Instructional Materials for WCSD Math Common Finals

The Instructional Materials are for student and teacher use and are aligned to the 2018-2019 Course Guides for the following course:

**High School**

- #2221 Algebra 2 Semester 1
- #7779 Foundations in Algebra 2 Semester 1

When used as test practice, success on the Instructional Materials does not guarantee success on the district math common final.

Students can use these Instructional Materials to become familiar with the format and language used on the district common finals. Familiarity with standards and vocabulary as well as interaction with the types of problems included in the Instructional Materials can result in less anxiety on the part of the students. The length of the actual final exam may differ in length from the Instructional Materials.

Teachers can use the Instructional Materials in conjunction with the course guides to ensure that instruction and content is aligned with what will be assessed. The Instructional Materials are not representative of the depth or full range of learning that should occur in the classroom.

*Students will be allowed to use a Scientific or graphing calculator on Algebra 2 Semester 1 and Algebra 2 Semester 2 final exams.*
Algebra 2 Semester 1 Test Reference Sheet

Sequences:

\[ a_n = \begin{cases} 
  a_{1,n=1} \\
  a_{n-1} + d, n > 1 
\end{cases} \]

\[ a_n = a_1 + d(n - 1) \]

Polynomial Identities:

\[ a^3 + b^3 = (a + b)(a^2 - ab + b^2) \]

\[ a^3 - b^3 = (a - b)(a^2 + ab + b^2) \]
1. Based on the graph below, which of the following statements are true? Select all that apply.

F. The function is increasing on the interval \((-\infty, \infty)\).
G. The function is decreasing on the interval \((0, \infty)\).
H. The function has two \(x\)-intercepts.
I. The function is negative at \((-\infty, 0)\).
J. The function is positive at \((-\infty, -6)\) and \((6, \infty)\).
K. The domain is \([-10, 10]\).
L. The range is \([-5, \infty)\).

2. Given the graph below, which interval has the smallest average rate of change?

A. \([-10, 4]\)
B. \([-8, 4]\)
C. \([0, 4]\)
D. \([2, 4]\)
3. The graph below represents $y = f(x)$.

Which of the following graphs represents $y = f(-x) + 2$?

A. 

B. 

C. 

D. 

4. The graph of $f(x)$ is shown below. If $g(x)$ is the result of translating $f(x)$ up 5 units and left 6 units, what is the equation of $g(x)$?

A. $g(x) = |x + 2| + 3$

B. $g(x) = |x + 3| + 2$

C. $g(x) = |x + 5| + 6$

D. $g(x) = |x + 6| + 5$
5. Describe the domain and range of the function graphed below.
   A. Domain: \([-4, 4]\)
      Range: \((-3, 2]\)
   B. Domain: \((-4, 4]\)
      Range: \([-3, 2]\)
   C. Domain: \((-3, -1]\)
      Range: \([-4, 4]\)
   D. Domain: \([-4, 4]\)
      Range: \((-3, -1]\)

6. Which graph represents the piecewise function?

   \[ f(x) = \begin{cases} 
   \frac{1}{2}x - 1, & x \geq -3 \\
   -\frac{1}{3}x + 2, & x < -3 
   \end{cases} \]
7. The table below shows the fees for renting a boat at the lake. What is the domain and range of the function?

<table>
<thead>
<tr>
<th>Hours, $x$</th>
<th>$0 &lt; x \leq 2$</th>
<th>$2 &lt; x \leq 4$</th>
<th>$4 &lt; x \leq 8$</th>
<th>$8 &lt; x \leq 10$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost, $y$</td>
<td>$350$</td>
<td>$500$</td>
<td>$800$</td>
<td>$1000$</td>
</tr>
</tbody>
</table>

