Instructional Materials for WCSD Math Common Finals

The Instructional Materials are for student and teacher use and are aligned to the 2021-22 Course Guides for the following courses:

High School

- **#2227 Algebra 2 Honors Semester 1**

Middle School

- **#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.

Algebra 2 Honors Semester 1 Test Reference Sheet

Polynomial Identities:

$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Matrices:

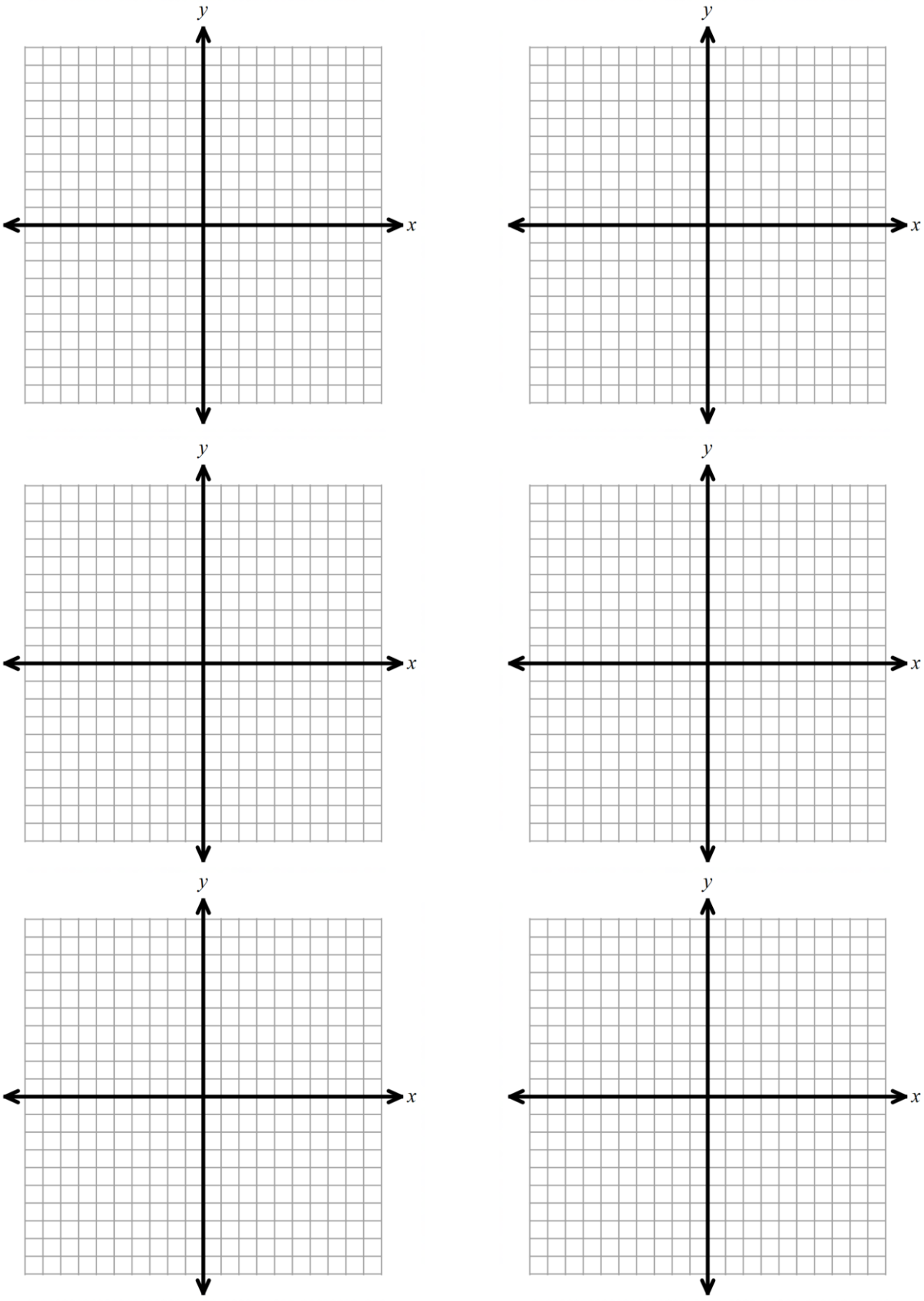
Identity Matrix: $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

Inverse Matrix: $\begin{bmatrix} a & b \\ c & d \end{bmatrix}\begin{bmatrix} d & e \\ f & g \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$\det A = ad - bc$

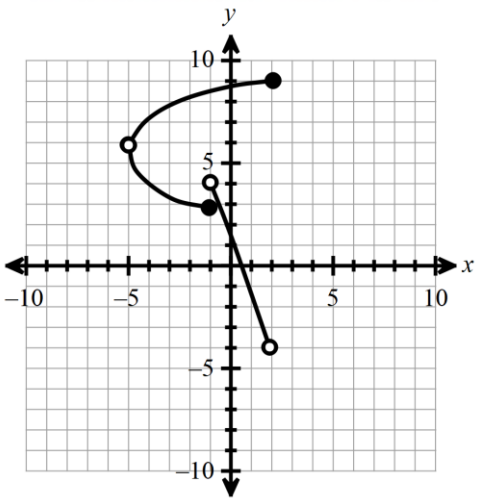
$A^{-1} = \frac{1}{\det A}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

Student Work Area

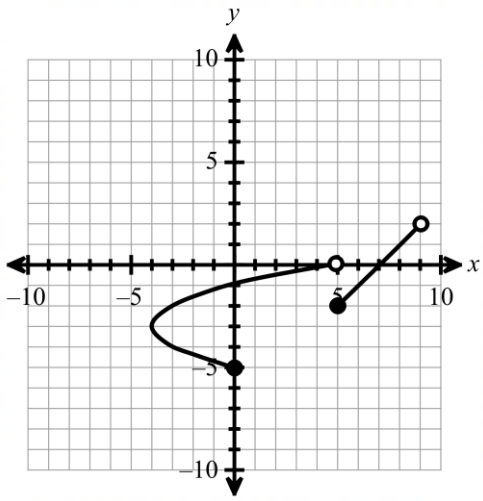


1. Which of the graphs below has the domain: $\{x|-4 \leq x < 9\}$ and range: $\{y|-5 \leq y < 2\}$?

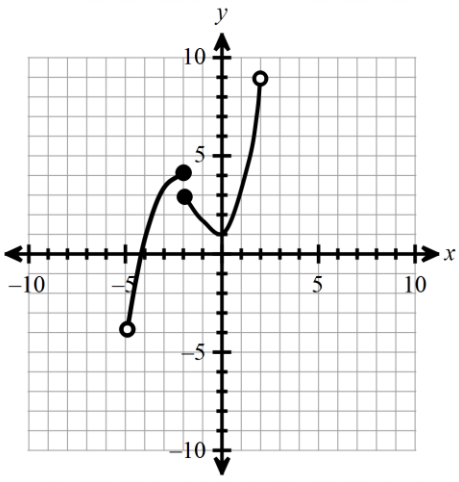
A.



