\). The relative error is \(\left| \frac{9.261 - 8}{9.261} \right| \approx 0.14\).

\[
\text{ANS: 2}
\]

\[
\frac{149.6 - 174.2}{149.6} \approx 0.1644
\]

\[
\text{PTS: 2} \quad \text{REF: 080926ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]

\[
\frac{55.42 - 50.27}{55.42} \approx 0.093
\]

\[
\text{PTS: 2} \quad \text{REF: 081023ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]

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

\[
\text{PTS: 2} \quad \text{REF: 061120ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]

\[
\frac{13.5 - 12.8}{13.5} \approx 0.093
\]

\[
\text{PTS: 2} \quad \text{REF: 081123ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]

\[
\frac{(2.6 \times 6.9) - (2.5 \times 6.8)}{(2.6 \times 6.9)} \approx 0.052
\]

\[
\text{PTS: 2} \quad \text{REF: 011209ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]

\[
\frac{8100 - 7678.5}{7678.5} \approx 0.055
\]

\[
\text{PTS: 2} \quad \text{REF: 061233ia} \quad \text{STA: A.M.3} \quad \text{TOP: Error}
\]

\[
\text{KEY: area}
\]
113 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

114 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

115 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

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

PTS: 2 REF: 061031ia STA: A.M.3 TOP: Error
KEY: volume and surface area

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

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

118 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

119 ANS:
\[ \frac{3}{8}. (H,H,H), (H,H,T), (H,T,H), (H,T,T), (T,H,H), (T,H,T), (T,T,H), (T,T,T) \]

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

(S,S), (S,K), (S,D), (K,S), (K,K), (K,D), (D,S), (D,K), (D,D), $\frac{4}{9}$

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

121 ANS:

(H,F,M), (H,F,J), (H,A,M), (H,A,J), (H,A,S), (C,F,M), (C,F,J), (C,F,S), (C,A,M), (C,A,J), (C,A,S),
(T,F,M), (T,F,J), (T,F,S), (T,A,M), (T,A,J), (T,A,S). There are 18 different kids’ meals, 12 do not include juice
and 6 include chicken nuggets.

PTS: 4  REF: 010939ia  STA: A.S.19  TOP: Sample Space

122 ANS:

(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),

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

123 ANS:

8, 3

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

124 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

125 ANS: 2  PTS: 2  REF: 060908ia  STA: A.S.21

TOP: Empirical Probability

126 ANS: 3

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

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

127 ANS: 3

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

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

128 ANS:

\[
\frac{6 - (11 + 5 + 3)}{25} = \frac{25}{25}
\]

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

129 ANS: 2  PTS: 2  REF: 011002ia  STA: A.S.20

TOP: Theoretical Probability
130 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

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

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

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

PTS: 2  REF: 011033ia  STA: A.S.22  TOP: Theoretical Probability

133 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

134 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

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

136 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

137 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


139 ANS: 4  PTS: 2  REF: 081229ia  STA: A.S.23  TOP: Theoretical Probability  KEY: independent events
\[
\frac{4}{12} \times \frac{2}{11} \times \frac{1}{10} = \frac{8}{1320} \quad \frac{6}{12} \times \frac{5}{11} \times \frac{4}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10} = \frac{120}{1320} + \frac{24}{1320} = \frac{144}{1320}
\]

PTS: 4  
REF: 081137ia  
STA: A.S.23  
TOP: Theoretical Probability

KEY: dependent events

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

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

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

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

144 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

145 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

146 ANS: 1

\[\frac{1}{8} \times \frac{1}{8} = \frac{1}{64}\]

PTS: 2  
REF: 010928ia  
STA: A.S.23  
TOP: Geometric Probability

147 ANS:
\[
\frac{3}{8} \times P(s_1 < 4) \times P(s_2 = \text{back}) = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}
\]

PTS: 2  
REF: 080832ia  
STA: A.S.23  
TOP: Geometric Probability

148 ANS:
\[
\frac{1}{8} \quad \text{After the English and social studies books are taken, 8 books are left and 1 is an English book.}
\]

PTS: 2  
REF: 060933ia  
STA: A.S.18  
TOP: Conditional Probability

149 ANS: 3

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

PTS: 2  
REF: 080905ia  
STA: A.N.7  
TOP: Conditional Probability

150 ANS: 4

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

PTS: 2  
REF: 061002ia  
STA: A.N.7  
TOP: Multiplication Counting Principle
151 ANS: 3  PTS: 2  REF: 060808ia  STA: A.N.8 
TOP: Permutations

152 ANS: 1
\[ P_4 = 4 \times 3 \times 2 \times 1 = 24 \]

PTS: 2  REF: 080816ia  STA: A.N.8  TOP: Permutations

153 ANS: 4
\[ P_3 = 336 \]

PTS: 2  REF: 061026ia  STA: A.N.8  TOP: Permutations

154 ANS: 3
\[ P_4 = 360 \]

PTS: 2  REF: 081028ia  STA: A.N.8  TOP: Permutations

155 ANS: 4
\[ P_5 = 5 \times 4 \times 3 \times 2 \times 1 = 120 \]

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

156 ANS: 60
\[ P_3 = 60 \]

PTS: 2  REF: 060931ia  STA: A.N.8  TOP: Permutations

157 ANS:
\[ 15,600,000, 4,368,000. 10 \times 10 \times 10 \times 26 \times 25 \times 24 = 15,600,000. 10 \times 9 \times 8 \times 26 \times 25 \times 24 = 11,232,000. 15,600,000 - 11,232,000 = 4,368,000. \]

PTS: 4  REF: 011037ia  STA: A.N.8  TOP: Permutations

158 ANS:
\[ 26 \times 25 \times 24 \times 23 = 358,800. 10^6 = 1,000,000. \text{Use the numeric password since there are over 500,000 employees} \]

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

159 ANS: 4
\[ 25(x - 3) = 25x - 75 \]

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

160 ANS: 4
\[ A = lw = (3w - 7)(w) = 3w^2 - 7w \]

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

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

162 ANS: 4
\[ 5(x + 4) = 5x + 20 \]

PTS: 2  REF: 081013ia  STA: A.A.1  TOP: Expressions
Not all of the homework problems are equations. The first problem is an expression.

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

\[3p = 21\]

\[p = 7\]
177 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

178 ANS: 2
Debbie failed to distribute the 3 properly.

PTS: 2  REF: 011009ia  STA: A.A.22  TOP: Solving Equations

179 ANS: 4.
\[3 + 2g = 5g - 9\]
\[12 = 3g\]
\[g = 4\]

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

180 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
181 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

182 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

183 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
184 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

185 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

186 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

187 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

188 ANS: 2
PTS: 2 REF: 080901ia STA: A.A.4
TOP: Modeling Equations
Let $x =$ youngest brother and $x + 4 =$ oldest brother. $3x - (x + 4) = 48.$

\[
2x - 4 = 48 \\
2x = 52 \\
x = 26
\]

\[
7, 9, 11. \ x + (x + 2) + (x + 4) = 5(x + 2) - 18 \\
3x + 6 = 5x - 8 \\
14 = 2x \\
7 = x
\]
\[ a + ar = b + r \]
\[ a(1 + r) = b + r \]
\[ a = \frac{b + r}{1 + r} \]

PTS: 2  REF: 060913ia  STA: A.A.23  TOP: Transforming Formulas

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

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

\[ \frac{ey}{n} + k = t \]
\[ \frac{ey}{n} = t - k \]
\[ y = \frac{n(t - k)}{e} \]

PTS: 2  REF: 011125ia  STA: A.A.23  TOP: Transforming Formulas

200 ANS: 4

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

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

201 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

202 ANS: 1

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

PTS: 2  REF: 081230ia  STA: A.A.23  TOP: Transforming Formulas

203 ANS: 3  PTS: 2  REF: 011125ia  STA: A.A.23  TOP: Transforming Formulas
\[ \begin{align*} bc + ac &= ab \\
\frac{c}{b + a} &= ab \\
\frac{ab}{b + a} &= c \\
\end{align*} \]

**PTS:** 2  
**REF:** 081131ia  
**STA:** A.A.23  
**TOP:** Transforming Formulas

205  
**ANS:** 3  
\[
\frac{0.75 \text{ hours}}{1} = \frac{x}{45} \\
x = 5400
\]

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

206  
**ANS:** 3  
\[
\frac{120}{60} = \frac{m}{150} \\
m = 300
\]

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

207  
**ANS:**  
\[
\frac{2160}{25} = \frac{x}{45} \\
25x = 54,000 \\
x = 2,160
\]