A. $D: \{x|0 < x \leq 10\}$  
   $R: \{y|350 \leq y \leq 1000\}$  

B. $D: \{x|0 < x \leq 10\}$  
   $R: \{350, 500, 800, 1000\}$  

C. $D: \{0, 2, 4, 8, 10\}$  
   $R: \{y|350 \leq y \leq 1000\}$  

D. $D: \{0, 2, 4, 8, 10\}$  
   $R: \{350, 500, 800, 1000\}$

8. Which of the following piecewise functions represents the graph below?

A. $f(x) = \begin{cases} 
\frac{3}{2}x + 1, & x < -2 \\
2x + 3, & -2 \leq x < 1 \\
-x + 2, & x \geq 1 
\end{cases}$

B. $f(x) = \begin{cases} 
\frac{3}{2}x + 1, & x < -2 \\
2x + 3, & -2 \leq x < 1 \\
x + 2, & x \geq 1 
\end{cases}$

C. $f(x) = \begin{cases} 
\frac{3}{2}x + 1, & x \leq -2 \\
2x + 3, & -2 < x \leq 1 \\
x + 2, & x > 1 
\end{cases}$

D. $f(x) = \begin{cases} 
\frac{3}{2}x + 1, & x \leq -2 \\
2x + 3, & -2 < x \leq 1 \\
-x + 2, & x > 1 
\end{cases}$

9. For the recursive definition $a_n = \begin{cases} 
22, n = 1 \\
6 + a_{n-1}, & n > 1 
\end{cases}$, what is the explicit definition?

A. $a_n = 22 + 6n$  

B. $a_n = 6 + 22n$  

C. $a_n = 22 + 6(n - 1)$  

D. $a_n = 6 + 22(n - 1)$
10. Given \( f(x) = 3x^2 - 6x + 5 \) and \( g(x) = -3x + 23 \), complete the tables below to find the \( x \)-values where \( f(x) = g(x) \).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( f(x) )</th>
<th>( x )</th>
<th>( g(x) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td></td>
<td>-3</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td></td>
<td>-2</td>
<td></td>
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<tr>
<td>-1</td>
<td></td>
<td>-1</td>
<td></td>
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<tr>
<td>0</td>
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<td>1</td>
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<td>2</td>
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<tr>
<td>5</td>
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<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

A. no solution  
B. \( x = 14, 29 \)  
C. \( x = 0, 1, 2, 6, 7 \)  
D. \( x = -2, 3 \)

11. Given the graph below, approximately when is \( -\frac{3}{5}x^2 + 5x + 8 < 0 \)?

A. \( x < -1.4 \) or \( x > 9.7 \)  
B. \( -1.4 < x < 9.7 \)  
C. \( x < 8 \)  
D. \( x > 8 \)
12. Solve the following system for $y$:

$$\begin{align*}
  x + y + z &= 3 \\
-x + y + z &= 5 \\
  x + 2y - 3z &= 2
\end{align*}$$

A. $y = 15$  
B. $y = 4.6$  
C. $y = 3$  
D. $y = 2.5$

13. Janessa wants to get a pedicure and manicure for the homecoming dance. She sees the following prices advertised at a salon.

<table>
<thead>
<tr>
<th>Service</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haircut and Manicure</td>
<td>$52.00</td>
</tr>
<tr>
<td>Haircut and Pedicure</td>
<td>$57.00</td>
</tr>
<tr>
<td>Haircut, Manicure, and Pedicure</td>
<td>$84.00</td>
</tr>
</tbody>
</table>

Assume the price of each option is the same as purchasing each item separately. How much will Janessa spend on a manicure and pedicure? Bubble your answer in the grid below.

[Answer grid]

Released 9/4/18
14. Which matrix below represents the linear system \[
\begin{align*}
2x - 3y &= 14 \\
6y + 4z &= 29 \\
-8x + 7z &= -10
\end{align*}
\]
?  

