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 courses:

**High School Algebra 2 S1**
- #2227 Algebra 2 Honors Semester 1

**Middle School Algebra 2 S1**
- #745 ACCEL Algebra 2

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 Honors Semester 1 and Algebra 2 Honors Semester 2 final exams.*
Algebra 2 Honors 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 range is \([-4, \infty)\).
   
   G. The domain is \([-11, -1]\).
   
   H. The function is always decreasing.
   
   I. The function increases on the interval \((-\infty, -6)\).
   
   J. The function is negative at \((-\infty, \infty)\).
   
   K. The function is positive at \((0, \infty)\).
   
   L. The function has two \(x\)-intercepts.

2. The tables below list the average rates of change over different intervals for two functions.

\[
\begin{array}{c|c}
\text{Interval} & f(x) \\
\hline
[-5, 2] & -\frac{1}{3} \\
[2, 4] & -\frac{1}{3} \\
[4, 7] & -\frac{1}{3}
\end{array}
\quad
\begin{array}{c|c}
\text{Interval} & g(x) \\
\hline
[-5, 2] & -\frac{1}{3} \\
[2, 4] & 0 \\
[4, 7] & -1
\end{array}
\]

Which of the following statements must be true?

A. \(g(x)\) must be a linear function over the interval \([-5, 7]\).

B. \(f(x)\) must be a linear function over the interval \([-5, 7]\).

C. \(g(x)\) must be a constant function over the interval \([-5, 7]\).

D. \(f(x)\) must be a constant function over the interval \([-5, 7]\).
3. The graph below represents \( y = f(x) \).

Which of the following graphs represents \( g(x) = f \left( -\frac{1}{2}x \right) \)?

A. 

B. 

C. 

D.
4. Which equation is obtained after the graph below is translated 4 units to the left and 5 units up?

A. \( f(x) = -\frac{1}{3}(x + 7)^2 + 3 \)
B. \( f(x) = -\frac{1}{3}(x - 1)^2 + 3 \)
C. \( f(x) = -3(x + 7)^2 + 3 \)
D. \( f(x) = -3(x - 1)^2 + 3 \)

5. Which of the following graphs shows a function over the domain \([-3, -1) \cup (0, 5]\)
6. Graph the function \( f(x) = \begin{cases} 
-x + 3, & x \leq -3 \\
-x^2 + 6, & x > -3 
\end{cases} \)

A.  
B.  
C.  
D.  

7. The graph below shows the costs for renting a vacation home. What is the domain and range of the function?

A. \( D: \{2, 4, 8, 10, 12, 14\} \)
   \( R: \{y|0 \leq y \leq 1500\} \)

B. \( D: \{2, 4, 8, 10, 12, 14\} \)
   \( R: \{250, 500, 750, 1500\} \)

C. \( D: \{x|0 < x \leq 14\} \)
   \( R: \{250, 500, 750, 1500\} \)

D. \( D: \{x|0 < x \leq 14\} \)
   \( R: \{y|0 \leq y \leq 1500\} \)
8. Write the piecewise function for the graph below:

\[ f(x) = \begin{cases} \frac{1}{2}x - 5, & x \leq 0 \\ -\frac{1}{3}x + 1, & 0 < x < 3 \\ 2x + 1, & x \geq 3 \end{cases} \]

\[ f(x) = \begin{cases} -\frac{1}{3}x + 1, & x \leq 0 \\ 2x + 1, & 0 < x < 3 \\ -\frac{1}{3}x + 1, & x \geq 3 \end{cases} \]

\[ f(x) = \begin{cases} \frac{1}{2}x - 5, & x \leq 0 \\ 2x + 1, & 0 \leq x \leq 3 \\ -\frac{1}{3}x + 1, & x \geq 3 \end{cases} \]

\[ f(x) = \begin{cases} \frac{1}{2}x - 5, & x \leq 0 \\ -\frac{1}{3}x + 1, & x \geq 3 \end{cases} \]