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

208  
**ANS:**  
\[
\frac{225}{15} = 15 \text{ mpg} \text{ is greater than } \frac{290}{23.2} = 12.5 \text{ mpg}
\]

**PTS:** 2  
**REF:** 060831ia  
**STA:** A.M.1  
**TOP:** Using Rate

209  
**ANS:** 4  
\[
\frac{\text{distance}}{\text{time}} = \frac{24}{6} = 4
\]

**PTS:** 2  
**REF:** 010902ia  
**STA:** A.M.1  
**TOP:** Speed

210  
**ANS:** 4  
\[
\frac{5}{45} = \frac{8}{x} \\
5x = 360 \\
x = 72
\]

**PTS:** 2  
**REF:** 060901ia  
**STA:** A.M.1  
**TOP:** Speed
211 ANS: 4
\[ s = \frac{d}{t} = \frac{150 \text{ m}}{1.5 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 6,000 \text{ m/hr} \]

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

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

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

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

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

214 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

215 ANS:
111.25. \[ \frac{\text{distance}}{\text{time}} = \frac{89}{0.8} = 111.25 \]

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

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

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

217 ANS:
50, 1.5, 10. \[ \frac{\text{distance}}{\text{time}} = \frac{60}{1.2} = 50. \] \[ \frac{\text{distance}}{\text{time}} = \frac{60}{40} = 1.5. \] speed \( \times \) time = 55 \( \times \) 2 = 110. 120 – 110 = 10

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

218 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

219 ANS: 4
\[ \frac{344 \text{ m}}{\text{sec}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr}} = 1,238,400 \text{ m/hr} \]

PTS: 2 REF: 060911ia STA: A.M.2 TOP: Conversions KEY: dimensional analysis
\[ \frac{3}{4} \times 5 = \frac{15}{4} \text{ teaspoons} \times \frac{1 \text{ tablespoon}}{3 \text{ teaspoons}} = \frac{5}{4} = 1 \frac{1}{4} \text{ tablespoon} \]

PTS: 2  
REF: 061228ia  
STA: A.M.2  
TOP: Conversions  
KEY: dimensional analysis

\[ 8900 \text{ ft} \times \frac{1 \text{ mi}}{5280 \text{ ft}} \approx 1.7 \text{ mi} \]

PTS: 2  
REF: 081210ia  
STA: A.M.2  
TOP: Conversions  
KEY: dimensional analysis

\[ 48 \text{ inches} \times \frac{1 \text{ yard}}{36 \text{ inches}} = \frac{4}{3} \text{ yards} \times 3.75 = 5.00 \]

PTS: 2  
REF: 011131ia  
STA: A.M.2  
TOP: Conversions  
KEY: dimensional analysis

\[ 16 \text{ feet equals } 4 \text{ yards} \times 4 = 16. \]

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

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

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

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

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

\[ \frac{11}{6}, 16.67\%, \$13.50. \quad \frac{18 - 15}{18} = \frac{1}{6}. \quad 18 \times 0.75 = 13.5 \]

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

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

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

\[ 259.99 \times 1.07 - 259.99(1 - 0.3) \times 1.07 = 83.46 \]

PTS: 4  
REF: 011239ia  
STA: A.N.5  
TOP: Percents
229 ANS: 4
\[ \frac{150}{20} = \frac{x}{30} \]
\[ 20x = 4500 \]
x = 225

PTS: 2  REF: 081101ia  STA: A.N.5  TOP: Direct Variation

230 ANS: 
d = 6.25h, 250. \ d = 6.25(40) = 250

PTS: 2  REF: 010933ia  STA: A.N.5  TOP: Direct Variation

231 ANS: 2  PTS: 2  REF: 080823ia  STA: A.A.32  TOP: Slope

232 ANS: 2  PTS: 2  REF: 081223ia  STA: A.A.32  TOP: Slope

233 ANS: 1  PTS: 2  REF: 081115ia  STA: A.A.32  TOP: Slope

234 ANS: 3  
m = \frac{4 - 10}{3 - (-6)} = \frac{-2}{3}

PTS: 2  REF: fall0716ia  STA: A.A.33  TOP: Slope

235 ANS: 3  
m = \frac{1 - (-4)}{-6 - 4} = \frac{-1}{2}

PTS: 2  REF: 060820ia  STA: A.A.33  TOP: Slope

236 ANS: 2  
m = \frac{5 - 3}{2 - 7} = \frac{-2}{5}

PTS: 2  REF: 010913ia  STA: A.A.33  TOP: Slope

237 ANS: 1  
m = \frac{4 - (-4)}{-5 - 15} = \frac{-2}{5}

PTS: 2  REF: 080915ia  STA: A.A.33  TOP: Slope

238 ANS: 2  
m = \frac{5 - 2}{3 - (-2)} = \frac{3}{5}

PTS: 2  REF: 061004ia  STA: A.A.33  TOP: Slope
239 ANS: 3
\[ m = \frac{6 - 4}{3 - (-2)} = \frac{2}{5} \]

PTS: 2        REF: 061110ia        STA: A.A.33        TOP: Slope

240 ANS: 4
\[ m = \frac{-3 - 1}{2 - 5} = \frac{-4}{-3} = \frac{4}{3} \]

PTS: 2        REF: 011215ia        STA: A.A.33        TOP: Slope

241 ANS: 4
\[ A(-3,4) \text{ and } B(5,8). \quad m = \frac{4 - 8}{-3 - 5} = \frac{-4}{-8} = \frac{1}{2} \]

PTS: 2        REF: 011007ia        STA: A.A.33        TOP: Slope

242 ANS: 2
\[ A(-3,8) \text{ and } B(3,6). \quad m = \frac{8 - 6}{-3 - 3} = \frac{2}{-6} = -\frac{1}{3} \]

PTS: 2        REF: 081005ia        STA: A.A.33        TOP: Slope

243 ANS: 2
\[ m = \frac{-A}{B} = \frac{-3}{-7} = \frac{3}{7} \]

PTS: 2        REF: 011122ia        STA: A.A.37        TOP: Slope

244 ANS: 4
\[ m = \frac{-A}{B} = \frac{(-3)}{2} = \frac{3}{2} \]

PTS: 2        REF: 061212ia        STA: A.A.37        TOP: Slope
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic
Answer Section

245 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

246 ANS: 1
\( y = mx + b \)
\(-6 = (-3)(4) + b \)
\[ b = 6 \]

PTS: 2 REF: 060922ia STA: A.A.34 TOP: Writing Linear Equations

247 ANS: 4
\( y = mx + b \)
\(-1 = (2)(3) + b \)
\[ b = -7 \]

PTS: 2 REF: 080927ia STA: A.A.34 TOP: Writing Linear Equations

248 ANS: 1
\( y = mx + b \)
\( 5 = (-2)(1) + b \)
\[ b = 7 \]

PTS: 2 REF: 081108ia STA: A.A.34 TOP: Writing Linear Equations

249 ANS: 3
\( y = mx + b \quad y = \frac{3}{4} x - \frac{1}{2} \)
\[ 1 = \left( \frac{3}{4} \right) (2) + b \quad 4y = 3x - 2 \]
\[ 1 = \frac{3}{2} + b \]
\[ b = -\frac{1}{2} \]

PTS: 2 REF: 081219ia STA: A.A.34 TOP: Writing Linear Equations
250 ANS: 
\[ y = \frac{3}{4} x + 10 \]  \[ y = mx + b \]  
\[ 4 = \frac{3}{4} (-8) + b \]  
\[ 4 = -6 + b \]  
\[ 10 = b \]  

PTS: 3  REF: 011134ia  STA: A.A.34  TOP: Writing Linear Equations

251 ANS: 1  
\[ m = \frac{3 - 0}{0 - 2} = -\frac{3}{2} \]  
Using the given \( y \)-intercept \((0, 3)\) to write the equation of the line \( y = -\frac{3}{2} x + 3 \).