A. \[
\begin{bmatrix}
2 & 3 & 14 \\
6 & 4 & 29 \\
-8 & 7 & -10
\end{bmatrix}
\]  

B. \[
\begin{bmatrix}
2 & -3 & 0 & 14 \\
0 & 6 & 4 & 29 \\
-8 & 0 & 7 & -10
\end{bmatrix}
\]  

C. \[
\begin{bmatrix}
-2 & -3 & -14 \\
-6 & -4 & -29 \\
8 & -7 & 10
\end{bmatrix}
\]  

D. \[
\begin{bmatrix}
-2 & 3 & 0 & -14 \\
0 & -6 & -4 & -29 \\
8 & 0 & -7 & 10
\end{bmatrix}
\]

15. A student uses matrices to solve the system \[
\begin{align*}
3x &= 2 + 2y \\
-5y &= 2 + 4x
\end{align*}
\] and finds that the reduced row echelon form is \[
\begin{bmatrix}
1 & 0 & \frac{6}{23} \\
0 & 1 & -\frac{14}{23}
\end{bmatrix}
\].  

What is the solution to the system?  

A. \((6, -14)\)  

B. \(\left(\frac{6}{23}, -\frac{14}{23}\right)\)  

C. \((1, 1)\) and \(\left(\frac{6}{23}, -\frac{14}{23}\right)\)  

D. \((1, \frac{6}{23})\) and \(\left(1, -\frac{14}{23}\right)\)
16. Compare the two functions represented below. Determine which of the following statements is true.

<table>
<thead>
<tr>
<th>Function $f(x)$</th>
<th>Function $g(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Graph of $f(x)$]</td>
<td>$g(x) = (x - 6)^2 - 4$</td>
</tr>
</tbody>
</table>

A. The functions have the same vertex.
B. The minimum value of $f(x)$ is the same as the minimum value of $g(x)$.
C. The functions have the same axis of symmetry.
D. The minimum value of $f(x)$ is less than the minimum value of $g(x)$.

17. The graph of $f(x) = x^2$ is vertically compressed by a factor of $\frac{1}{2}$ and translated to the right three units and down one unit to produce the function $g(x)$. Which of the following equations represents $g(x)$?

A. $g(x) = -\frac{1}{2}(x + 3)^2 + 1$
B. $g(x) = -\frac{1}{2}(x + 1)^2 + 3$
C. $g(x) = \frac{1}{2}(x - 3)^2 - 1$
D. $g(x) = \frac{1}{2}(x - 1)^2 - 3$
18. A parabola has a vertex of \((5, 6)\) and passes through the point \((10, -4)\). In the \(y = a(x - h)^2 + k\) form of the parabola, what is the value of \(a\)?

A. \(-2\)  
B. \(\frac{2}{5}\)  
C. \(-\frac{2}{5}\)  
D. \(-\frac{2}{45}\)

19. Which of the following statements describe key features of \((x) = x^2 + 2x + 7\)? Select all that apply.

F. The \(y\)-intercept is \((0, 7)\).
G. The \(y\)-intercept is \((0, 2)\).
H. The vertex is \((-1, 6)\).
I. The vertex is \((2, 7)\).
J. The minimum is \(y = 6\).
K. The minimum is \(y = 7\).
L. The axis of symmetry is \(x = -1\).
M. The axis of symmetry is \(x = 2\).
20. Translate \( y = x^2 - 4x + 6 \) five units to the left. What is the graph obtained after the translation?

A. \[ x^2 - 3x + c = y \]
B. \[ 4x^2 + 6x + c = y \]
C. \[ 5x^2 + 9x + c = y \]
D. \[ a - 3b + c = y \]

21. Which of the following systems of equations could a student use to write a quadratic function in standard form for the parabola passing through the points \((1, -3), (4, 6), \) and \((5, 9)\)?

A. \[ \begin{cases} x^2 - 3x + c = y \\ 4x^2 + 6x + c = y \\ 5x^2 + 9x + c = y \end{cases} \]
B. \[ \begin{cases} 2a + b + c = -3 \\ 8a + 4b + c = 6 \\ 10a + 5b + c = 9 \end{cases} \]
C. \[ \begin{cases} a - 3b + c = y \\ 16a + 6b + c = y \\ 25a + 9b + c = y \end{cases} \]
D. \[ \begin{cases} a + b + c = -3 \\ 16a + 4b + c = 6 \\ 25a + 5b + c = 9 \end{cases} \]
22. Which of the following functions does not represent the parabola with a vertex at (1,4) and x-intercepts (-1,0) and (3,0).