9. Given the sequence, \(-5, -2, 1, 4 \ldots\) which of the following statements are true? Select all that apply.

F. \[ a_n = \begin{cases} -5, & n = 1 \\ a_{n-1} + 3, & n > 1 \end{cases} \]

G. \[ a_n = -5 + 3(n - 1) \]

H. \[ a_n = \begin{cases} 3, & n = 1 \\ a_{n-1} - 5, & n > 1 \end{cases} \]

I. \[ a_n = 3 - 5(n - 1) \]

J. The 10th term of the sequence is 22.

K. The 10th term of the sequence is 19.
10. Solve \((x + 4)^2 - 3 = -|x - 1| + 8\).
   A. \(x = -6\) and \(x = -1\)
   B. \(x = 1\) and \(x = 6\)
   C. \(x = 1\)
   D. \(x = -6\)

11. Solve \(-\frac{1}{2}|x + 1| + 4 \geq 0\).
   A. \(-3 \leq x \leq 1\)
   B. \(-9 \leq x \leq 7\)
   C. \(x \leq -3\) or \(x \geq 1\)
   D. \(x \leq -9\) or \(x \geq 7\)

12. Solve the following system for \(z\):
    \[
    \begin{cases}
    x + 2y - z = 5 \\
    -3x - 2y - 3z = 11 \\
    4x + 4y + 5z = -18
    \end{cases}
    \]
   A. \(z = 0\)
   B. \(z = -2\)
   C. \(z = -4\)
   D. \(z = 8\)
13. Kwon is planning a vacation and finds the following packages offered by a vacation booking company.

<table>
<thead>
<tr>
<th>Package</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme Park Ticket and Transportation</td>
<td>$95.25</td>
</tr>
<tr>
<td>Theme Park Ticket and Hotel</td>
<td>$147.00</td>
</tr>
<tr>
<td>Theme Park Ticket, Transportation, and Hotel</td>
<td>$182.50</td>
</tr>
</tbody>
</table>

Assuming the price of each option is the same as purchasing each item separately, how much will Kwon expect to pay for booking the hotel and transportation? Bubble your answer in the grid below.

14. Which matrix below represents the linear system \[ \begin{cases} 6x = 3y - 14 \\ 5z - 7y = 12x + 20 \\ 9z - 6 = 4y \end{cases} \] ?

A. \[
\begin{bmatrix}
6 & 3 & -14 & 0 \\
5 & -7 & 12 & 20 \\
9 & -6 & 4 & 0
\end{bmatrix}
\]

B. \[
\begin{bmatrix}
6 & 3 & 0 & -14 \\
12 & 5 & -7 & 20 \\
4 & 9 & 0 & -6
\end{bmatrix}
\]

C. \[
\begin{bmatrix}
6 & 12 & 0 & -14 \\
3 & -7 & 4 & 20 \\
0 & 5 & 9 & 0
\end{bmatrix}
\]

D. \[
\begin{bmatrix}
-6 & -3 & 0 & -14 \\
-12 & -7 & 5 & 20 \\
0 & -4 & 9 & 6
\end{bmatrix}
\]
15. A student uses matrices to solve a system of linear equations and finds that the reduced row echelon form is \[
\begin{bmatrix}
1 & 0 & 2 \\
0 & 0 & 6
\end{bmatrix}.
\]
Which of the following statements must be true?

A. The lines are parallel.
B. The lines intersect at \( (2, 6) \).
C. The lines intersect \( (1, 2) \) and \( (0, 6) \).
D. The system of equations has infinite solutions.

16. Compare the two functions represented below. Determine which of the following statements is true.

\[
g(x) = -(x - 8)^2 - 4
\]

<table>
<thead>
<tr>
<th>Function ( f(x) )</th>
<th>Function ( g(x) )</th>
</tr>
</thead>
</table>
| \[
\begin{align*}
\text{Function } f(x) & = 4 \left(x - \frac{2}{7}\right)^2 + \frac{1}{9} \\
\text{Function } g(x) & = -(x - 8)^2 - 4
\end{align*}
\] |

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

17. Given \( f(x) = 4 \left(x - \frac{2}{7}\right)^2 + \frac{1}{9}, \) identify the domain and range of the function.

A. Domain: \((-\infty, +\infty)\)  
   Range: \((-\infty, -\frac{2}{7})\)
B. Domain: \([-\infty, +\infty]\)  
   Range: \([\infty, -\frac{2}{7}]\)
C. Domain: \((-\infty, +\infty)\)  
   Range: \((\infty, 4)\)
D. Domain: \((-\infty, +\infty)\)  
   Range: \([\frac{1}{9}, \infty)\)

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18. Which of the following is the quadratic equation for a parabola with a vertex of \((-8, 2)\) going through the point \((-13, 12)\) ?