PTS: 2  REF: fall0713ia  STA: A.A.35  TOP: Writing Linear Equations

252 ANS: 3  
\[ m = \frac{7 - 3}{-3 - 3} = \frac{4}{-6} = -\frac{2}{3} \]  
\[ y = mx + b \]  
\[ 3 = -\frac{2}{3} (3) + b \]  
\[ 3 = -2 + b \]  
\[ 5 = b \]  

PTS: 2  REF: 011013ia  STA: A.A.35  TOP: Writing Linear Equations

253 ANS: 2  
\[ m = \frac{5 - 3}{8 - 1} = \frac{2}{7} \]  
\[ y - y_1 = m(x - x_1) \]  
\[ y - 5 = \frac{2}{7} (x - 8) \]  

PTS: 2  REF: 081029ia  STA: A.A.35  TOP: Writing Linear Equations

254 ANS: 2  
\[ y = \frac{2}{5} x + 2 \]  
\[ m = \frac{4 - 0}{5 - (-5)} = \frac{2}{5} \]  
\[ y = mx + b \]  
\[ 4 = \frac{2}{5} (5) + b \]  
\[ b = 2 \]  

PTS: 3  REF: 080836ia  STA: A.A.35  TOP: Writing Linear Equations

256 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
257 ANS: 3
2(1)+3=5

PTS: 2 REF: 061007ia STA: A.A.39 TOP: Linear Equations

258 ANS: 4

PTS: 2 REF: 081016ia STA: A.A.39 TOP: Identifying Points on a Line

259 ANS: 4

PTS: 2 REF: 011218ia STA: A.A.39 TOP: Identifying Points on a Line

260 ANS: 4
2(2) – (-7) = 11

PTS: 2 REF: 081217ia STA: A.A.39 TOP: Identifying Points on a Line

261 ANS: 2
TOP: Parallel and Perpendicular Lines

262 ANS: 1
TOP: Parallel and Perpendicular Lines

263 ANS: 2
TOP: Parallel and Perpendicular Lines

264 ANS: 4
TOP: Parallel and Perpendicular Lines

265 ANS: 1
The slope of both is -4.

PTS: 2 REF: 060814ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

266 ANS: 1
The slope of $y = 3 - 2x$ is -2. Using $m = \frac{-4}{B}$, the slope of $4x + 2y = 5$ is $\frac{-4}{2} = -2$.

PTS: 2 REF: 010926ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

267 ANS: 1
The slope of $2x - 4y = 16$ is $\frac{-4}{B} = \frac{-2}{-4} = \frac{1}{2}$

PTS: 2 REF: 011026ia STA: A.A.38 TOP: Parallel and Perpendicular Lines

268 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
269  ANS: 1
3(2m - 1) ≤ 4m + 7
6m - 3 ≤ 4m + 7
2m ≤ 10
m ≤ 5

PTS: 2  REF: 081002ia  STA: A.A.24  TOP: Solving Inequalities

270  ANS: 4
-6x - 17 ≥ 8x + 25
-42 ≥ 14x
-3 ≥ x

PTS: 2  REF: 081121ia  STA: A.A.24  TOP: Solving Inequalities

271  ANS:
2(x - 4) ≥ \frac{1}{2}(5 - 3x)
4(x - 4) ≥ 5 - 3x
4x - 16 ≥ 5 - 3x
7x ≥ 21
x ≥ 3

PTS: 3  REF: 011234ia  STA: A.A.24  TOP: Solving Inequalities

272  ANS: 1
-2x + 5 > 17
-2x > 12
x < -6

PTS: 2  REF: fall0724ia  STA: A.A.21  TOP: Interpreting Solutions

273  ANS: 4
-4x + 2 > 10
-4x > 8
x < -2

PTS: 2  REF: 080805ia  STA: A.A.21  TOP: Interpreting Solutions
\[ \frac{4}{3} x + 5 < 17 \]
\[ \frac{4}{3} x < 12 \]
\[ 4x < 36 \]
\[ x < 9 \]

PTS: 2  REF: 060914ia  STA: A.A.21  TOP: Interpreting Solutions

\[ -2(x - 5) < 4 \]
\[ -2x + 10 < 4 \]
\[ -2x < -6 \]
\[ x > 3 \]

PTS: 2  REF: 080913ia  STA: A.A.21  TOP: Interpreting Solutions

\[ -12.  3 \left( \frac{2}{3} x + 3 < -2x - 7 \right) \]
\[ x + 9 < -6x - 21 \]
\[ 7x < -30 \]
\[ x < -\frac{30}{7} \]

PTS: 3  REF: 061034ia  STA: A.A.21  TOP: Interpreting Solutions

\[ \text{TOP: Modeling Inequalities} \]

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\[ \text{TOP: Modeling Inequalities} \]
284 \text{ANS: 1} \\
0.07m + 19 \leq 29.50 \\
0.07m \leq 10.50 \\
m \leq 150 \\
\text{PTS: 2} \quad \text{REF: 010904ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

285 \text{ANS: 1} \\
13.95 + 0.49s \leq 50.00 \\
0.49s \leq 36.05 \\
s \leq 73.57 \\
\text{PTS: 2} \quad \text{REF: 080904ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

286 \text{ANS: 3} \\
5x < 55 \\
x < 11 \\
\text{PTS: 2} \quad \text{REF: 061211ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

287 \text{ANS: 4} \\
375 + 155w \geq 900 \\
155w \geq 525 \\
w \geq 3.4 \\
\text{PTS: 2} \quad \text{REF: 081206ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

288 \text{ANS:} \\
7. \ 15x + 22 \geq 120 \\
x \geq 6.53 \\
\text{PTS: 3} \quad \text{REF: fall0735ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

289 \text{ANS:} \\
10 + 2d \geq 75, \ 33. \ 10 + 2d \geq 75 \\
d \geq 32.5 \\
\text{PTS: 3} \quad \text{REF: 060834ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

290 \text{ANS:} \\
0.65x + 35 \leq 45 \\
0.65x \leq 10 \\
x \leq 15 \\
\text{PTS: 3} \quad \text{REF: 061135ia} \quad \text{STA: A.A.6} \quad \text{TOP: Modeling Inequalities}

291 \text{ANS: 4} \quad \text{PTS: 2} \quad \text{REF: 061028ia} \quad \text{STA: A.G.6} \\
\text{TOP: Linear Inequalities}
The slope of the inequality is \(-\frac{1}{2}\).

\[(1, -3)\] is in the solution set. \(4(1) - 3(-3) > 9\)

\[4 + 9 > 9\]
300 ANS:

. Graph becomes wider as the coefficient approaches 0.

PTS: 3 REF: 061035ia STA: A.G.5 TOP: Graphing Absolute Value Functions

301 ANS:

The graph becomes steeper.

PTS: 3 REF: 081134ia STA: A.G.5 TOP: Graphing Absolute Value Functions

302 ANS: 2

\[2x^2 + 10x - 12 = 2(x^2 + 5x - 6) = 2(x + 6)(x - 1)\]

PTS: 2 REF: 080806ia STA: A.A.20 TOP: Factoring Polynomials

303 ANS: 2 PTS: 2

TOP: Factoring Polynomials

304 ANS: 2 PTS: 2

TOP: Factoring Polynomials

305 ANS: 4

\[3x^3 - 33x^2 + 90x = 3x(x^2 - 11x + 30) = 3x(x - 5)(x - 6)\]

PTS: 2 REF: 061227ia STA: A.A.20 TOP: Factoring Polynomials
306 ANS: 3  PTS: 2  REF: fall0706ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

307 ANS: 1  PTS: 2  REF: 060804ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

308 ANS: 2  PTS: 2  REF: 010909ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

309 ANS: 1  PTS: 2  REF: 080902ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

310 ANS: 2  PTS: 2  REF: 011022ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

311 ANS: 3  PTS: 2  REF: 081008ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

312 ANS: 2
\[ a^3 - 4a = a(a^2 - 4) = a(a - 2)(a + 2) \]

PTS: 2  REF: 011108ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

313 ANS: 3  PTS: 2  REF: 061101ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

314 ANS: 2
\[ 36x^2 - 100y^6 = 4(9x^2 - 25y^6) = 4(3x + 5y^3)(3x - 5y^3) \]

PTS: 2  REF: 081129ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

315 ANS: 2  PTS: 2  REF: 011201ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

316 ANS: 3  PTS: 2  REF: 081207ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

317 ANS:
\[ 4x(x + 3)(x - 3). \ 4x^3 - 36x = 4x(x^2 - 9) = 4x(x + 3)(x - 3) \]

PTS: 2  REF: 060932ia  STA: A.A.19
TOP: Factoring the Difference of Perfect Squares

318 ANS: 3
\[ x^2 - 6x = 0 \]
\[ x(x - 6) = 0 \]
\[ x = 0 \ x = 6 \]

PTS: 2  REF: 080921ia  STA: A.A.27
TOP: Solving Quadratics by Factoring

319 ANS: 3
\[ x^2 - 10x + 21 = 0 \]
\[ (x - 7)(x - 3) = 0 \]
\[ x = 7 \ x = 3 \]

PTS: 2  REF: 010914ia  STA: A.A.28
TOP: Roots of Quadratics
320 ANS: 4  
\[x^2 - 7x + 6 = 0\]  
\[(x - 6)(x - 1) = 0\]  
\[x = 6, x = 1\]  