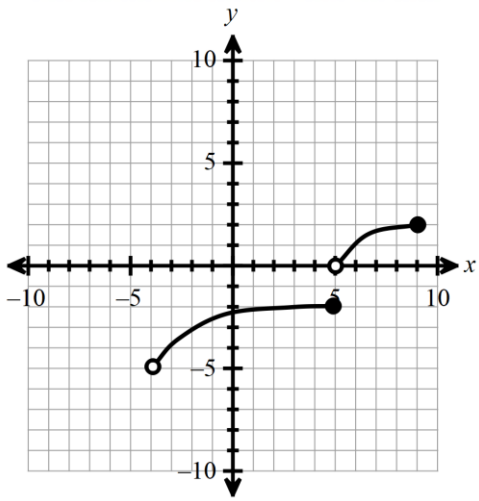
C.



B.

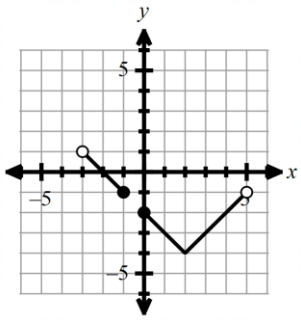


D.

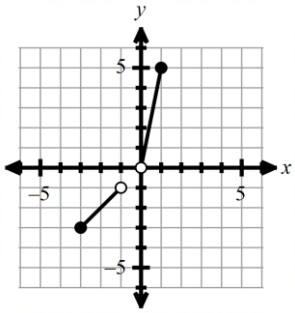


2. Which of the following graphs shows a function over the domain $[-3, -1) \cup (0, 5]$?

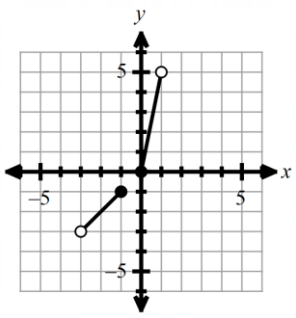
A.



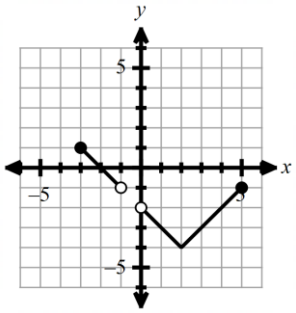
B.



C.

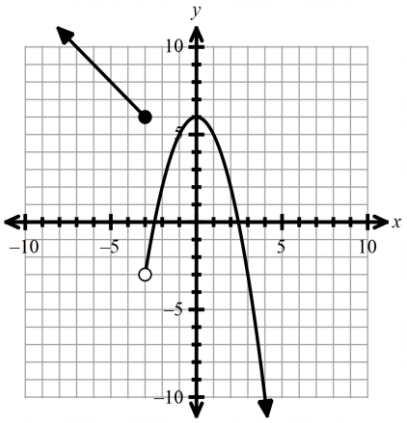


D.

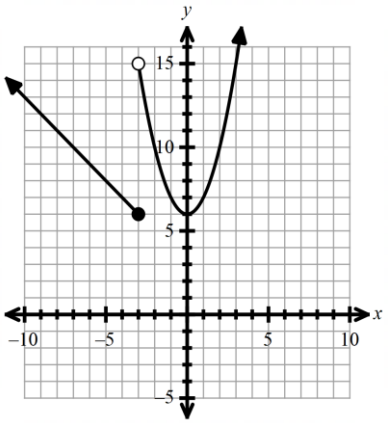


3. Graph the function $f(x) = \begin{cases} -x + 3, & x \leq -3 \\ -x^2 + 6, & x > -3 \end{cases}$

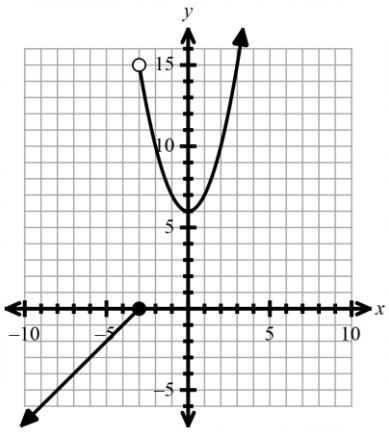
A.



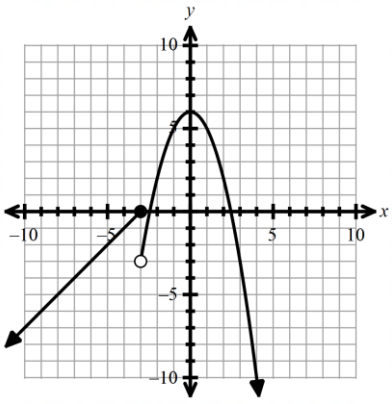
C.



B.



D.



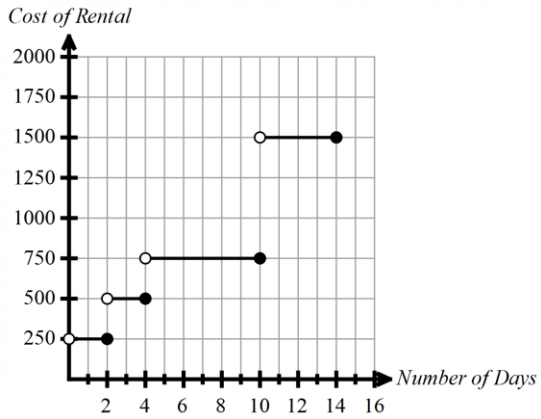
4. The graph below shows the costs for renting a vacation home. What is the domain and range of the function?