A. \(y = -\frac{10}{441}(x + 8)^2 + 2\) 
B. \(y = -\frac{2}{5}(x - 8)^2 + 2\) 
C. \(y = \frac{2}{5}(x + 8)^2 + 2\) 
D. \(y = \frac{10}{441}(x - 8)^2 + 2\)

19. Which of the following statements describe key features of \(x = \frac{1}{3}x^2 + 6x - 8\) ? Select all that apply.

F. The axis of symmetry is \(x = -1\).
G. The minimum is \(y = -8\).
H. The axis of symmetry is \(x = -9\).
I. The minimum is \(y = -35\).
J. The \(y\)-intercept is \((0, 6)\).
K. The vertex is \((-6, -8)\).
L. The \(y\)-intercept is \((0, -8)\).
M. The vertex is \((-9, -35)\).
20. The path an object follows after it is thrown off a platform is modeled by the function graphed below.

If the equation \( f(x) = -16x^2 + 32x + c \) also models this function, then what is the value of \( c \)?

A. \( c = 0 \)  
B. \( c = 1 \)  
C. \( c = 15 \)  
D. \( c = 31 \)

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 \((1, 4), (3, -2), \) and \((-2, 17)\)?

A. \( \begin{align*} a + 4b + c &= y \\ 9a - 2b + c &= y \\ -4a + 17b + c &= y \end{align*} \)  
B. \( \begin{align*} a + b + c &= 4 \\ 9a + 3b + c &= -2 \\ 4a - 2b + c &= 17 \end{align*} \)  
C. \( \begin{align*} 2a + b + c &= 4 \\ 6a + 3b + c &= -2 \\ -4a - 2b + c &= 17 \end{align*} \)  
D. \( \begin{align*} x^2 + 4x + c &= y \\ 3x^2 - 2x + c &= y \\ -2x^2 + 17x + c &= y \end{align*} \)
22. Which of the following functions represent the parabola opening upwards with a compression factor of \( \frac{1}{4} \) and x-intercepts \((-4, 0)\) and \((6, 0)\).

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>( y = \frac{1}{4}(x + 4)(x - 6) )</td>
</tr>
<tr>
<td>II.</td>
<td>( y = \frac{1}{4}x^2 + \frac{5}{2}x - 6 )</td>
</tr>
<tr>
<td>III.</td>
<td>( y = 4(x - 4)^2 + 6 )</td>
</tr>
<tr>
<td>IV.</td>
<td>( y = \frac{1}{4}x^2 - \frac{1}{2}x - 6 )</td>
</tr>
<tr>
<td>V.</td>
<td>( y = \frac{1}{4}(x - 1)^2 - \frac{25}{4} )</td>
</tr>
</tbody>
</table>

A. Options I, IV, and V  
B. Options I, III, and V  
C. Options I, III, and IV  
D. Options II, IV, and V  

23. Over which interval(s) is the function \( f(x) = -2x^2 - 2x + 40 \) negative?

A. \((-\infty, -5)\) and \((4, \infty)\)  
B. \((-\infty, -4)\) and \((5, \infty)\)  
C. \((-4, 5)\)  
D. \((-5, 4)\)

24. A parabola has x-intercepts at \(-3\) and \(7\) and goes through the point \((-5, 6)\). What other point is on the parabola?

A. \((-8, 42)\)  
B. \((-1, 22)\)  
C. \((8, 44)\)  
D. \((11, 14)\)
25. Simplify: $4i(10 + i) - 6(2 - 3i)$
   A. $28 + 22i$  
   B. $-16 + 58i$  
   C. $-8 + 58i$  
   D. $8 + 22i$

26. Simplify: $(i\sqrt{7} + 8)(i\sqrt{7} - 8)$
   A. $7i - 64$  
   B. $i\sqrt{7} - 64$  
   C. $-57$  
   D. $-71$

27. Simplify: $\frac{2i(6-4i)}{3+3i}$
   A. $4i$  
   B. $\frac{8}{3} + 4i$  
   C. $60 + \frac{2}{3}i$  
   D. $\frac{10}{3} + \frac{2}{3}i$

28. When rewriting the function $y = x^2 - 10x + 3$ into the form $y = (x + a)^2 + 3 + b$, what value should be used to replace $a$?
   A. $a = -10$  
   B. $a = -5$  
   C. $a = 25$  
   D. $a = 100$
29. Given \( f(x) = 2x^2 + 16x + 18 \), find the value of \( k \) if the function is written in vertex form, \( f(x) = a(x - h)^2 + k \). Bubble your answer in the grid provided below.