PTS: 2  REF: 060902ia  STA: A.A.28  TOP: Roots of Quadratics

321 ANS: 2  
\[x^2 - 2x - 15 = 0\]  
\[(x - 5)(x + 3) = 0\]  
\[x = 5, x = -3\]  

PTS: 2  REF: 011128ia  STA: A.A.28  TOP: Roots of Quadratics

322 ANS: 2  
\[x^2 - 5x + 6 = 0\]  
\[(x - 3)(x - 2) = 0\]  
\[x = 3, x = 2\]  

PTS: 2  REF: 081120ia  STA: A.A.28  TOP: Roots of Quadratics

323 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

324 ANS: -2, 3.  
\[x^2 - x = 6\]  
\[x^2 - x - 6 = 0\]  
\[(x - 3)(x + 2) = 0\]  
\[x = 3 \text{ or } -2\]  

PTS: 3  REF: 011034ia  STA: A.A.28  TOP: Roots of Quadratics

325 ANS: -15, 2  
\[x^2 + 13x - 30 = 0\]  
\[(x + 15)(x - 2) = 0\]  
\[x = -15, 2\]  

PTS: 3  REF: 081036ia  STA: A.A.28  TOP: Roots of Quadratics

326 ANS: 4  PTS: 2  REF: 060829ia  STA: A.G.5  TOP: Graphing Quadratic Functions

327 ANS: 2  PTS: 2  REF: 061113ia  STA: A.G.5  TOP: Graphing Quadratic Functions
\[ x^2 - 36 = 5x \]
\[ x^2 - 5x - 36 = 0 \]
\[ (x - 9)(x + 4) = 0 \]
\[ x = 9 \]
336 ANS: 3
\[ b = 3 + d \quad (3 + d)d = 40 \]
\[ bd = 40 \quad d^2 + 3d - 40 = 0 \]
\[ (d + 8)(d - 5) = 0 \]
\[ d = 5 \]

PTS: 2 REF: 011208ia STA: A.A.8 TOP: Writing Quadratics

337 ANS:
6, 8, 10. Three consecutive even integers are \( x \), \( x + 2 \) and \( x + 4 \). \((x + 2)(x + 4) = 10x + 20\)
\[ x^2 + 6x + 8 = 10x + 20 \]
\[ x^2 - 4x - 12 = 0 \]
\[ (x - 6)(x + 2) = 0 \]
\[ x = 6 \]

PTS: 4 REF: 011039ia STA: A.A.8 TOP: Writing Quadratics

338 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

339 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

340 ANS:
w\((w + 15) = 54, 3, 18. \quad w(w + 15) = 54 \]
\[ w^2 + 15w - 54 = 0 \]
\[ (w + 18)(w - 3) = 0 \]
\[ w = 3 \]

PTS: 4 REF: 060837ia STA: A.A.8 TOP: Geometric Applications of Quadratics

341 ANS: 1

TOP: Identifying the Vertex of a Quadratic Given Graph

342 ANS: 1

TOP: Identifying the Vertex of a Quadratic Given Graph
343 ANS: 2 PTS: 2 REF: 010916ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

344 ANS: 2 PTS: 2 REF: 011015ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

345 ANS: 1 PTS: 2 REF: 061005ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

346 ANS: 2 PTS: 2 REF: 081111ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

347 ANS: 4 PTS: 2 REF: 081214ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

348 ANS: 
\[ x = 1; (1, -5) \]

PTS: 2 REF: 061133ia STA: A.G.10
TOP: Identifying the Vertex of a Quadratic Given Graph

349 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-(-16)}{2(1)} = 8. \]
\[ y = (8)^2 - 16(8) + 63 = -1 \]

PTS: 2 REF: 060918ia STA: A.A.41
TOP: Identifying the Vertex of a Quadratic Given Equation

350 ANS: 3
\[ x = \frac{-b}{2a} = \frac{-10}{2(-1)} = 5. \]

PTS: 2 REF: 081018ia STA: A.A.41
TOP: Identifying the Vertex of a Quadratic Given Equation

351 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-6}{2(-1)} = 3. \]

PTS: 2 REF: 011127ia STA: A.A.41
TOP: Identifying the Vertex of a Quadratic Given Equation

352 ANS: 1
\[ x = \frac{-b}{2a} = \frac{-(-3)}{2(2)} = \frac{3}{4}. \]

PTS: 2 REF: 011219ia STA: A.A.41
TOP: Identifying the Vertex of a Quadratic Given Equation

353 ANS: 3
\[ x = \frac{-b}{2a} = \frac{-24}{2(-2)} = 6. \]
\[ y = -2(6)^2 + 24(6) - 100 = -28 \]

PTS: 2 REF: 061214ia STA: A.A.41
TOP: Identifying the Vertex of a Quadratic Given Equation
ANS:  
\[ x = \frac{-b}{2a} = \frac{-(-8)}{2(-2)} = -2 \]
\[ y = -2(-2)^2 - 8(-2) + 3 = 11 \]

PTS: 3  REF: 080934ia  STA: A.A.41  TOP: Identifying the Vertex of a Quadratic Given Equation

ANS: 3  
\[ 5x + 2y = 48 \]
\[ 3x + 2y = 32 \]
\[ 2x = 16 \]
\[ x = 8 \]

PTS: 2  REF: fall0708ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 2  
\[ x + 2y = 9 \]
\[ x - y = 3 \]
\[ 3y = 6 \]
\[ y = 2 \]

PTS: 2  REF: 060925ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 1  
\[ x - 2y = 1 \]
\[ x + 4y = 7 \]
\[ -6y = -6 \]
\[ y = 1 \]

PTS: 2  REF: 080920ia  STA: A.A.10  TOP: Solving Linear Systems

ANS: 3  
\[ c + 3d = 8 \quad c = 4d - 6 \]
\[ 4d - 6 + 3d = 8 \quad c = 4(2) - 6 \]
\[ 7d = 14 \quad c = 2 \]
\[ d = 2 \]

PTS: 2  REF: 061012ia  STA: A.A.10  TOP: Solving Linear Systems
359\ ANS: 2
\[2(x - 3y = -3)\]
\[2x + y = 8\]
\[2x - 6y = -6\]
\[7y = 14\]
\[y = 2\]

PTS: 2 \ REF: 081021ia \ STA: A.A.10 \ TOP: Solving Linear Systems

360\ ANS: 3
\[2x - 5y = 11\]
\[2x - 5(-1) = 11\]
\[-2x + 3y = -9\]
\[2x = 6\]
\[-2y = 2\]
\[x = 3\]
\[y = -1\]

PTS: 2 \ REF: 081109ia \ STA: A.A.10 \ TOP: Solving Linear Systems

361\ ANS:
2. Subtracting the equations: 3\(y = 6\)
\[y = 2\]

PTS: 2 \ REF: 061231ia \ STA: A.A.10 \ TOP: Solving Linear Systems

362\ 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

363\ ANS: 3 \ PTS: 2 \ REF: 081201ia \ STA: A.G.7 \ TOP: Solving Linear Systems

364\ ANS:

PTS: 4 \ REF: 080938ia \ STA: A.G.7 \ TOP: Solving Linear Systems
365 ANS:

\[3c + 4m = 12.50\]
\[3c + 2m = 8.50\]
\[2m = 4.00\]
\[m = 2.00\]