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

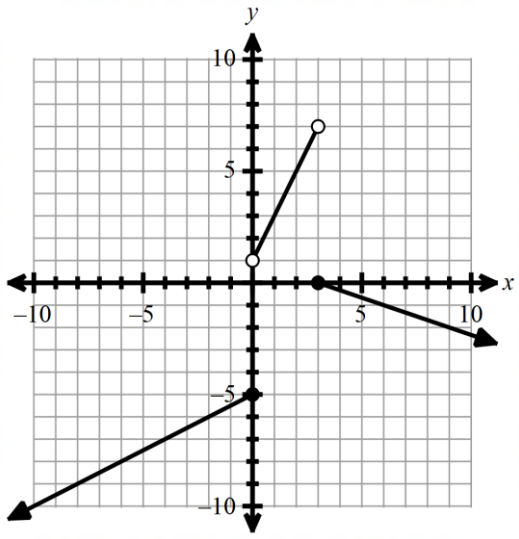
B. $D: \{2, 4, 8, 10, 12, 14\}$
$R: \{250, 500, 750, 1500\}$

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

D. $D: \{x | 0 < x \leq 14\}$
$R: \{y | 0 \leq y \leq 1500\}$



5. Write the piecewise function for the graph below:



A. $f(x) = \begin{cases} \frac{1}{2}x - 5, & x \le 0 \\ -\frac{1}{3}x + 1, & 0 < x < 3 \\ 2x + 1, & x \ge 3 \end{cases}$

B. $f(x) = \begin{cases} \frac{1}{2}x - 5, & x \le 0 \\ 2x + 1, & 0 < x < 3 \\ -\frac{1}{3}x + 1, & x \ge 3 \end{cases}$

C. $f(x) = \begin{cases} -\frac{1}{3}x + 1, & x \le 0 \\ 2x + 1, & 0 < x < 3 \\ \frac{1}{2}x - 5, & x \ge 3 \end{cases}$

D. $f(x) = \begin{cases} \frac{1}{2}x - 5, & x \le 0 \\ 2x + 1, & 0 \le x \le 3 \\ -\frac{1}{3}x + 1, & x \ge 3 \end{cases}$

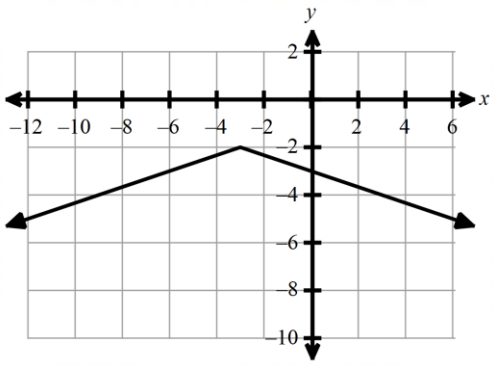
6. Which equation is obtained after the graph below is translated 4 units to the left and 5 units up?

A. $f(x) = -\frac{1}{3}|x + 7| + 3$

B. $f(x) = -\frac{1}{3}|x - 1| + 3$

C. $f(x) = -3|x + 7| + 3$

D. $f(x) = -3|x - 1| + 3$



7. Which of the following statements are true for the function $(x) = -2|x - 1| + 4$? Select all that apply.

F. $f(x)$ is decreasing on the intervals $(-\infty, 1)$ and $(3, \infty)$.

G. $f(x)$ is decreasing on the interval $(-\infty, \infty)$.

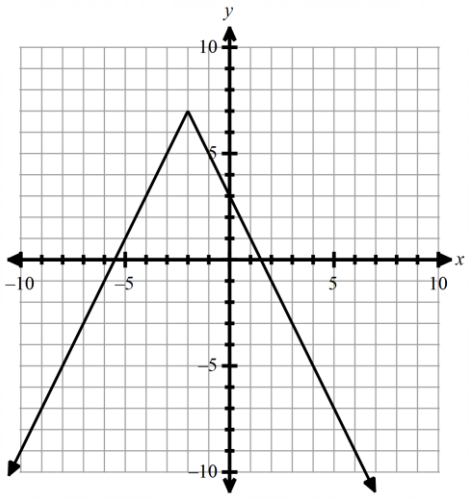
H. $f(x)$ is decreasing on the interval $(1, \infty)$.

I. $f(x)$ is increasing on the interval $(-1, 3)$.

J. $f(x)$ is increasing on the interval $(-\infty, \infty)$.

K. $f(x)$ is increasing on the interval $(-\infty, 1)$.

8. The function, $f(x)$, is graphed below. Which of the following statements is correct?



A. The average rate of change over the interval $[-7, 5]$ is the same as the interval $[0, 2]$.

B. The average rate of change over the interval $[-6, -1]$ is greater than the interval $[-7, 0]$.

C. The average rate of change over the interval $[-7, 0]$ is the same as the interval $[-6, 0]$.

D. The average rate of change over the interval $[-6, -1]$ is greater than the interval $[-6, -2]$.

9. Solve $(x+4)^2 - 3 = -|x-1| + 8$.

A. $x = -6$ and $x = -1$

B. $x = 1$ and $x = 6$

C. $x = 1$

D. $x = -6$

10. 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 $x \geq 7$

11. 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. $z = -2$

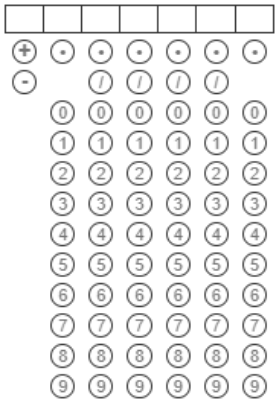
C. $z = -4$

D. $z = 8$

12. Kwon is planning a vacation and finds the following packages offered by a vacation booking company.

Theme Park Ticket and Transportation	$95.25
Theme Park Ticket and Hotel	$147.00
Theme Park Ticket, Transportation, and Hotel	$182.50

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.



13. The matrix below represents the prices of backpacks and binders a company has in stock. The backpacks and binders are offered in three different colors: red, yellow, and purple. If the company has a 40% off sale, then which matrix shows the price of the item after the discount?

$$\begin{array}{r} \\ \text{Backpack} \\ \text{Binder} \end{array} \begin{array}{c} \begin{array}{ccc} \text{R} & \text{Y} & \text{P} \end{array} \\ \begin{bmatrix} 35.50 & 27.00 & 45.25 \\ 2.50 & 1.75 & 3.00 \end{bmatrix} \end{array}$$

A. $\begin{bmatrix} 35.10 & 26.60 & 44.85 \\ 2.10 & 1.35 & 2.60 \end{bmatrix}$

B. $\begin{bmatrix} 34.90 & 36.40 & 44.65 \\ 1.9 & 1.05 & 2.40 \end{bmatrix}$

C. $\begin{bmatrix} 14.20 & 10.80 & 18.10 \\ 1.00 & 0.70 & 1.20 \end{bmatrix}$

D. $\begin{bmatrix} 21.30 & 16.20 & 27.15 \\ 1.50 & 1.05 & 1.80 \end{bmatrix}$

14. Which matrix is the additive inverse of $A = \begin{bmatrix} -5 & 3 \\ -10 & 8 \\ 25 & 1 \end{bmatrix}$

A. $\begin{bmatrix} 5 & -3 \\ 10 & -8 \\ -25 & -1 \end{bmatrix}$

B. $\begin{bmatrix} -5 & -10 & 25 \\ 3 & 8 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 3 & -5 \\ 8 & -10 \\ 1 & 25 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 8 & 1 \\ -5 & -10 & 25 \end{bmatrix}$