![Grid Image]

30. Solve: \( 5(x + 1)^2 = 120 \)

A. \( x = \pm \sqrt{23} \)  
B. \( x = -5 \pm \frac{2\sqrt{30}}{5} \)  
C. \( x = -1 \pm 2\sqrt{6} \)  
D. \( x = -3\sqrt{6} \) or \( \sqrt{6} \)

31. What are the solutions to the quadratic equation, \( 3x^2 + 21x = 5x - 60 \)?

A. \( x = \frac{-8 \pm 4i\sqrt{29}}{3} \)  
B. \( x = \frac{-8 \pm 2i\sqrt{29}}{3} \)  
C. \( x = \frac{-8 \pm 2i\sqrt{61}}{3} \)  
D. \( x = \frac{-8 \pm i\sqrt{61}}{2} \)

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

A. $x = -\frac{25}{4}$  
B. $x = 3, -4$  
C. $x = 3 \pm 4i$  
D. $x = \pm 7i$  

33. Given the diagram below, approximate to the nearest foot how many feet of walking distance a person saves by cutting across the lawn instead of walking on the sidewalk.

A. 60 feet  
B. 48 feet  
C. 36 feet  
D. 24 feet

34. What are the $x$-coordinates of the points of intersection given the system below?

\[
\begin{cases} 
  x^2 + 6x + 5y + 16 = 0 \\
  2x + y = -3 
\end{cases}
\]

A. $x = 2 + \sqrt{3}, x = 2 - \sqrt{3}$  
B. $x = 2 + i\sqrt{15}, x = 2 - i\sqrt{15}$  
C. $x = 4 + 2\sqrt{3}, x = 4 - 2\sqrt{3}$  
D. $x = -8 + \sqrt{33}, x = -8 - \sqrt{33}$
35. Two water balloons are launched in an experiment. The height of each water balloon is modeled by the equation \( h = -16t^2 + v_0 t + h_0 \) where \( t \) is time in seconds, \( h \) is the height above the ground and \( h_0 \) is the initial height. The first balloon is launched from a 15 foot high platform at an initial velocity \( (v_0) \) of 50 \( ft/sec \). The second balloon is launched from the ground with an initial velocity of 62 \( ft/sec \). At what height will the balloons collide? Round your answer to the nearest tenth if necessary. Bubble your answer in the grid provided below.

36. Which of the following represents the quadratic inequality below?

A. \( \begin{cases} y > \frac{1}{2}(x - 3)^2 - 4 \\ y \leq -x + 3 \end{cases} \)
B. \( \begin{cases} y < \frac{1}{2}(x - 3)^2 - 4 \\ y \geq -x + 3 \end{cases} \)
C. \( \begin{cases} y \leq \frac{1}{2}(x - 3)^2 - 4 \\ y > -x + 3 \end{cases} \)
D. \( \begin{cases} y \geq \frac{1}{2}(x - 3)^2 - 4 \\ y < -x + 3 \end{cases} \)
37. The function \( f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 - \frac{15}{4}x \) is graphed below. Over which intervals of \( x \) is the graph positive?

A. 

B. 

C. 

D. 

![Graph](image)

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. \( g(x) = x^3 + 2x \)

![Graph](image)
39. Based on the function graphed below, which statements are true? Select all that apply

![Graph of a function]

F. The function is decreasing over the interval \((-\infty, \infty)\).
G. The function is increasing over the interval \((-4, 4)\).
H. The function is increasing over the interval \((4, 0)\).
I. The function has a relative minimum value of 0.
J. The function has a relative minimum value of \(-1\).