PTS: 3 REF: 011235ia STA: A.G.7 TOP: Solving Linear Systems

366 ANS: 2
\[b = 42 - r\]
\[r = 2b + 3\]
\[r = 2b + 3\]
\[r = 2(42 - r) + 3\]
\[r = 84 - 2r + 3\]
\[3r = 87\]
\[r = 29\]

PTS: 2 REF: 060806ia STA: A.A.7 TOP: Writing Linear Systems

367 ANS: 3
\[s + o = 126\]
\[s + 2s = 126\]
\[o = 2s\]
\[s = 42\]

PTS: 2 REF: 060812ia STA: A.A.7 TOP: Writing Linear Systems

368 ANS: 2
\[L + S = 47\]
\[L - S = 15\]
\[2L = 62\]
\[L = 31\]

PTS: 2 REF: 060912ia STA: A.A.7 TOP: Writing Linear Systems
370 ANS: 1
so $= f + 60$  $j = 2f - 50$  $se = 3f$.  $f + (f + 60) + (2f - 50) + 3f = 1424$

$$7f + 10 = 1424$$

$$f = 202$$

PTS: 2  REF: 060917ia  STA: A.A.7  TOP: Writing Linear Systems

371 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

372 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

373 ANS: 1
$f + m = 53$
$f - m = 25$

$$2m = 28$$

$$m = 14$$

PTS: 2  REF: 061126ia  STA: A.A.7  TOP: Writing Linear Systems

374 ANS: 1
$b = 2j + 4$  $2j + 4 = 31 - j$

$$b + j = 31$$

$$3j = 27$$

$$b = 31 - j$$

$$j = 9$$

PTS: 2  REF: 081119ia  STA: A.A.7  TOP: Writing Linear Systems

375 ANS: 2
$W + L = 72$
$W - L = 12$

$$2W = 84$$

$$W = 42$$

PTS: 2  REF: 081227ia  STA: A.A.7  TOP: Writing Linear Systems
376 ANS:
\[ m = 50\text{¢}, \ p = 15\text{¢}. \ 3m + 2p = 1.80. \ 9m + 6p = 5.40. \ 4(0.50) + 6p = 2.90 \]
\[ 4m + 6p = 2.90 \quad 4m + 6p = 2.90 \quad 6p = 0.90 \]
\[ 5m = 2.50 \quad p = 0.15 \]
\[ m = 0.50 \]

PTS: 4 REF: 080837ia STA: A.A.7 TOP: Writing Linear Systems

377 ANS: 1 PTS: 2 REF: 061010ia STA: A.A.40
TOP: Systems of Linear Inequalities

378 ANS: 2 PTS: 2 REF: 081127ia STA: A.A.40
TOP: Systems of Linear Inequalities

379 ANS: 4 PTS: 2 REF: 061222ia STA: A.A.40
TOP: Systems of Linear Inequalities

380 ANS: 4 PTS: 2 REF: 080825ia STA: A.A.40
TOP: Systems of Linear Inequalities

381 ANS: 2 PTS: 2 REF: 011023ia STA: A.A.40
TOP: Systems of Linear Inequalities

382 ANS:

PTS: 4 REF: 010938ia STA: A.G.7 TOP: Systems of Linear Inequalities

383 ANS:

PTS: 4 REF: 081037ia STA: A.G.7 TOP: Systems of Linear Inequalities
384 ANS:

PTS: 4 REF: 011139ia STA: A.G.7 TOP: Systems of Linear Inequalities

385 ANS:

PTS: 4 REF: 061139ia STA: A.G.7 TOP: Systems of Linear Inequalities

386 ANS:

PTS: 4 REF: 081239ia STA: A.G.7 TOP: Systems of Linear Inequalities
\[ x^2 - 2 = x \] Since \( y = x \), the solutions are \((2, 2)\) 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

\[ x^2 + 5x + 6 = -x + 1 \] \( y = -x + 1 \)

\[ x^2 + 6x + 5 = 0 \] \( = -(5) + 1 \)

\[ (x + 5)(x + 1) = 0 \] \( = 6 \)

\[ x = -5 \text{ or } -1 \]

**PTS:** 2  **REF:** 080812ia  **STA:** A.A.11  **TOP:** Quadratic-Linear Systems

\[ x^2 - x - 20 = 3x - 15 \] \( y = 3x - 15 \)

\[ x^2 - 4x - 6 = 0 \] \( = 3(-1) - 15 \)

\[ (x = 5)(x + 1) = 0 \] \( = -18 \)

\[ x = 5 \text{ or } -1 \]

**PTS:** 2  **REF:** 010922ia  **STA:** A.A.11  **TOP:** Quadratic-Linear Systems

\[ x^2 - x = x + 3 \] Since \( y = x + 3 \), the solutions are \((3, 6)\) 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
\[ y = -x + 5 \quad \rightarrow -x + 5 = x^2 - 25 \quad \therefore y = -(6) + 5 = 11. \]

\[ 0 = x^2 + x - 30 \quad y = -5 + 5 = 0 \]
\[ 0 = (x + 6)(x - 5) \]
\[ x = -6, 5 \]

\[ y = - (x + 6) + 5 = 11 \]
\[ y = -5 + 5 = 0 \]

\[ \text{PTS: 2} \quad \text{REF: 061213ia} \quad \text{STA: A.A.11} \quad \text{TOP: Quadratic-Linear Systems} \]

\[ (3, -5), (3, 7). \quad x^2 + 2x - 8 = 2x + 1. \quad y = 2(3) + 1 = 7 \]
\[ x^2 - 9 = 0 \quad y = 2(-3) + 1 = -5 \]
\[ x = \pm 3 \]

\[ \text{PTS: 3} \quad \text{REF: 081236ia} \quad \text{STA: A.A.11} \quad \text{TOP: Quadratic-Linear Systems} \]

\[ 2y - 2x = 10 \quad \text{axis of symmetry: } x = \frac{-b}{2a} = \frac{-2}{2(1)} = -1 \]
\[ 2y = 2x + 10 \]
\[ y = x + 5 \]

\[ \text{PTS: 2} \quad \text{REF: 081010ia} \quad \text{STA: A.G.9} \quad \text{TOP: Quadratic-Linear Systems} \]

\[ 2y - 2x = 10 \quad \text{axis of symmetry: } x = \frac{-b}{2a} = \frac{-2}{2(1)} = -1 \]
\[ 2y = 2x + 10 \]
\[ y = x + 5 \]

\[ \text{PTS: 4} \quad \text{REF: fall0738ia} \quad \text{STA: A.G.9} \quad \text{TOP: Quadratic-Linear Systems} \]
398 ANS:

PTS: 4  REF: 080839ia  STA: A.G.9  TOP: Quadratic-Linear Systems

399 ANS:

PTS: 4  REF: 060939ia  STA: A.G.9  TOP: Quadratic-Linear Systems

400 ANS:

PTS: 4  REF: 061039ia  STA: A.G.9  TOP: Quadratic-Linear Systems
401 ANS: 

\[ -3(x - 4) - 2(x + 3) = -3x^2 + 12x - 6x = -5x^2 + 6x \]

PTS: 4 REF: 081138ia STA: A.G.9 TOP: Quadratic-Linear Systems

402 ANS: 4

\[ -3x(x - 4) - 2(x + 3) = -3x^2 + 12x - 6x = -5x^2 + 6x \]

PTS: 4 REF: 081138ia STA: A.G.9 TOP: Quadratic-Linear Systems

403 ANS: 3 PTS: 2 REF: 080819ia TOP: Addition and Subtraction of Monomials

404 ANS: 2 PTS: 2 REF: 060923ia TOP: Addition and Subtraction of Polynomials

405 ANS: 3 PTS: 2 REF: 061003ia TOP: Addition and Subtraction of Polynomials

406 ANS: 1 PTS: 2 REF: 011126ia TOP: Addition and Subtraction of Polynomials

407 ANS: 4 PTS: 2 REF: 061130ia TOP: Addition and Subtraction of Polynomials

408 ANS: 1 PTS: 2 REF: 011213ia TOP: Addition and Subtraction of Polynomials

409 ANS: 4 PTS: 2 REF: 061226ia TOP: Addition and Subtraction of Polynomials

410 ANS: 2 PTS: 2 REF: 081205ia TOP: Addition and Subtraction of Polynomials

411 ANS: 1 PTS: 2 REF: 060807ia TOP: Addition and Subtraction of Polynomials

412 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
\[ \frac{12x^2 - 6x^2 + 2x}{2x} = \frac{2x(6x^2 - 3x + 1)}{2x} = 6x^2 - 3x + 1 \]

PTS: 2    REF: 011011ia    STA: A.A.14    TOP: Division of Polynomials

\[ \begin{align*}
3a^2b^2 - 6a & \cdot \frac{45a^4b^3 - 90a^3b}{15a^2b} = \frac{45a^4b^3}{15a^2b} - \frac{90a^3b}{15a^2b} = 3a^2b^2 - 6a
\end{align*} \]

PTS: 2    REF: 081031ia    STA: A.A.14    TOP: Division of Polynomials

\[ \frac{3^6}{3^1} = 3^5 \]

PTS: 2    REF: 061219ia    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

\[ \frac{(2x^3)(8x^5)}{4x^6} = \frac{16x^8}{4x^6} = 4x^2 \]

PTS: 2    REF: fall0703ia    STA: A.A.12    TOP: Division of Powers

\[ \frac{3x^2m^6}{4} \]

PTS: 2    REF: 010932ia    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

\[
\left(\frac{4x^3}{2x}\right)^2 = \frac{16x^6}{2x} = 8x^5
\]