15. A segment with endpoints $D(-4, 5)$ and $E(-1, 7)$ can be represented by the matrix $\begin{bmatrix} -4 & -1 \\ 5 & 7 \end{bmatrix}$. $\overline{DE}$ is translated using the matrix operation $\begin{bmatrix} -4 & -1 \\ 5 & 7 \end{bmatrix} + \begin{bmatrix} -3 & -3 \\ -2 & -2 \end{bmatrix}$. Which of the following statements describes how $\overline{DE}$ is translated?

A. $\overline{DE}$ is translated to the left 2 units and down 3 units.

B. $\overline{DE}$ is translated to the left 3 units and down 2 units.

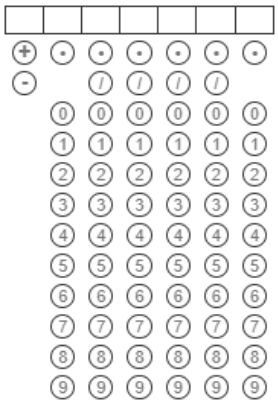
C. $\overline{DE}$ is translated to the right 2 units and up 3 units.

D. $\overline{DE}$ is translated to the right 3 units and up 2 units.

16. Find the value of y below:

$$\begin{bmatrix} 15 & 12 \\ 5x & 0 \end{bmatrix} + \begin{bmatrix} 13 & 9 \\ x & 2y + 4 \end{bmatrix} = \begin{bmatrix} 28 & 21 \\ 36 & 3y + 6 \end{bmatrix}$$

Round your answer to the nearest tenth if needed. Bubble your answer in the grid below.



17. Find the product of $\boldsymbol{SR}$, given $R = \begin{bmatrix} 12 & 3 \\ -4 & -2 \end{bmatrix}$ and $S = \begin{bmatrix} -7 & 15 \\ 11 & 5 \end{bmatrix}$.

A. $\begin{bmatrix} -39 & -2 \\ 147 & -54 \end{bmatrix}$

B. $\begin{bmatrix} -51 & 225 \\ 6 & -70 \end{bmatrix}$

C. $\begin{bmatrix} -84 & 45 \\ -44 & -10 \end{bmatrix}$

D. $\begin{bmatrix} -144 & -51 \\ 112 & 23 \end{bmatrix}$

18. Three matrices are given below.

$X = \begin{bmatrix} -2 & 0 \\ 5 & 7 \end{bmatrix}$ $Y = \begin{bmatrix} -1 & 3 \\ -5 & 8 \end{bmatrix}$ $Z = \begin{bmatrix} 11 & 3 \\ 5 & -7 \end{bmatrix}$

Which of the following statements are true? Select all that apply.

F. $(X + Y)Z = XZ + YZ$

G. $XY = YX$

H. $-5(XY) = (-5X)Y$

I. $X(Y + Z) = XY + XZ$

J. $X + Y = Y + X$

K. $Y - Z = Z - Y$

19. Three matrices are described below:

- A is any 2×2 matrix
- Z is a 2×2 zero matrix
- I is a 2×2 identity matrix

Which of the following equations is true?

A. $AI = Z$

B. $AZ = I$

C. $A + Z = A$

D. $A + I = A$

20. Which of the following operations will reflect the vector $\langle 3, -2\rangle$ across the *y*-axis?

A. $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -2 \end{bmatrix}$

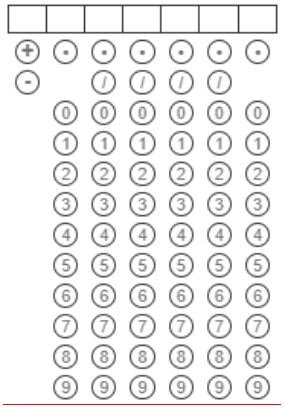
B. $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -2 \end{bmatrix}$

C. $\begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -2 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix} \cdot \begin{bmatrix} 3 \\ -2 \end{bmatrix}$

21. Find the value of $\det B$, given $B = \begin{bmatrix} -27 & 18 \\ -5 & 7 \end{bmatrix}$

Round your answer to the nearest tenth if needed. Bubble your answer in the grid below.



22. Is the matrix $A = \begin{bmatrix} 9 & -3 \\ 27 & -9 \end{bmatrix}$ an invertible matrix? Explain.

A. No, A is not an invertible matrix because $\det A = 0$.

B. Yes, A is an invertible matrix because $\det A = 0$.

C. No, A is not an invertible matrix because $\det A \neq 0$.

D. Yes, A is an invertible matrix because $\det A \neq 0$.

23. Find the inverse of $M = \begin{bmatrix} 4 & 2 \\ 10 & -5 \end{bmatrix}$.

A. $M^{-1} = \begin{bmatrix} -\frac{1}{10} & \frac{1}{20} \\ -\frac{1}{4} & -\frac{1}{8} \end{bmatrix}$

B. $M^{-1} = \begin{bmatrix} 200 & 80 \\ 400 & -160 \end{bmatrix}$

C. $M^{-1} = \begin{bmatrix} \frac{1}{8} & \frac{1}{20} \\ \frac{1}{4} & -\frac{1}{10} \end{bmatrix}$

D. M^{-1} does not exist

24. A student sketches a triangle with vertices at $(-5, 11.5)$, $(-1, -5.5)$, and $(13, 1.5)$. Using vectors, what is the area of the triangle?

A. $24\ units^2$

B. $48\ units^2$

C. $133\ units^2$

D. $266\ units^2$

25. Which matrix equation represents the system of equations below?

$$\begin{cases} 2x - 10y - 12z = -42 \\ 5y - 17z = 50 \\ 11x + 6y = -27 \end{cases}$$

A. $\begin{bmatrix} 2 & -10 & -12 \\ 5 & -17 & 0 \\ 11 & 6 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -42 \\ 50 \\ -27 \end{bmatrix}$

B. $\begin{bmatrix} 2 & -10 & -12 \\ 5 & -17 & 0 \\ 11 & 6 & 0 \end{bmatrix} \begin{bmatrix} -42 \\ 50 \\ -27 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

C. $\begin{bmatrix} 2 & -10 & -12 \\ 0 & 5 & -17 \\ 11 & 6 & 0 \end{bmatrix} \begin{bmatrix} -42 \\ 50 \\ -27 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

D. $\begin{bmatrix} 2 & -10 & -12 \\ 0 & 5 & -17 \\ 11 & 6 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -42 \\ 50 \\ -27 \end{bmatrix}$

26. Two students are each asked use the inverse matrix to solve the system of equations:

$$\begin{cases} 2x + y = 6 \\ x - 3y = 10 \end{cases}$$

Each student makes a different claim about how to determine the solution to the system.