- A. \( f(x) = -(x - 1)^2 + 4 \)
- B. \( f(x) = -x^2 + x + 4 \)
- C. \( f(x) = -x^2 + 2x + 3 \)
- D. \( f(x) = -(x + 1)(x - 3) \)

23. Identify the interval(s) on which the function \( f(x) = x^2 - x - 6 \) is positive.

- A. \(-2 < x \) and \( x > 3 \)
- B. \(-3 < x \) and \( x > 2 \)
- C. \(-2 < x < 3 \)
- D. \(-3 < x < 2 \)

24. A parabola has x-intercepts at 2 and 6 and goes through the point (8,4). What other point is on the parabola?

- A. \((-2, -2)\)
- B. \((4, -2)\)
- C. \((-3, 15)\)
- D. \((1, 15)\)

25. Simplify: \((11 + i) + (3 - 15i)\)

- A. \(14 - 14i\)
- B. \(-4 + 4i\)
- C. \(12 - 12i\)
- D. \(14 + 16i\)
26. Simplify: \((3 - 7i)^2\)
   A. \(-40 + 0i\)  
   B. \(-40 - 42i\)  
   C. \(58 + 0i\)  
   D. \(58 - 42i\)

27. Simplify: \(\frac{6+2i}{2-i}\)
   A. \(2 + 2i\)  
   B. \(2 + 3i\)  
   C. \(\frac{6 + 2i}{2 - i}\)  
   D. \(10 + 10i\)

28. Which of the following functions is equivalent to \(f(x) = \frac{1}{2}x^2 + 6x + 11\) ?
   A. \(g(x) = \frac{1}{2}(x + 6)^2 + 11\)  
   B. \(g(x) = \frac{1}{2}(x + 6)^2 + 22\)  
   C. \(g(x) = \frac{1}{2}(x + 6)^2 - 7\)  
   D. \(g(x) = \frac{1}{2}(x + 6)^2 - 14\)

29. If \((x + 3)(x - 9) = (x - h)^2 + k\), then what is the value of \(k\) ?
   A. \(k = -36\)  
   B. \(k = -27\)  
   C. \(k = -18\)  
   D. \(k = 9\)
30. Solve the following equation: \( \frac{1}{6} (x + 5)^2 = 8 \)

   A. \( x = \pm \sqrt{23} \)  
   B. \( x = \pm \sqrt{43} \)  
   C. \( x = -5 \pm \frac{2\sqrt{3}}{3} \)  
   D. \( x = -5 \pm 4\sqrt{3} \)

31. What are the solutions to the quadratic equation, \( 3x^2 + 7x + 11 = 5x + 7 \)?

   A. \( x = \frac{-2 \pm 2i\sqrt{11}}{3} \)  
   B. \( x = \frac{-1 \pm i\sqrt{11}}{3} \)  
   C. \( x = \frac{1 \pm i\sqrt{11}}{3} \)  
   D. \( x = \frac{\pm i\sqrt{11}}{3} \)

32. The function \( f(x) \) is graphed below. What are the solutions to \( f(x) = 0 \)?

   A. \( x = -4 \pm 2i \)  
   B. \( x = 4 \pm i \)  
   C. \( x = -8, 0 \)  
   D. \( x = 3, 5 \)
33. A local business wants to expand the size of their rectangular parking lot that currently measures 120 ft by 200 ft. The project will cost less if equal amounts are added to each side, as shown below. Zoning restrictions limit the total size of the parking lot to 35,000 ft². What is the maximum amount of distance (x) that can be added on to the each side of the parking lot? Round your answer to the nearest foot. Bubble your answer in the grid provided below.

![Diagram of parking lot expansion](image)

34. What are the x-coordinates of the solution for the system given below?

\[
\begin{align*}
\begin{cases}
x^2 + 10x + 6y + 8 &= 13 \\
2x + 3y &= 7
\end{cases}
\end{align*}
\]

A. \(x = 2\) and \(x = 4\)  
B. \(x = -4\) and \(x = -2\)  
C. \(x = -3\) and \(x = 3\)  
D. \(x = -3\)
35. Two rockets are launched from the same point and at the same time. Rocket A’s path is modeled by the equation \( h = -\frac{1}{4}t^2 + 8t \), where \( h \) is the height and \( t \) is the time.