40. Let \(f(x) = -6(x - 7)^2\) and \(g(x) = 4(x - 5)^2\). Which of the following is equivalent to \(f(x) - g(x)\)?

A. \(-10x^2 + 394\)  
B. \(-10x^2 + 44x - 194\)  
C. \(-10x^2 + 124x - 394\)  
D. \(100x^2 + 440x + 484\)

41. Multiply: \((2x^2 + 4x - 5)(-x^2 + 3x + 6)\)

A. \(-2x^4 + 2x^3 + 29x^2 + 9x - 30\)  
B. \(2x^4 + 10x^3 + 19x^2 + 9x - 30\)  
C. \(-2x^4 + 9x^2 + 21x - 30\)  
D. \(-2x^4 + 24x^2 - 30\)
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.

![Diagram of cardboard box with dimensions marked](image)

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 the following using imaginary numbers: 9\(x^2 + 49\)

A. \((3x - 7i)^2\)  
B. \((\sqrt{3}x + 7i)(\sqrt{3}x - 7i)\)  
C. \((3x + 7i)(3x - 7i)\)  
D. \((3x + 7i)^2\)

44. Factor: 125\(x^3 - 343\)

A. \((5x - 7)(5x^2 + 35x + 7)\)  
B. \((5x - 7)(5x^2 + 35x - 7)\)  
C. \((5x - 7)(25x^2 + 35x + 49)\)  
D. \((5x - 7)(25x^2 - 35x - 49)\)
45. If \( a^3 - b^3 = (a - b)(a^2 + ab + b^2) \), then which expression is equivalent to \( 125x^6 - 27y^{12} \)?

A. \((5x^2 - 3y^4)(5x^2)^2 + (5x^2)(3y^4) + (3y^4)^2) \)

B. \((5x - 3y)(5x^4 + 5x^2)(3y^4) + 3y^4) \)

C. \((125x^2 - 27y^4)((125x^2)^2 + (125x^2)(27y^4) + (27y^4)^2) \)

D. \((125x - 27)(125x^4 + (125x^2)(27y^4) + 27y^4) \)

46. What is the remainder in the division \((6x^3 - x^2 + 4x - 9) \div (2x - 3)\)? Bubble your answer in the grid provided below.

47. Find the quotient of \((3x^3 - 44x + 8) \div (x - 4)\)?

A. \(3x^2 - 12x + 4 \)

B. \(3x^2 - 12x + 4 + \frac{-8}{x - 4} \)

C. \(3x^2 - 32 + \frac{-120}{x - 4} \)

D. \(3x^2 + 12x + 4 + \frac{24}{x - 4} \)
48. Sketch the graphs of \( f(x) \) and \( g(x) \) on the same coordinate plane given the following information:
- \( f(x) \) has zeros at \(-1, 4, 8\)
- As \( x \to -\infty \), \( f(x) \to +\infty \) and as \( x \to +\infty \), \( f(x) \to -\infty \)
- \( f(x) \) has a local minimum at approximately \((1, -4)\) and a local maximum at approximately \((6, 3)\)
- \( g(x) = 2x + 1 \)

How many real solutions exist when \( f(x) = g(x) \)?

A. no real solution  
B. 1 real solution  
C. 2 real solutions  
D. 3 real solutions

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, \( f(x) = (x^4 - 5x - 3)(-9x^5 + 6x^3) \)?

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: \( 10y^3 - 4y^2 - 2y = -5y^3 + 3y^2 \)

A. \( y = -3, y = 0, y = 10 \)
B. \( y = -\frac{1}{5}, y = 0, y = \frac{2}{3} \)
C. \( y = 0, y = \frac{1 \pm \sqrt{41}}{10} \)
D. \( y = 0 \)
53. Find all of the zeros of \( f(x) = x^3 - 3x^2 + 4x - 2 \).
   - **A.** \( x = 1 + i, 1 - i, 1 \)
   - **B.** \( x = 1 \)
   - **C.** \( x = -2, -1, 1, 2 \)
   - **D.** \( x = -1, -2i, 2i \)

54. Write a polynomial function of least degree that has rational coefficients, a leading coefficient of 1, and the zeros \( 3i, \sqrt{2}, -4 \).
   - **A.** \( f(x) = x^5 - 4x^4 + 7x^3 + 28x^2 - 18x - 76 \)
   - **B.** \( f(x) = x^5 - 4x^4 - 13x^3 - 52x^2 + 36x + 144 \)
   - **C.** \( f(x) = x^5 + 4x^4 + 7x^3 + 28x^2 - 18x - 72 \)
   - **D.** \( f(x) = x^6 - 9x^4 - 130x^2 + 288 \)

55. If the function \( f(x) = x^3 \) is translated left eight units and up ten units, how will the domain and range of the function change?