- Student 1 claims that the solution can be determined by solving the matrix equation $\begin{bmatrix} x \\ y \end{bmatrix} = -\frac{1}{7}\begin{bmatrix} -3 & -1 \\ -1 & 2 \end{bmatrix}\begin{bmatrix} 6 \\ 10 \end{bmatrix}$

- Student 2 claims that the solution can be determined by solving the matrix equation $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 1 & -3 \end{bmatrix}\begin{bmatrix} 6 \\ 10 \end{bmatrix}$

Which of the following statements about the student's claims are true? Select all that apply.

F. The claim Student 1 makes is correct.

G. The claim Student 1 makes is incorrect because they should have multiplied by -7.

H. The claim Student 1 makes is incorrect because their inverse matrix is not correct.

I. The claim Student 2 makes is correct.

J. The claim Student 2 makes is incorrect because they multiplied by the coefficient matrix and not the inverse matrix.

27. At a bake sale, three different customers purchase plates of cookies, boxes of muffins, and boxes of cupcakes. Their purchases and total costs are shown in the table below.

Customer	Plate of Cookies	Boxes of Muffins	Boxes of Cupcakes	Total Cost ($)
Luther	1	3	4	17.00
Watson	4	1	3	13.50
Belinda	5	2	5	21.50

Given that the inverse of the matrix $\begin{bmatrix} 1 & 3 & 4 \\ 4 & 1 & 3 \\ 5 & 2 & 5 \end{bmatrix}$ is $\begin{bmatrix} 0.25 & 1.75 & -1.25 \\ 1.25 & 3.75 & -3.25 \\ -0.75 & -3.25 & 2.75 \end{bmatrix}$, what is the cost of one box of cupcakes?

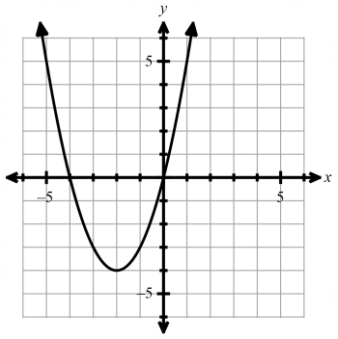
A. $1.00

B. $2.50

C. $4.33

D. $6.00

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

Function $f(x)$	Function $g(x)$
	$g(x) = -(x-8)^2 - 4$

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 $g(x)$.

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

A. Domain: $(-\infty, +\infty)$
Range: $\left(-\infty, -\frac{2}{7}\right)$

B. Domain: $[-\infty, +\infty]$
Range: $\left[\infty, -\frac{2}{7}\right]$

C. Domain: $(-\infty, +\infty)$
Range: $(\infty, 4)$

D. Domain: $(-\infty, +\infty)$
Range: $\left[\frac{1}{9}, \infty\right)$

30. 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. $y = \frac{10}{441}(x-8)^2 + 2$

31. Which of the following statements describe key features of $f(x) = \frac{1}{3}x^2 + 6x - 8$? 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 $y = -35$.

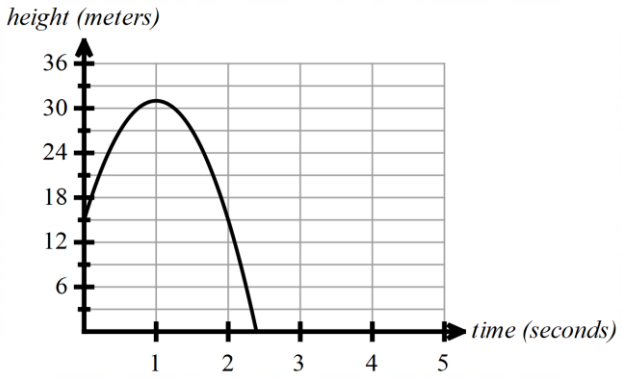
J. The *y*-intercept is $(0, 6)$.

K. The vertex is $(-6, -8)$.

L. The *y*-intercept is $(0, -8)$.

M. The vertex is $(-9, -35)$.

32. 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. $c = 31$

33. 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. $\begin{cases} a + 4b + c = y \\ 9a - 2b + c = y \\ -4a + 17b + c = y \end{cases}$

B. $\begin{cases} a + b + c = 4 \\ 9a + 3b + c = -2 \\ 4a - 2b + c = 17 \end{cases}$

C. $\begin{cases} 2a + b + c = 4 \\ 6a + 3b + c = -2 \\ -4a - 2b + c = 17 \end{cases}$

D. $\begin{cases} x^2 + 4x + c = y \\ 3x^2 - 2x + c = y \\ -2x^2 + 17x + c = y \end{cases}$

34. Which of the following functions represent the parabola opening upwards with a compression factor of $\frac{1}{4}$ and *x*-intercepts $(-4, 0)$ and $(6, 0)$.

I.	$y = \frac{1}{4}(x + 4)(x - 6)$
II.	$y = \frac{1}{4}x^2 + \frac{5}{2}x - 6$
III.	$y = 4(x - 4)^2 + 6$
IV.	$y = \frac{1}{4}x^2 - \frac{1}{2}x - 6$
V.	$y = \frac{1}{4}(x - 1)^2 - \frac{25}{4}$

A. Options I, IV, and V

B. Options I, III, and V

C. Options I, III, and IV

D. Options II, IV, and V

35. 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. $(-5, 4)$

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

A. $(-8, 42)$

B. $(-1, 22)$

C. $(8, 44)$

D. $(11, 14)$

37. Simplify: $4i(10 + i) - 6(2 - 3i)$

A. $28 + 22i$

B. $-16 + 58i$

C. $-8 + 58i$

D. $8 + 22i$

38. Simplify: $(i\sqrt{7} + 8)(i\sqrt{7} - 8)$

A. $7i - 64$

B. $i\sqrt{7} - 64$

C. -57

D. -71

39. Simplify: $\frac{2i(6-4i)}{3+3i}$

A. $4i$

B. $\frac{8}{3} + 4i$

C. $60 + \frac{2}{3}i$

D. $\frac{10}{3} + \frac{2}{3}i$

40. 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?