Rocket B’s path is modeled by the equation \( h = \frac{3}{4}t \). When will the rockets collide? Round your answer to the nearest tenth if necessary. Bubble your answer in the grid provided below.

36. Graph the system \( \begin{cases} y \geq -(x - 2)^2 + 6 \\ y \geq -3x + 7 \end{cases} \)
37. The function \( f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 - \frac{15}{4}x \) is graphed to the right. Over which intervals of \( x \) is the graph positive?

A.  
B.  
C.  
D.  

38. Which of the following functions has the same end behavior as the function below?

A. \( g(x) = -6x - 7 \)  
B. \( g(x) = -|x + 3| - 5 \)  
C. \( g(x) = x^2 - 4x + 5 \)  
D. \( g(x) = x^3 + 2x \)
39. State where the function is increasing and decreasing.
   A. Never Increasing
      Decreasing: \((-\infty, +\infty)\)
   B. Increasing: \((-8, 0) \cup (0, +\infty)\)
      Decreasing: \((-\infty, -8)\)
   C. Increasing: \((-\infty, -8) \cup (0, 8)\)
      Decreasing: \((-8, 0)\)
   D. Increasing: \((-8, -4) \cup (0, +\infty)\)
      Decreasing: \((-\infty, -8) \cup (-4, 0)\)

40. Which expression must be subtracted from \((4x^3 - 5x^2 + 6x - 3)\) to result in \((6x^3 - 2x^2 + 4x + 7)\) ?
   A. \(-2x^3 - 3x^2 + 2x - 10\)  
   B. \(2x^3 + 3x^2 - 2x + 10\)  
   C. \(-2x^3 - 7x^2 + 10x + 4\)  
   D. \(2x^3 - 7x^2 + 10x + 4\)

41. Find the product: \((x - 1)(x + 5)(x - 3)\)
   A. \(x^3 + 15\)  
   B. \(x^3 + x^2 - 17x + 15\)  
   C. \(x^3 - 3x^2 - 13x - 15\)  
   D. \(x^3 + 7x^2 - 7x + 15\)
42. A manufacturer is going to package their product in an open rectangular box made from a single flat piece of cardboard. The box will be created by cutting a square out from each corner of the rectangle and folding the flaps up to create a box. The original rectangular piece of cardboard is 20 inches long and 15 inches wide. Write a function that represents the volume of the box.

A. \( V(x) = x^3 - 35x^2 + 300x \) 
B. \( V(x) = 4x^3 - 70x^2 + 300x \) 
C. \( V(x) = x^2 - 35x + 300 \) 
D. \( V(x) = 4x^2 - 70x + 300 \)

43. Factor completely: \( x^4 - 13x^2 + 36 \)

A. \((x^2 - 9)(x^2 + 4)\) 
B. \((x - 3)(x + 3)(x + 4)(x - 4)\) 
C. \((x - 3)(x + 3)(x + 2)^2\) 
D. \((x - 3)(x + 3)(x + 2)(x - 2)\)

44. Factor completely: \( 64x^3 - 27 \)

A. \((4x - 3)(4x^2 + 12x + 9)\) 
B. \((4x - 3)(4x^2 + 12x - 9)\) 
C. \((4x - 3)(16x^2 + 12x + 9)\) 
D. \((4x - 3)(16x^2 - 12x - 9)\)
45. If \((a + b)^2 = a^2 + 2ab + b^2\), then which expression is equivalent to \((4x^2 + 6y^4)^2\)?

A. \(2(4x^2) + 2(4x^2)(6y^4) + 2(6y^4)\)

B. \(4x^2(2) + 2(4)(6) + 6y^4(2)\)

C. \((4x^2)^2 + 2(4x^2)(6y^4) + (6y^4)^2\)

D. \(4x^2 + 2(4)(6) + 6y^2\)

46. What is the remainder in the division \((-4x^3 + 80x - 150) \div (x - 5)\)? Bubble your answer in the grid provided below.