PTS: 2  REF: 011216ia  STA: A.A.12  TOP: Powers of Powers

\[
\frac{9.2 \times 10^6}{2.3 \times 10^2} = 4 \times 10^4
\]

PTS: 2  REF: 081006ia  STA: A.N.4  TOP: Operations with Scientific Notation

\[
6.56 \times 10^{-2}
\]

PTS: 2  REF: 081231ia  STA: A.N.4  TOP: Operations with Scientific Notation

\[
35000(1 - 0.05)^4 \approx 28507.72
\]

PTS: 2  REF: fall0719ia  STA: A.A.9  TOP: Exponential Functions

\[
500(1 + 0.06)^3 \approx 596
\]

PTS: 2  REF: 080929ia  STA: A.A.9  TOP: Exponential Functions

\[
R = 0.5^{d-1}
\]

PTS: 2  REF: 011006ia  STA: A.A.9  TOP: Exponential Functions
439 ANS: 1

\[ 15000(1.2)^\frac{6}{3} = 21,600. \quad 21,600 - 15,000 = 6,600 \]

PTS: 2  REF: 061030ia  STA: A.A.9  TOP: Exponential Functions

440 ANS: 2

\[ 2000(0.88)^3 = 13629.44 \]

PTS: 2  REF: 061124ia  STA: A.A.9  TOP: Exponential Functions

441 ANS: 2

\[ 2000(1 + 0.04)^3 \approx 2249 \]

PTS: 2  REF: 081124ia  STA: A.A.9  TOP: Exponential Functions

442 ANS: 1  PTS: 2  REF: 011202ia  STA: A.A.9  TOP: Exponential Functions

443 ANS: 2  PTS: 2  REF: 061229ia  STA: A.A.9  TOP: Exponential Functions

444 ANS: 3  PTS: 2  REF: 081211ia  STA: A.A.9  TOP: Exponential Functions

445 ANS:

\[ 5,583.86. \quad A = P(1 + R)^t = 5000(1 + 0.0375)^3 \approx 5583.86 \]

PTS: 3  REF: 060935ia  STA: A.A.9  TOP: Exponential Functions

446 ANS:

\[ 24,435.19. \quad 30000(0.95)^4 \approx 24435.19 \]

PTS: 4  REF: 011138ia  STA: A.A.9  TOP: Exponential Functions

447 ANS:

[Graph]

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
\[ \frac{\sqrt{32}}{4} = \frac{\sqrt{16 \cdot 2}}{4} = \sqrt{2} \]

\[ \sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2} \]

\[ \sqrt{32} = \sqrt{16 \cdot 2} = 4\sqrt{2} \]

\[ 5\sqrt{20} = 5\sqrt{4 \cdot 5} = 10\sqrt{5} \]

\[ 3\sqrt{250} = 3\sqrt{25 \cdot 10} = 15\sqrt{10} \]

\[ 2\sqrt{45} = 2\sqrt{9 \cdot 5} = 6\sqrt{5} \]

\[ 30\sqrt{2} = 5\sqrt{72} = 5\sqrt{36 \cdot 2} = 30\sqrt{2} \]

\[ -3\sqrt{48} = -3\sqrt{16 \cdot 3} = -12\sqrt{3} \]
ANS: 4

\[ 6\sqrt{50} + 6\sqrt{2} = 6\sqrt{25}\sqrt{2} + 6\sqrt{2} = 30\sqrt{2} + 6\sqrt{2} = 36\sqrt{2} \]

PTS: 2  REF: 011024ia  STA: A.N.3  TOP: Operations with Radicals

KEY: addition

ANS: 3

\[ \sqrt{72} - 3\sqrt{2} = \sqrt{36}\sqrt{2} - 3\sqrt{2} = 6\sqrt{2} - 3\sqrt{2} = 3\sqrt{2} \]

PTS: 2  REF: 061008ia  STA: A.N.3  TOP: Operations with Radicals

KEY: subtraction

ANS: 3

\[ 3\sqrt{2} + \sqrt{8} = 3\sqrt{2} + \sqrt{4}\sqrt{2} = 3\sqrt{2} + 2\sqrt{2} = 5\sqrt{2} \]

PTS: 2  REF: 011121ia  STA: A.N.3  TOP: Operations with Radicals

KEY: addition

ANS:

\[ -2\sqrt{3} \frac{16\sqrt{21}}{2\sqrt{7}} - 5\sqrt{12} = 8\sqrt{3} - 5\sqrt{4}\sqrt{3} = 8\sqrt{3} - 10\sqrt{3} = -2\sqrt{3} \]

PTS: 3  REF: 081136ia  STA: A.N.3  TOP: Operations with Radicals

ANS:

\[ 6\sqrt{3} \frac{3\sqrt{75} + \sqrt{27}}{3} = \frac{3\sqrt{25}\sqrt{3} + \sqrt{9}\sqrt{3}}{3} = \frac{15\sqrt{3} + 3\sqrt{3}}{3} = \frac{18\sqrt{3}}{3} = 6\sqrt{3} \]

PTS: 3  REF: 061236ia  STA: A.N.3  TOP: Operations with Radicals

ANS:

\[ 60 - 42\sqrt{5}. 3\sqrt{20} (2\sqrt{5} - 7) = 6\sqrt{100} - 21\sqrt{20} = 60 - 21\sqrt{4}\sqrt{5} = 60 - 42\sqrt{5} \]

PTS: 3  REF: 080834ia  STA: A.N.3  TOP: Operations with Radicals

KEY: multiplication

ANS: 2

\[ \frac{9x^4 - 27x^6}{3x^3} = \frac{9x^4(1 - 3x^2)}{3x^3} = 3x(1 - 3x^2) \]

PTS: 2  REF: fall0718ia  STA: A.A.16  TOP: Rational Expressions

KEY: a > 0

ANS: 2

\[ \frac{2x^2 - 12x}{x - 6} = \frac{2x(x - 6)}{x - 6} = 2x \]

PTS: 2  REF: 060824ia  STA: A.A.16  TOP: Rational Expressions

KEY: a > 0
\[
\frac{25x - 125}{x^2 - 25} = \frac{25(x - 5)}{(x + 5)(x - 5)} = \frac{25}{x + 5}
\]

PTS: 2 REF: 080821ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{x^2 - 2x - 15}{x^2 + 3x} = \frac{(x - 5)(x + 3)}{x(x + 3)} = \frac{x - 5}{x}
\]

PTS: 2 REF: 060921ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{x^2 - x - 6}{x^2 - 5x + 6} = \frac{(x - 3)(x + 2)}{(x - 3)(x + 2)} = \frac{x + 2}{x - 2}
\]

PTS: 2 REF: 011130ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{x^2 - 3x - 10}{x^2 - 25} = \frac{(x - 5)(x + 2)}{(x + 5)(x - 5)} = \frac{x + 2}{x + 5}
\]

PTS: 2 REF: 061216ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{2x^2(x^4 - 9x^2 + 1)}{2x^2} = x^2
\]

PTS: 2 REF: 081222ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{x - 1}{x + 2} \cdot \frac{x^2 - 1}{x^2 + 3x + 2} = \frac{(x + 1)(x - 1)}{(x + 2)(x + 1)}
\]

PTS: 2 REF: 011233ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\frac{x^2 - 5x - 24}{x - 8} = \frac{(x - 8)(x + 3)}{x - 8} = x + 3
\]

PTS: 2 REF: 061131ia STA: A.A.16 TOP: Rational Expressions
KEY: a > 0

\[
\text{ANS: 1} \quad \text{PTS: 2} \quad \text{REF: fall0728ia STA: A.A.15}
\]

TOP: Undefined Rationals
473 ANS: 3 PTS: 2 REF: 060817ia STA: A.A.15
TOP: Undefined Rationals

474 ANS: 2 PTS: 2 REF: 010925ia STA: A.A.15
TOP: Undefined Rationals

475 ANS: 4 PTS: 2 REF: 060916ia STA: A.A.15
TOP: Undefined Rationals

476 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

477 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

478 ANS: 4
\[ x^2 - 4x - 12 = 0 \]
\[ (x - 6)(x + 2) = 0 \]
\[ x = 6 \text{ or } x = -2 \]

PTS: 2 REF: 061125ia STA: A.A.15 TOP: Undefined Rationals

479 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

480 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

481 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
Integrated Algebra Regents Exam Questions by Performance Indicator: Topic
Answer Section

482 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

483 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

484 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

485 ANS:
\[ \frac{3}{4x-8} \cdot \frac{3x+6}{4x+12} \cdot \frac{x^2-4}{x+3} = \frac{3(x+2)}{4(x+3)} \cdot \frac{x+3}{(x+2)(x-2)} = \frac{3}{4(x-2)} \]