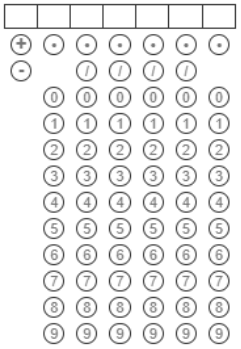
A. $a = -10$

B. $a = -5$

C. $a = 25$

D. $a = 100$

41. 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.



42. Solve: $5(x + 1)^2 = 120$

A. $x = \pm\sqrt{23}$

B. $x = \dfrac{-5 \pm 2\sqrt{30}}{5}$

C. $x = -1 \pm 2\sqrt{6}$

D. $x = -3\sqrt{6}\ or\ \sqrt{6}$

43. What are the solutions to the quadratic equation, $3x^2 + 21x = 5x - 60$?

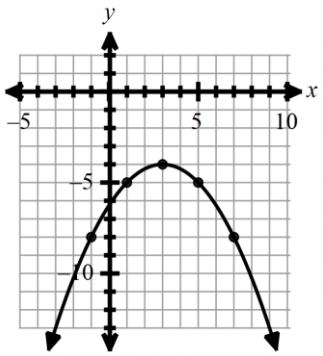
A. $x = \dfrac{-8 \pm 4i\sqrt{29}}{3}$

B. $x = \dfrac{-8 \pm 2i\sqrt{29}}{3}$

C. $x = \dfrac{-8 \pm 2i\sqrt{61}}{3}$

D. $x = \dfrac{-8 \pm i\sqrt{61}}{2}$

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



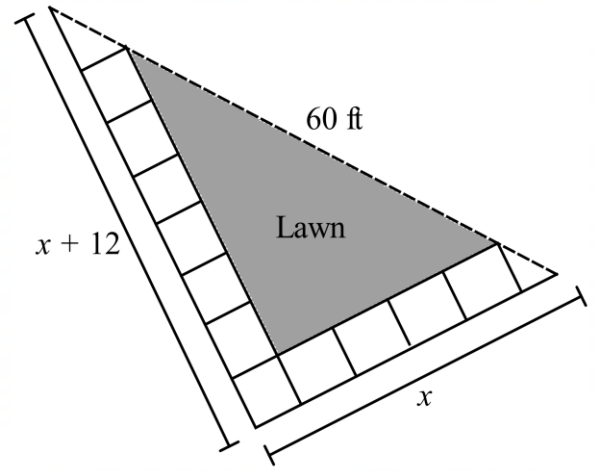
A. $x = -\frac{25}{4}$

B. $x = 3, -4$

C. $x = 3 \pm 4i$

D. $x = \pm 7i$

45. 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. $24\ feet$

46. 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. $x = 2 + \sqrt{3}, x = 2 - \sqrt{3}$

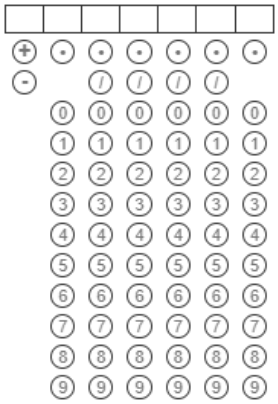
B. $x = 2 + i\sqrt{15}, x = 2 - i\sqrt{15}$

C. $x = 4 + 2\sqrt{3}, x = 4 - 2\sqrt{3}$

D. $x = -8 + \sqrt{33}, x = -8 - \sqrt{33}$

47. Two water balloons are launched in an experiment. The height of each water balloon is modeled by the equation $h = -16t^2 + v_0t + h_0$ where t is time in seconds, h is the height above the ground, h_0 is the initial height, and v_0 is the initial velocity. The first balloon is launched from a $15\ foot$ high platform at an initial velocity 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.



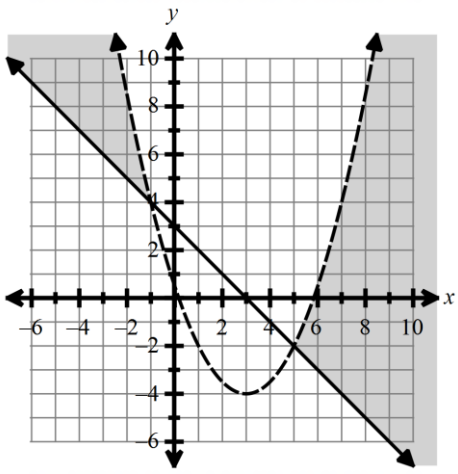
48. Which of the following represents the system of inequalities below?

A. $\begin{cases} y > \frac{1}{2}(x-3)^2 - 4 \\ y \leq -x + 3 \end{cases}$

B. $\begin{cases} y < \frac{1}{2}(x-3)^2 - 4 \\ y \geq -x + 3 \end{cases}$

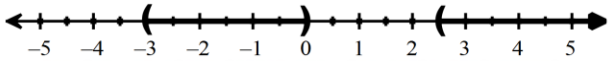
C. $\begin{cases} y \leq \frac{1}{2}(x-3)^2 - 4 \\ y > -x + 3 \end{cases}$

D. $\begin{cases} y \geq \frac{1}{2}(x-3)^2 - 4 \\ y < -x + 3 \end{cases}$

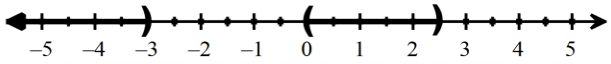


49. The function $f(x) = \frac{1}{2}x^3 + \frac{1}{4}x^2 - \frac{15}{4}x$ is graphed below. Over which intervals of x is the graph positive?

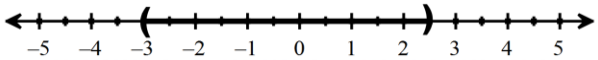
A.



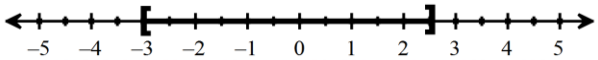
B.

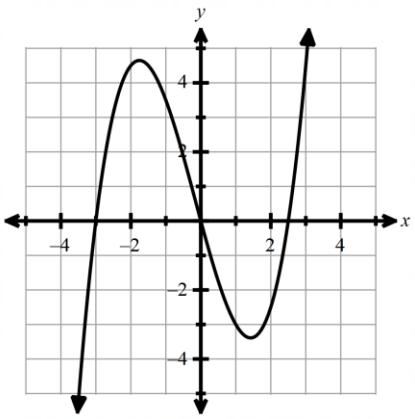


C.