47. Use synthetic or long division to find the quotient of \((2x^2 - 33x + 16) \div (x - 16)\)?

A. \(2x - 33 + \frac{16}{x - 16}\)

B. \(2x - 1\)

C. \(2x - 1 + \frac{-32}{x - 16}\)

D. \(2x + 1\)
48. Given \((x - 9)\) is a factor of the polynomial, \(f(x) = 16x^3 - 144x^2 - 81x + 729\), what are the remaining factors?

A. \((4x - 9)(4x + 9)\)  
B. \((16x^2 + 81)\)  
C. \((4x - 9)\)  
D. \((4x - 9)(4x - 9)\)

49. Which polynomial is graphed below?

A. \(f(x) = (x + 1)(x - 3)\)  
B. \(f(x) = (x - 1)(x + 1)(x + 3)\)  
C. \(f(x) = x(x + 3)(x - 1)\)  
D. \(f(x) = x(x - 3)(x + 1)\)

50. The equation \(x^3 - 3x^2 + 4x - 12 = 0\) is graphed below. Use the graph to help solve the equation and find all the roots of the function.

A. \(x = 3, -2, 2\)  
B. \(x = -12, 1, 3\)  
C. \(x = 3, -2i, 2i\)  
D. \(x = 12, \frac{3 - i\sqrt{7}}{2}, \frac{3 + i\sqrt{7}}{2}\)
51. What is the end behavior for the function, \( f(x) = (x^2 + 4x - 3)(3x^5 + 6x^3) \)?
   A. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to +\infty \)
   B. as \( x \to -\infty \), \( f(x) \to +\infty \) and as \( x \to +\infty \), \( f(x) \to +\infty \)
   C. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to -\infty \)
   D. as \( x \to -\infty \), \( f(x) \to +\infty \) and as \( x \to +\infty \), \( f(x) \to -\infty \)

52. Solve: \( 3m^3 - 2m^2 - 5m = 0 \)
   A. \( m = -1, m = 0, m = \frac{5}{3} \)
   B. \( m = -3, m = 0, m = 5 \)
   C. \( m = -\frac{5}{3}, m = 0, m = 1 \)
   D. \( m = -5, m = 0, m = 3 \)

53. Solve: \( x^4 - 3x^2 = 10 \)
   A. \( x = 5, x = -2 \)
   B. \( x = \pm 5, x = \pm 2i \)
   C. \( x = \pm \sqrt{5}, x = \pm \sqrt{2} \)
   D. \( x = \pm \sqrt{5}, x = \pm i \sqrt{2} \)

54. Write the equation of a cubic function with rational coefficients that has zeros of \(-4\) and \(3 - \sqrt{5}\).
   A. \( x^3 - (3 + \sqrt{5})x^2 - 16x + 48 + 16\sqrt{5} \)
   B. \( x^4 - 6x^3 - 12x^2 + 96x - 64 \)
   C. \( x^3 - 2x^2 - 20x + 16 \)
   D. \( x^2 + (1 - \sqrt{5})x - 12 + 4\sqrt{5} \)
55. Given the two functions:

\[ f(x) = (x + 1)(x - 4)(x + 5) \]
\[ g(x) = 2 \cdot f(x) \]

Determine which of the following statements is correct.

A. The function \( g(x) \) has exactly one zero.
B. The function \( g(x) \) has exactly six zeros.
C. The function \( g(x) \) has zeros at \( x = -5, -1, 4 \).
D. The function \( g(x) \) has zeros at \( x = -10, -2, 8 \).

56. Which of the following functions is odd?

A. \( f(x) = 12x^5 - 4x^2 + 3 \)
B. \( f(x) = -x^6 + 3 \)
C. \( f(x) = -x^6 + 3 \)
D. \( f(x) = -x^6 + 3 \)
57. If \( x \) and \( y \) vary inversely and \( x = 1.5 \) when \( y = 8 \), what is the value of \( y \) when \( x = -20 \)? Round your answer to the nearest tenth if necessary. Bubble your answer in the grid provided below.