PTS: 3
REF: 010935ia
STA: A.A.18
TOP: Multiplication and Division of Rationals
KEY: division

486 ANS:
\[ \frac{x-7}{3x} \cdot \frac{2x^2-8x-42}{6x^2} + \frac{x^2-9}{x^2-3x} = \frac{2(x^2-4x-21)}{6x^2} \cdot \frac{x(x-3)}{(x+3)(x-3)} = \frac{(x-7)(x+3)}{3x} \cdot \frac{1}{x+3} = \frac{x-7}{3x} \]

PTS: 4
REF: 080937ia
STA: A.A.18
TOP: Multiplication and Division of Rationals
KEY: division

487 ANS:
\[ \frac{x^2+9x+14}{x^2-49} + \frac{3x+6}{x^2+x-56} = \frac{(x+7)(x+2)}{(x+7)(x-7)} \cdot \frac{(x+8)(x-7)}{3(x+2)} = \frac{x+8}{3} \]

PTS: 4
REF: 061037ia
STA: A.A.18
TOP: Multiplication and Division of Rationals
KEY: division

488 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
489 \[\frac{6}{5x} - \frac{2}{3x} = \frac{18x - 10x}{15x^2} = \frac{8x}{15x^2} = \frac{8}{15x}\]

PTS: 2 REF: 010921ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

490 \[\frac{6}{4a} - \frac{2}{3a} = \frac{18a - 8a}{12a^2} = \frac{10a}{12a^2} = \frac{5}{6a}\]

PTS: 2 REF: 060929ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

491 \[\frac{3}{2x} + \frac{4}{3x} = \frac{9x + 8x}{6x^2} = \frac{17x}{6x^2} = \frac{17}{6x}\]

PTS: 2 REF: 080917ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

492 \[\frac{2+x}{5x} - \frac{x-2}{5x} = \frac{2+x-x+2}{5x} = \frac{4}{5x}\]

PTS: 2 REF: 011025ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

493 \[\frac{3}{2x} + \frac{7}{4x} = \frac{12x + 14x}{8x^2} = \frac{26x}{8x^2} = \frac{13}{4x}\]

PTS: 2 REF: 061024ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

494 \[\frac{7}{12x} - \frac{y}{6x^2} = \frac{42x^2 - 12xy}{72x^3} = \frac{6x(7x - 2y)}{72x^3} = \frac{7x - 2y}{12x^2}\]

PTS: 2 REF: 011120ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

495 \[\frac{2y}{y+5} + \frac{10}{y+5} = \frac{2y+10}{y+5} = \frac{2(y+5)}{y+5} = 2\]

PTS: 2 REF: 081027ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

496 \[\frac{2y}{y+5} + \frac{10}{y+5} = \frac{2y+10}{y+5} = \frac{2(y+5)}{y+5} = 2\]

PTS: 2 REF: 011120ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

497 \[\frac{2y}{y+5} + \frac{10}{y+5} = \frac{2y+10}{y+5} = \frac{2(y+5)}{y+5} = 2\]

PTS: 2 REF: 061129ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

498 \[\frac{2y}{y+5} + \frac{10}{y+5} = \frac{2y+10}{y+5} = \frac{2(y+5)}{y+5} = 2\]

PTS: 2 REF: 011230ia STA: A.A.17 TOP: Addition and Subtraction of Rationals

TOP: Addition and Subtraction of Rationals
\[
\frac{5}{x} = \frac{x + 13}{6}
\]
\[x^2 + 13x = 30\]
\[x^2 + 13x - 30 = 0\]
\[(x + 15)(x - 2) = 0\]
\[x = -15 \text{ or } 2\]

PTS: 2  
REF: 060826ia  
STA: A.A.26  
TOP: Solving Rationals

\[
\frac{k + 4}{2} = \frac{k + 9}{3}
\]
\[3(k + 4) = 2(k + 9)\]
\[3k + 12 = 2k + 18\]
\[k = 6\]

PTS: 2  
REF: 010906ia  
STA: A.A.26  
TOP: Solving Rationals

\[
\frac{2}{x} - 3 = \frac{26}{x}
\]
\[-3 = \frac{24}{x}\]
\[x = -8\]

PTS: 2  
REF: 010918ia  
STA: A.A.26  
TOP: Solving Rationals
$\frac{x + 2}{x - 2} = \frac{-3}{x}$

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

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

$x^2 + 5x - 6 = 0$

$(x + 6)(x - 1) = 0$

$x = -6 \text{ or } 1$

**PTS:** 2  **REF:** 011028ia  **STA:** A.A.26  **TOP:** Solving Rationals

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$\frac{2x - 3}{x - 4} = \frac{2}{3}$

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

$6x - 9 = 2x - 8$

$4x = 1$

$x = \frac{1}{4}$

**PTS:** 2  **REF:** 081012ia  **STA:** A.A.26  **TOP:** Solving Rationals

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$\frac{2}{x + 1} = \frac{x + 1}{2}$

$x^2 + 2x + 1 = 4$

$x^2 + 2x - 3 = 0$

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

$x = -3, 1$

**PTS:** 2  **REF:** 081226ia  **STA:** A.A.26  **TOP:** Solving Rationals
505 ANS:

6, -2. \( \frac{x + 1}{x} = \frac{-7}{x - 12} \)

\((x + 1)(x - 12) = -7x\)
\(x^2 - 11x - 12 = -7x\)
\(x^2 - 4x - 12 = 0\)
\((x - 6)(x + 2) = 0\)
\(x = 6\) or \(-2\)

PTS: 4 REF: fall0739ia STA: A.A.26 TOP: Solving Rationals

506 ANS:

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

\((x + 2)(x - 1) = 18\)
\(x^2 - x + 2x - 2 = 18\)
\(x^2 + x - 20 = 0\)
\((x + 5)(x - 4) = 0\)
\(x = -5\) or \(4\)

PTS: 3 REF: 011136ia STA: A.A.26 TOP: Solving Rationals

507 ANS:

\(-\frac{9}{4} = \frac{3}{4} = \frac{-(x + 11)}{4x} + \frac{1}{2x}\)

\(\frac{3}{4} = \frac{-x - 11}{4x} + \frac{2}{4x}\)
\(\frac{3}{4} = \frac{-x - 9}{4x}\)

12x = -4x - 36
16x = -36
\(x = -\frac{9}{4}\)

PTS: 4 REF: 061137ia STA: A.A.26 TOP: Solving Rationals

508 ANS: 4 PTS: 2 REF: fall0717ia STA: A.G.4 TOP: Families of Functions

509 ANS: 1 PTS: 2 REF: 060801ia STA: A.G.4 TOP: Families of Functions
510 ANS: 1  PTS: 2  REF: 010905ia  STA: A.G.4
TOP: Families of Functions

511 ANS: 4  PTS: 2  REF: 081025ia  STA: A.G.4
TOP: Families of Functions

512 ANS: 4  PTS: 2  REF: 061111ia  STA: A.G.4
TOP: Families of Functions

513 ANS: 3  PTS: 2  REF: 081118ia  STA: A.G.4
TOP: Families of Functions

514 ANS: 3  PTS: 2  REF: 080925ia  STA: A.G.4
TOP: Identifying the Equation of a Graph

515 ANS: 4  PTS: 2  REF: 061221ia  STA: A.G.4
TOP: Identifying the Equation of a Graph

516 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

517 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

518 ANS: 2
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

519 ANS: 4
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

520 ANS: 4  PTS: 2  REF: fall0730ia  STA: A.G.3
TOP: Defining Functions

521 ANS: 4  PTS: 2  REF: 010930ia  STA: A.G.3
TOP: Defining Functions

522 ANS: 3  PTS: 2  REF: 060919ia  STA: A.G.3
TOP: Defining Functions

523 ANS: 4  PTS: 2  REF: 061013ia  STA: A.G.3
TOP: Defining Functions

524 ANS: 3  PTS: 2  REF: 011204ia  STA: A.G.3
TOP: Defining Functions

525 ANS: 1  PTS: 2  REF: 061209ia  STA: A.G.3
TOP: Defining Functions

526 ANS: 1
$30^2 + 40^2 = c^2$.  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
527 ANS: 3  PTS: 2  REF: 060825ia  STA: A.A.45  TOP: Pythagorean Theorem
528 ANS: 4
\[16^2 + b^2 = 34^2\]
\[b^2 = 900\]
\[b = 30\]