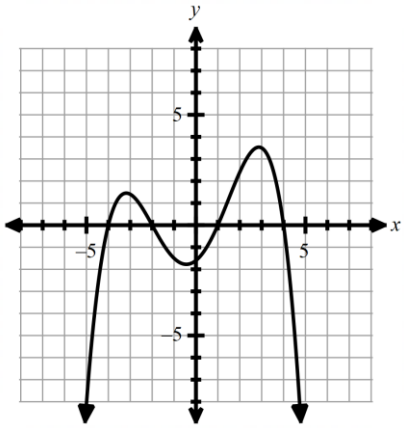


D.





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



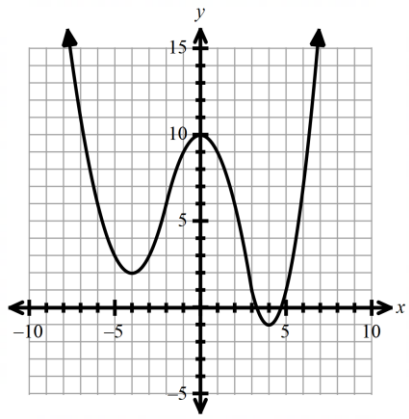
A. $g(x) = -6x - 7$

B. $g(x) = -|x + 3| - 5$

C. $g(x) = x^2 - 4x + 5$

D. $g(x) = x^3 + 2x$

51. Based on the function graphed below, which statements are true? Select all that apply



F. The function is always decreasing over the interval $(-\infty, \infty)$.

G. The function is always increasing over the interval $(-4, 4)$.

H. The function is always 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.

52. 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. $100x^2 + 440x + 484$

53. Multiply: $(2x^2 + 4x - 5)(-x^2 + 3x + 6)$

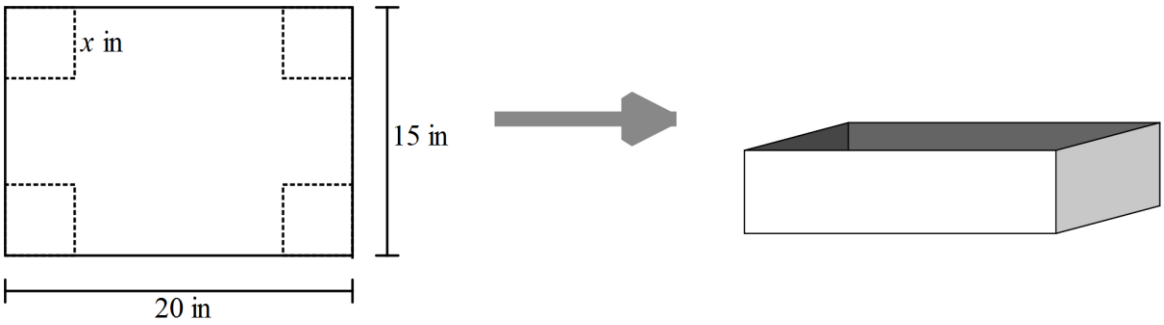
A. $-2x^4 + 2x^3 + 29x^2 + 9x - 30$

B. $2x^4 + 10x^3 + 19x^2 + 9x - 30$

C. $-2x^4 + 9x^2 + 21x - 30$

D. $-2x^4 + 24x^2 - 30$

54. 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. $V(x) = 4x^2 - 70x + 300$

55. Factor the following using imaginary numbers: $9x^2 + 49$

A. $(3x - 7i)^2$

B. $(\sqrt{3}x + 7i)(\sqrt{3}x - 7i)$

C. $(3x + 7i)(3x - 7i)$

D. $(3x + 7i)^2$

56. Factor: $125x^3 - 343$

A. $(5x - 7)(5x^2 + 35x + 7)$

B. $(5x - 7)(5x^2 + 35x - 7)$

C. $(5x - 7)(25x^2 + 35x + 49)$

D. $(5x - 7)(25x^2 - 35x - 49)$

57. If $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$, then which expression is equivalent to $125x^6 - 27y^{12}$?

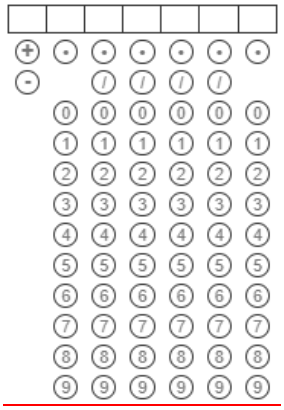
A. $(5x^2 - 3y^4)((5x^2)^2 + (5x^2)(3y^4) + (3y^4)^2)$

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

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



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

A. $3x^2 - 12x + 4$

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

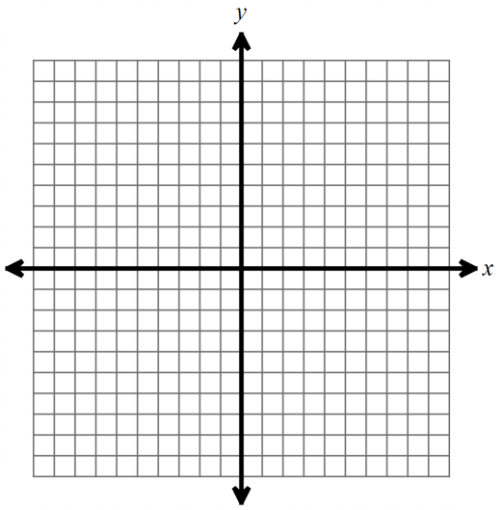
C. $3x^2 - 32 + \frac{-120}{x - 4}$

D. $3x^2 + 12x + 4 + \frac{24}{x - 4}$

60. 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 $f(x) = g(x)$?