   - **A.** The domain will become \( D: \{ x \mid x \geq -8 \} \) and the range will become \( R: \{ y \mid y \geq 10 \} \).
   - **B.** The domain will become \( D: \{ x \mid x \geq 8 \} \) and the range will become \( R: \{ y \mid y \geq 10 \} \).
   - **C.** The domain will become \( D: \{ x \mid x \geq -8 \} \) and the range will remain \( R: \{ y | all \ real \ numbers \} \).
   - **D.** The domain will remain \( D: \{ x | all \ real \ numbers \} \) and the range will remain \( R: \{ y | all \ real \ numbers \} \).
56. Which of the following functions is odd?

A. \( f(x) = 6x^7 - 5x^4 + 8 \)

B. \( f(x) = -3x^6 + 9 \)

C. \( f(x) = -3x^6 + 9 \)

D. \( f(x) = 6x^7 - 5x^4 + 8 \)

57. Four painters can paint a house in 14 hours. If the time varies inversely with the number of people painting, how many hours would it take seven painters to paint the same house? Round your answer to the nearest tenth if necessary. Bubble your answer in the grid provided below.
58. Which of the following is the graphing form of \( f(x) = \frac{4x-14}{x-6} \)?

A. \( f(x) = \frac{6}{x-3} + 10 \)  
B. \( f(x) = \frac{4}{x-3} + 10 \)  
C. \( f(x) = \frac{4}{x-6} + 4 \)  
D. \( f(x) = \frac{10}{x-6} + 4 \)

59. Identify any holes, asymptotes, and intercepts of \( f(x) = \frac{x^2-x-6}{x^2+7x+10} \)

A. Horizontal Asymptote: \( y = -2,3 \)  
   Vertical Asymptote: \( x = -5,-2 \)  
   Hole: none  
   \( x \)-intercept: \((10,0)\)  
   \( y \)-intercept: \((0,-6)\)

B. Horizontal Asymptote: none  
   Vertical Asymptote: \( x = -5 \)  
   Hole at \( x = -2 \)  
   \( x \)-intercept: \((3,0)\)  
   \( y \)-intercept: \((0,-\frac{3}{5})\)

C. Horizontal Asymptote: \( y = 1 \)  
   Vertical Asymptote: \( x = -5 \)  
   Hole at \( x = -2 \)  
   \( x \)-intercept: \((3,0)\)  
   \( y \)-intercept: \((0,-\frac{3}{5})\)

D. Horizontal Asymptote: \( y = -5 \)  
   Vertical Asymptote: \( x = 1 \)  
   Hole: none  
   \( x \)-intercept: \((-2,0),(-5,0)\)  
   \( y \)-intercept: \((0,-2),(0,3)\)

60. Translate the graph of \( f(x) = \frac{6x+7}{x+1} \) one unit down and four units left. Which of the following is the function after the translations?

A. \( g(x) = \frac{1}{x-4} - 1 \)  
B. \( g(x) = \frac{6}{x-4} - 1 \)  
C. \( g(x) = \frac{1}{x-3} + 5 \)  
D. \( g(x) = \frac{1}{x+5} + 5 \)
61. Which statement describes the end behavior of the function \( f(x) = \frac{-5x+4}{2x-3} \)?

A. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to \frac{5}{2} \)
B. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to +\frac{3}{2} \)
C. as \( x \to -\infty \), \( f(x) \to -\frac{5}{2} \) and as \( x \to +\infty \), \( f(x) \to -\frac{5}{2} \)
D. as \( x \to -\infty \), \( f(x) \to -\infty \) and as \( x \to +\infty \), \( f(x) \to -\frac{5}{2} \)

62. Which is a graph of \( f(x) = \frac{4x+4}{x+2} \) with any asymptotes indicated by dashed lines?
63. After diluting salt water, the concentration of salt in the water is given by the function 
\[ f(x) = \frac{3x}{x^2 - 5} \] where \( x \) is the time in hours since the dilution. After how many hours will the concentration of salt in the water be 0.3? Round your answer to the nearest hundredth.