58. Translate the graph of \( f(x) = \frac{1}{x} \) two units up and one unit right. Which of the following is the function after the translations?

A. \( f(x) = \frac{1}{x + 1} + 2 \)

B. \( f(x) = \frac{2x - 1}{x - 1} \)

C. \( f(x) = \frac{1}{x + 2} + 1 \)

D. \( f(x) = \frac{2}{x - 1} \)

59. Identify the asymptotes, domain and range of the function \( f(x) = \frac{2}{x - 2} - 8 \).

A. Asymptotes: \( x = 2, y = -8 \)
   \[ D: \{x|x \neq 2\} \]
   \[ R: \{y|y \neq -8\} \]

B. Asymptotes: None
   \[ D: \{\text{all real numbers}\} \]
   \[ R: \{\text{all real numbers}\} \]

C. Asymptotes: \( x = 0, y = -1 \)
   \[ D: \{x|x \neq 0\} \]
   \[ R: \{y|y \neq -1\} \]

D. Asymptotes: \( x = 2, y = -1 \)
   \[ D: \{x|x \neq 2\} \]
   \[ R: \{y|y \neq -1\} \]
60. Which of the following is an equivalent form of \( f(x) = \frac{2x+3}{x-3} \)?

   A. \( f(x) = \frac{2}{x-3} + 3 \)  
   B. \( f(x) = \frac{2}{x-3} + 9 \)  
   C. \( f(x) = \frac{3}{x-3} + 9 \)  
   D. \( f(x) = \frac{9}{x-3} + 2 \)

61. Which statement describes the end behavior of the function \( f(x) = \frac{3x+4}{x-5} \)?

   A. as \( x \to -\infty \), \( f(x) \to +5 \) and as \( x \to +\infty \), \( f(x) \to +5 \)  
   B. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to +3 \)  
   C. as \( x \to -\infty \), \( f(x) \to +3 \) and as \( x \to +\infty \), \( f(x) \to +3 \)  
   D. as \( x \to -\infty \), \( f(x) \to +3 \) and as \( x \to +\infty \), \( f(x) \to +5 \)
62. Which is a graph of \( f(x) = \frac{3x+1}{x+3} \) with any vertical or horizontal asymptotes indicated by dashed lines?

A. 

![Graph A](image1)

B. 

![Graph B](image2)

C. 

![Graph C](image3)

D. 

![Graph D](image4)

63. A candy company purchases a machine to make lollipops for $15,000. The company also pays $0.35 for ingredients to make each lollipop. Write a function for the total average cost for making each lollipop.

A. \( f(x) = \frac{15,000x + 0.35}{x} \)

B. \( f(x) = \frac{15,000 + 0.35x}{x} \)

C. \( f(x) = \frac{x + 0.35}{15,000x} \)

D. \( f(x) = \frac{x + 15,000}{0.35x} \)
64. Perform the indicated operation: \(\frac{x^2-3x-10}{x^2+2x-3} \div \frac{x+5}{x+3}\)
   