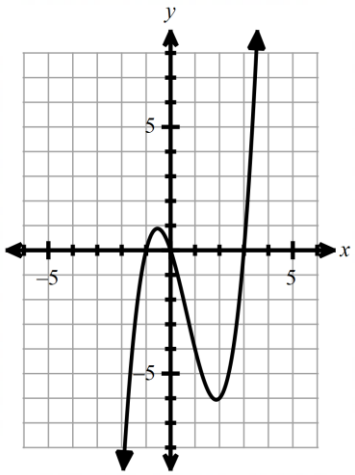
A. *no real solution*

B. *1 real solution*

C. *2 real solutions*

D. *3 real solutions*

61. Which polynomial is graphed below?



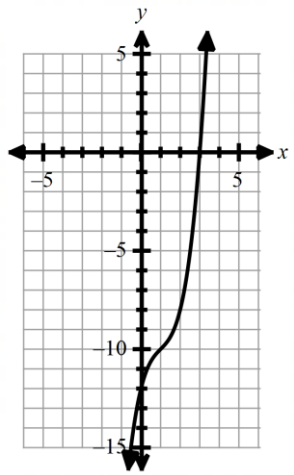
A. $f(x) = (x + 1)(x - 3)$

B. $f(x) = (x - 1)(x + 1)(x + 3)$

C. $f(x) = x(x - 3)(x + 1)$

D. $f(x) = x(x + 3)(x - 1)$

62. 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. $x = 12, \frac{3 - i\sqrt{7}}{2}, \frac{3 + i\sqrt{7}}{2}$

63. 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 $x \to +\infty$, $f(x) \to -\infty$

64. 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. $y = 0$

65. 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. $x = -1, -2i, 2i$

66. 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. $f(x) = x^6 - 9x^4 - 130x^2 + 288$

67. 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 $D: \{x | x \geq -8\}$ and the range will become $R: \{y | y \geq 10\}$.

B. The domain will become $D: \{x | x \geq 8\}$ and the range will become $R: \{y | y \geq 10\}$.

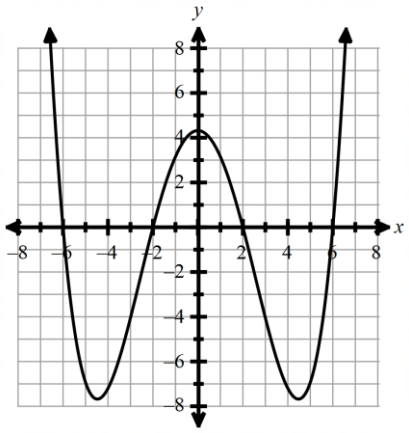
C. The domain will become $D: \{x | x \geq -8\}$ and the range will remain $R: \{y | all\ real\ numbers\}$.

D. The domain will remain $D: \{x | all\ real\ numbers\}$ and the range will remain $R: \{y | all\ real\ numbers\}$.

68. Which of the following functions is odd?

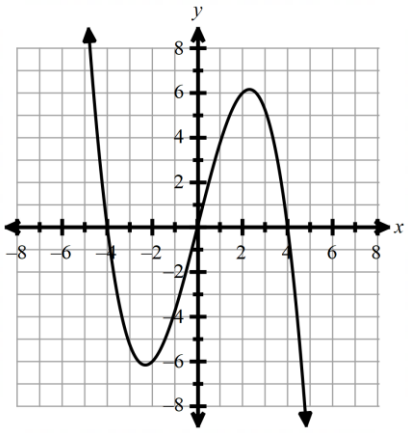
A. $f(x) = 6x^7 - 5x^4 + 8$

B.



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

D.



Algebra 2 Honors Semester 1
Instructional Materials 2021-22 Answers

Topic 1 Linear Functions & Systems			Topic 10 Matrices		
1.	C	HSF.IF.B.5	**13.**	D	HSN.VM.C.7(+)
2.	D	HSF.IF.B.5	**14.**	A	HSN.VM.C.8(+)
3.	A	HSF.IF.C.7b	**15.**	B	HSN.VM.C.12(+)
4.	C	HSF.IF.B.5	**16.**	-2	HSN.VM.C.8(+)
5.	B	HSF.LE.A.2 HSF.IF.C.7b	**17.**	D	HSN.VM.C.8(+)
6.	A	HSF.BF.B.3	**18.**	F, H, I, J	HSN.VM.C.9(+)
7.	K, H	HSF.IF.B.4	**19.**	C	HSN.VM.C.12(+)
8.	B	HSF.IF.B.6	**20.**	C	HSN.VM.C.10(+)
9.	A	HSA.REI.D.11	**21.**	-99	HSN.VM.10(+)
10.	B	HSA.REI.D.11	**22.**	A	HSN.VM.10(+)
11.	C	HSA.REI.C.6	**23.**	C	HSN.VM.10(+)
12.	122.75	HSA.REI.C.6	**24.**	C	HSN.VM.C.12(+)
			25.	D	HSA.REI.C.9
			26.	F, J	HSA.REI.C.9
			27.	B	HSA.REI.C.9

Algebra 2 Honors Semester 1
Instructional Materials 2021-22 Answers

Topic 2 Quadratic Functions & Equations			Topic 3 Polynomial Functions		
28.	B	HSF.IF.B.4	**49.**	A	HSF.IF.B.4
29.	D	HSF.IF.B.4	**50.**	B	HSF.IF.B.4
30.	C	HSA.CED.A.2	**51.**	H, J	HSF.IF.B.4
31.	H, I, L, M	HSF.IF.B.4	**52.**	C	HSA.APR.A.1
32.	C	HSF.BF.B.3	**53.**	A	HSA.APR.A.1
33.	B	HSA.CED.A.2	**54.**	B	HSF.BF.A.1.b
34.	A	HSA.CED.A.2	**55.**	C	HSA.SSE.A.2 HSN.CN.C.8
35.	A	HSF.IF.B.4	**56.**	C	HSA.SSE.A.2
36.	D	HSA.CED.A.2	**57.**	A	HSA.APR.C.4
37.	B	HSN.CN.A.2	**58.**	15	HSA.APR.B.2
38.	D	HSN.CN.A.2	**59.**	D	HSA.APR.D.6
39.	D	HSN.CN.A.3(+)	**60.**	B	HSA.APR.B.2 HSF.IF.B.4
40.	B	HSA.SSE.A.3b	**61.**	C	HSA.APR.B.3 HSF.IF.C.7.c
41.	−14	HSA.REI.B.4a	**62.**	C	HSN.CN.C.7 HSA.APR.B.3
42.	C	HSA.REI.B.4b	**63.**	D	HSF.IF.C.7
43.	B	HSA.REI.B.4b HSN.CN.C.7	**64.**	B	HSN.CN.C.8(+) HSN.CN.C.9(+) HSA.APR.B.2 HSA.APR.B.3
44.	C	HSA.CED.A.2 HSN.CN.C.7	**65.**	A	HSN.CN.C.8(+) HSN.CN.C.9(+) HSA.APR.B.2 HSA.APR.B.3
45.	D	HSA.CED.A.2 HSA.REI.B.4	**66.**	C	HSN.CN.C.9(+)
46.	A	HSA.RE.IC.7	**67.**	D	HSF.BF.B.3
47.	52.5	HSA.REI.C.7 HSA.REI.D.11	**68.**	D	HSF.IF.B.4 HSF.BF.B.3
48.	B	HSA.REI.D.11 HSA.REI.D.12			