A. 0.18 hours  
B. 10.48 hours  
C. 11.45 hours  
D. 15.00 hours

64. Simplify:
\[ \frac{x^2 - 9x + 14}{x^2 - 6x + 5} \cdot \frac{x^2 - 8x + 7}{x^2 - 7x + 10} \]

A. \( \frac{(x - 2)^2}{(x - 1)^2} \)  
B. \( \frac{(x - 7)^2}{(x - 5)^2} \)  
C. \( \frac{(x - 5)(x - 7)}{2(x - 1)} \)  
D. \( \frac{x - 7}{2(x - 1)} \)

65. Perform the indicated operation:
\[ \frac{x+2}{x+5} \cdot \frac{x^2}{x+1} \]

A. \( \frac{x^2(x + 1)}{(x + 5)^2} \)  
B. \( \frac{(x + 2)^2}{x^2(x + 1)} \)  
C. \( \frac{(x + 5)^2}{x^2(x + 1)} \)  
D. \( \frac{x^2}{x + 1} \)
66. Perform the indicated operation: \[
\frac{x+4}{x+8} + \frac{x-1}{x-3} - \frac{5x-6}{x^2+5x-24}
\]
A. \[
\frac{2x^2 + 3x + 41}{(x + 8)^2(x - 3)^2}
\]
B. \[
\frac{10x^2 - 2x - 12}{(x + 8)(x - 3)}
\]
C. \[
\frac{2x^2 + 3x - 14}{(x + 8)(x - 3)}
\]
D. \[
\frac{-3x + 9}{(x + 8)(x - 3)}
\]

67. Simplify: \[
\frac{1}{1-x} + \frac{x}{x-1}
\]
A. 1
B. \[
\frac{x + 1}{x - 1}
\]
C. \[
\frac{x + 1}{1-x}
\]
D. \[
\frac{x + 1}{(x - 1)^2}
\]

68. 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. \[
\frac{x + 1}{x + 2} + \frac{x - 1}{x + 2}
\]

69. Perform the indicated operation: \[
\frac{x-3}{\frac{2}{x+1}} + \frac{x}{\frac{3}{x}}
\]
A. \[
\frac{3x + 3}{2(x + 4)}
\]
B. \[
\frac{x^3 - x^2 - 15x + 36}{6(x + 1)}
\]
C. \[
\frac{3x^2 - 6x - 9}{-8x}
\]
D. \[
\frac{3x^2 - 6x - 9}{2(-4 + x)}
\]
70. Solve: \( \frac{2}{x^2-4} = \frac{1}{2x-4} \)

A. \( x = -2 \) \hspace{2cm} B. \( x = 0 \) \hspace{2cm} C. \( x = 2 \) \hspace{2cm} D. \( \text{no solution} \)

71. Solve: \( \frac{x-1}{x+1} + \frac{x+7}{x-1} = \frac{4}{x^2-1} \)

A. \( x = -1, -2 \) \hspace{2cm} B. \( x = -1, 1 \) \hspace{2cm} C. \( x = -2 \) \hspace{2cm} D. \( \text{no solution} \)

72. Let \( f(x) = \frac{2x+3}{x+3} \) and \( g(x) = -3x - 7 \). Use the graph of \( f(x) \) below to help determine the values of \( x \) for which \( f(x) = g(x) \).

A. \( x = -1, 5 \) \hspace{2cm} B. \( x = -2, -4 \) \hspace{2cm} C. \( x = -3, 2 \) \hspace{2cm} D. \( \text{no solution} \)
73. A person paddling a canoe on a river takes 6 hours to paddle 4 miles downstream and 4 miles upstream. When the water is still the person can paddle at an average speed of 2 miles per hour. Which of the following statements are true? Select all that apply.

F. The equation \( \frac{4}{r+2} + \frac{4}{r-2} = 6 \) can be used to find the average rate of the current \((r)\).

G. The equation \( \frac{4}{(r+2)(r-2)} = 6 \) can be used to find the average rate of the current \((r)\).

H. The equation \( \frac{6}{r+2} + \frac{6}{r-2} = 4 \) can be used to find the average rate of the current \((r)\).

I. The average rate of the current is about 1.15 miles per hour.

J. The average rate of the current is about 2.16 miles per hour.

K. The average rate of the current is about 2.77 miles per hour.
## Algebra 2 Honors Semester 1 Instructional Materials 2018-19 Answers

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