   A. \(\frac{(x-5)(x+2)}{(x-1)(x+5)}\)
   
   B. \(\frac{(x-5)(x+3)(x+2)}{(x-1)(x-3)(x+5)}\)
   
   C. \(\frac{(x+2)}{(x-1)}\)
   
   D. \(\frac{(x-1)}{(x+2)}\)

65. Find the product and the domain of the expression: \(\frac{x^2+4x-12}{x^2+x-30} \cdot \frac{x-5}{x-4}\)

   A. \(\frac{1}{2}\), except for \(x = -6, 4, 5\)
   
   B. \(\frac{1}{2}\), except for \(x = 4\)
   
   C. \(\frac{x-2}{x-4}\), except for \(x = -6, 4, 5\)
   
   D. \(\frac{x-2}{x-4}\), except for \(x = 4\)

66. Perform the indicated operation: \(\frac{7}{x-4} - \frac{11}{x-4}\)

   A. \(\frac{-77}{x-4}\)
   
   B. \(\frac{-77}{(x-4)^2}\)
   
   C. \(\frac{1}{x}\)
   
   D. \(\frac{-4}{x-4}\)

67. Perform the indicated operation: \(\frac{3x+4}{x^2-16} - \frac{2}{x-4}\)

   A. \(\frac{x}{x^2-16}\)
   
   B. \(\frac{x+8}{x^2-16}\)
   
   C. \(\frac{3x+2}{x-4}\)
   
   D. \(\frac{1}{x+4}\)
68. What would be the next logical step in simplifying the expression below?

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<th>( \frac{6x - 3}{x^2 - x - 12} - \frac{x}{x + 3} )</th>
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<td>( \frac{6x - 3}{(x + 3)(x - 4)} - \frac{x}{x + 3} )</td>
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<td>( \frac{6x - 3}{(x + 3)(x - 4)} - \frac{x}{x + 3} \cdot \frac{x - 4}{x - 4} )</td>
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<td>Step 4</td>
<td>( \frac{(6x - 3) - x(x - 4)}{(x + 3)(x - 4)} )</td>
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A. \( \frac{6x + 3 + x^2 + 4}{(x + 3)(x - 4)} \)

B. \( \frac{6x - 3 + x^2 - 4}{(x + 3)(x - 4)} \)

C. \( \frac{6x - 3 - x^2 - 4}{(x + 3)(x - 4)} \)

D. \( \frac{6x - 3 - x^2 + 4x}{(x + 3)(x - 4)} \)

69. If each of the following expressions is defined, which is equivalent to \( x - 1 \) ?

A. \( \frac{(x + 1)(x - 1)}{(x - 1)} \)

B. \( \frac{(x - 1)(x + 2)}{x + 1} \cdot \frac{x + 1}{x + 2} \)

C. \( \frac{(x + 1)(x + 2)}{x - 2} \div \frac{x + 2}{x - 2} \)

D. \( \frac{x + 1}{x + 2} + \frac{x - 1}{x + 2} \)
70. Which of the following is equivalent to \( \frac{t+2}{t^2+8t+15} \) ?

A. \( \frac{(t + 2)(t - 4)}{(t + 3)^2(t + 5)} \)

B. \( \frac{(t + 2)(t + 5)}{(t - 4)(t - 5)} \)

C. \( \frac{(t + 2)}{(t - 4)(t + 5)} \)

D. \( \frac{(t + 2)(t - 4)}{(t + 3)(t + 5)} \)

71. Solve: \( \frac{x+4}{x-5} = \frac{x-3}{x+6} \)

A. \( x = 2 \)

B. \( x = -\frac{1}{2} \)

C. \( x = -2 \)

D. \( x = \frac{1}{2} \)

72. Solve: \( \frac{3x}{x-1} + \frac{2x}{x-6} = \frac{5x^2-15x+20}{x^2-7x+6} \)

A. \( x = 1 \)

B. \( x = 6 \)

C. \( x = 4 \)

D. \( x = -4 \)
73. Jessie can install flooring in a room in 8 hours. Dustin can install flooring in the same sized room in 3 hours. Based on this information, which of the following statements are true? Select all that apply.

   F. The equation $8x + 3x = 1$ can be used to determine the amount of time it would take to install flooring if Jessie and Dustin work together.

   G. The equation $\frac{3}{x} + \frac{8}{x} = 1$ can be used to determine the amount of time it would take to install flooring if Jessie and Dustin work together.

   H. The equation $\frac{x}{3} + \frac{x}{8} = 1$ can be used to determine the amount of time it would take to install flooring if Jessie and Dustin work together.

   I. If working together, Jessie and Dustin would complete the floor in about 1.1 hours.

   J. If working together, Jessie and Dustin would complete the floor in about 2.2 hours.

   K. If working together, Jessie and Dustin would complete the floor in about 5.5 hours.

   L. If working together, Jessie and Dustin would complete the floor in about 11 hours.
### Algebra 2 Semester 1 Instructional Materials 2018-19 Answers

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