PTS: 2  REF: 080809ia  STA: A.A.45  TOP: Pythagorean Theorem
529 ANS: 3
\[3^2 + 5^2 = x^2\]
\[34 = x^2\]
\[\sqrt{34} = x\]

PTS: 2  REF: 060909ia  STA: A.A.45  TOP: Pythagorean Theorem
530 ANS: 1
\[8^2 + 15^2 = c^2\]
\[c^2 = 289\]
\[c = 17\]

PTS: 2  REF: 080906ia  STA: A.A.45  TOP: Pythagorean Theorem
531 ANS: 2
\[\sqrt{5^2 + 7^2} \approx 8.6\]

PTS: 2  REF: 081004ia  STA: A.A.45  TOP: Pythagorean Theorem
532 ANS: 2
\[\sqrt{18.4^2 - 7^2} \approx 17\]

PTS: 2  REF: 011107ia  STA: A.A.45  TOP: Pythagorean Theorem
533 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
534 ANS: 1
\[\sqrt{1700^2 - 1300^2} \approx 1095\]

PTS: 2  REF: 011221ia  STA: A.A.45  TOP: Pythagorean Theorem
535  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

536  ANS: 1
\sin C = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{13}{85}

PTS: 2  REF: fall0721ia  STA: A.A.42  TOP: Trigonometric Ratios

537  ANS: 2
\sin U = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{15}{17}

PTS: 2  REF: 010919ia  STA: A.A.42  TOP: Trigonometric Ratios

538  ANS: 3
\cos A = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{15}{17}

PTS: 2  REF: 011008ia  STA: A.A.42  TOP: Trigonometric Ratios

539  ANS: 2
\tan A = \frac{\text{opposite}}{\text{adjacent}} = \frac{14}{48}

PTS: 2  REF: 061009ia  STA: A.A.42  TOP: Trigonometric Ratios

540  ANS: 2
\tan B = \frac{\text{opposite}}{\text{adjacent}} = \frac{8}{15} = 0.53

PTS: 2  REF: 081026ia  STA: A.A.42  TOP: Trigonometric Ratios

541  ANS: 1
\sin x = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{28}{53}

PTS: 2  REF: 011109ia  STA: A.A.42  TOP: Trigonometric Ratios

542  ANS: 2
\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

ANS: 4

If \( m\angle C = 90 \), then \( AB \) is the hypotenuse, and the triangle is a 3-4-5 triangle.

PTS: 2  REF: 061224ia  STA: A.A.42  TOP: Trigonometric Ratios

ANS: 2

\[
\tan 32 = \frac{x}{25}
\]

\[x \approx 15.6\]

PTS: 2  REF: 080914ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

ANS: 2

\[
\sin 57 = \frac{x}{8}
\]

\[x \approx 6.7\]

PTS: 2  REF: 061108ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

ANS: 2

\[
\cos 38 = \frac{10}{x}
\]

\[x = \frac{10}{\cos 38} \approx 12.69\]

PTS: 2  REF: 081126ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

ANS: 3

\[
\cos 30 = \frac{x}{24}
\]

\[x \approx 21\]

PTS: 2  REF: 010912ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side

ANS:

\[39, 63. \ \tan 52 = \frac{50}{x} \quad \sin 52 = \frac{50}{x}\]

\[x \approx 39 \quad x \approx 63\]

PTS: 4  REF: 060937ia  STA: A.A.44  TOP: Using Trigonometry to Find a Side
550 ANS:
\[84, 71 \quad \sin 50 = \frac{x}{110} \quad \cos 50 = \frac{y}{110}\]
\[x \approx 84 \quad y \approx 71\]

PTS: 4 REF: 081039ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

551 ANS:
2.1. \(\cos 65 = \frac{x}{5}\)
\[x \approx 2.1\]

PTS: 2 REF: 011133ia STA: A.A.44 TOP: Using Trigonometry to Find a Side

552 ANS: 2
\[\sin A = \frac{8}{12}\]
\[A \approx 42\]

PTS: 2 REF: 060816ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle

553 ANS: 1
\[\sin A = \frac{10}{16}\]
\[B = 180 -(90 = 38.7) = 51.3. \quad \text{A 90° angle is not acute.}\]
\[A \approx 38.7\]

PTS: 2 REF: 080829ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle

554 ANS: 3
\[\sin A = \frac{16}{20}\]
\[\text{A } 90° \text{ angle is not acute.}\]
\[A \approx 53\]

PTS: 2 REF: 011032ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle

555 ANS: 1
\[\sin x = \frac{30}{50}\]
\[x = \sin^{-1} \frac{3}{5}\]
\[x \approx 37\]

PTS: 2 REF: 061033ia STA: A.A.43 TOP: Using Trigonometry to Find an Angle
558 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

559 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

560 ANS:
54, 23. \( \cos A = \frac{17}{29} \cdot \sqrt{29^2 - 17^2} \approx 23 \)
\[ x \approx 54 \]

PTS: 4    REF: 081238ia    STA: A.A.43    TOP: Using Trigonometry to Find an Angle

561 ANS: 2    PTS: 2    REF: 080815ia    STA: A.G.1    TOP: Compositions of Polygons and Circles    KEY: area

562 ANS: 1    PTS: 2    REF: 080924ia    STA: A.G.1    TOP: Compositions of Polygons and Circles    KEY: perimeter

563 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

564 ANS: 2
shaded = whole – unshaded
\[ = \text{rectangle-triangle} \]
\[ = lw - \frac{1}{2} bh \]
\[ = 15 \times 6 - \frac{1}{2} \times 15 \times 4.6 \]
\[ = 90 - 34.5 \]
\[ = 55.5 \]

PTS: 2    REF: 081019ia    STA: A.G.1    TOP: Compositions of Polygons and Circles    KEY: area
\[ A = lw + lw + \frac{\pi r^2}{4} = 5 \cdot 3 + 5 \cdot 3 + \frac{\pi \cdot 3^2}{4} \approx 37 \]

PTs: 2  REF: 011123ia  STA: A.G.1  TOP: Compositions of Polygons and Circles

**ANS:** 1

\[ 7 + 8 + 7 + \frac{12\pi}{2} = 22 + 6\pi \]

PTs: 2  REF: 081128ia  STA: A.G.1  TOP: Compositions of Polygons and Circles

**KEY:** area

**TOP:** Compositions of Polygons and Circles

If the area of the square is 36, a side is 6, the diameter of the circle is 6, and its radius is 3. \( A = \pi r^2 = 3^2 \pi = 9\pi \)

PTs: 2  REF: 011217ia  STA: A.G.1  TOP: Compositions of Polygons and Circles

**KEY:** area

**TOP:** Compositions of Polygons and Circles

\[ 4 + 6 + 10 + \frac{6\pi}{2} = 20 + 3\pi \]

PTs: 2  REF: 081228ia  STA: A.G.1  TOP: Compositions of Polygons and Circles

**KEY:** perimeter

**TOP:** Compositions of Polygons and Circles

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

**TOP:** Compositions of Polygons and Circles

\[ 36 - 9\pi \].  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

**TOP:** Compositions of Polygons and Circles

50. \(12 + 10 + 12 + \frac{1}{2} (10\pi) \approx 50\)

PTs: 2  REF: 010931ia  STA: A.G.1  TOP: Compositions of Polygons and Circles

**KEY:** perimeter

**TOP:** Compositions of Polygons and Circles
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 $\frac{1}{2} \times 4(12 + 16) = 56$.

572 ANS: 

573 ANS: 4

$V = \pi r^2 h = \pi \cdot 6^2 \cdot 15 \approx 1696.5$

574 ANS: 2

$1.5^3 = 3.375$

575 ANS: 3

$V = \pi r^2 h = \pi \cdot 5^2 \cdot 2.3 \approx 180.6$

576 ANS: 4

$V = \pi r^2 h$

$32\pi = \pi r^2 (2)$

$16 = r^2$

$4 = r$

577 ANS:

$\frac{38}{\pi} \cdot 2$. $V = \pi r^2 h$. $\frac{36}{\pi} \approx 2.97$. Three cans will not fit. The maximum number is 2.

$342 = \pi \left(\frac{6}{2}\right)^2 h \left(\frac{38}{\pi}\right)$

$\frac{342}{9\pi} = h$

$\frac{38}{\pi} = h$

578 ANS:

$5,112. \ (12 \times 30 \times 16) - (6 \times 12 \times 9) = 5112$

PTS: 3

PTS: 2

PTS: 2

PTS: 2

PTS: 2

PTS: 2

PTS: 2

PTS: 2

PTS: 3

PTS: 2

PTS: 2
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

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: 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:  
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