Sharyland ISD Study Guide

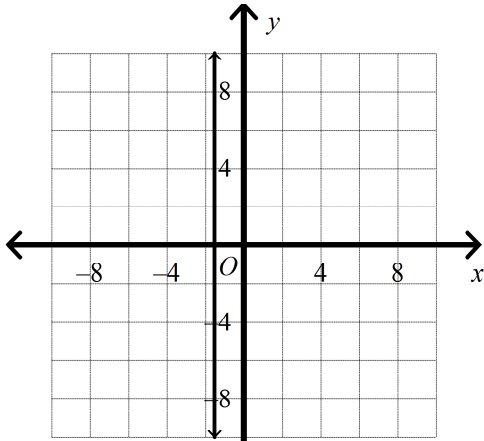# Algebra II Semester A

Student Name: _____

Student ID: _____

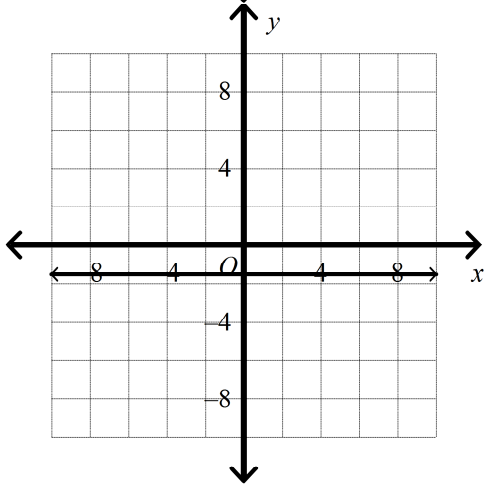# Algebra II A CBE 2019-2020 Study Guide

Multiple Choice
Identify the choice that best completes the statement or answers the question.

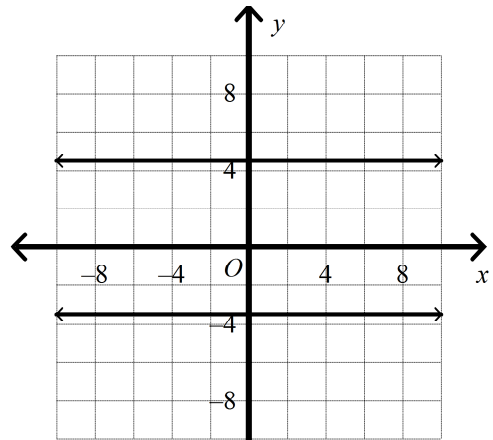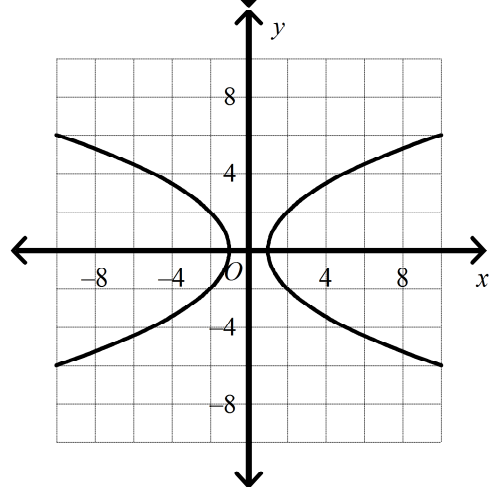1 Use the vertical-line test to determine which graph represents a function.

A

C

B

D

2 Find the minimum value of $f(x) = |x - 5| + 5$ on the interval $[-4, 6]$.

    F 10
    G 13
    H 4
    J 5

3 Find the maximum value of $f(x) = -|x - 3| + 3$ on the interval $[-2, 4]$.

    A 6
    B 7
    C 2
    D 3

4 A biologist took a count of the number of migrating waterfowl at a particular lake, and recounted the lake's population of waterfowl on each of the next six weeks.

Week	0	1	2	3	4	5	6
Population	585	582	629	726	873	1,070	1,317

    a. Find a quadratic function that models the data as a function of x, the number of weeks.

    b. Use the model to estimate the number of waterfowl at the lake on week 8.

    F $P(x) = 25x^2 - 28x + 585$; 1,614 waterfowl
    G $P(x) = 30x^2 + 28x + 535$; 2,679 waterfowl
    H $P(x) = 25x^2 - 28x + 585$; 1,961 waterfowl
    J $P(x) = 30x^2 + 28x + 535$; 2,201 waterfowl

Short Answer

5 Use set notation to write the domain and range of the function $y = 2(x+3)^2 - 4$ shown in the graph.
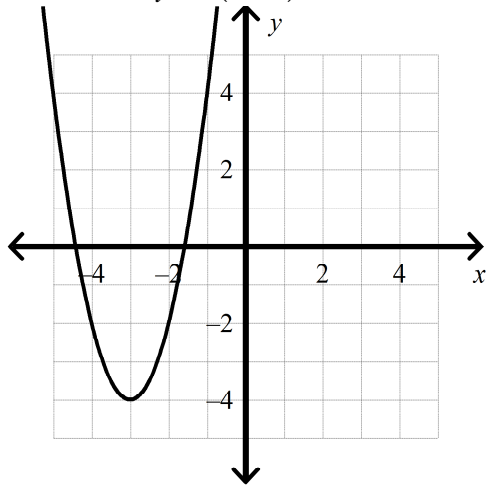
6 Let $f(x) = 4x - 5$ and $g(x) = 6x - 3$. Find $f(x) + g(x)$.

7 Let $f(x) = x^2 - 16$ and $g(x) = x + 4$. Find $\dfrac{f}{g}$ and its domain.

8 Given $f(x) = x^3$ and $g(x) = 4x + 3$, find $g(f(3))$.

9 Find the inverse of the function $f(x) = \dfrac{2}{5}x + 2$.

10 Find an equation for the inverse of $f(x) = \dfrac{x}{3} - 5$.

Solve the absolute value equation. Graph the solution.

11 What is the sum of the solutions of $2|3x - 2| - 6 = -2$?

Solve the equation. Check for extraneous solutions.

12 $2|4 - 9x| = 9x + 7$

Solve the inequality. Graph the solution.

13 $|4x + 6| \le 30$

14 $|2x + 5| \ge 15$

15   A furniture maker uses the specification $23.84 \le w \le 24.16$ for the width w in inches of a desk drawer. Write the specification as an absolute value inequality.

16   The graph of $f(x - 4)$ would be identical to the graph of $f(x)$ except that it would be shifted 4 units

17   If the graph of the parent function of the absolute function, $y = |x|$ is shifted 2 units right and 4 units up, what is the equation of the shifted graph?
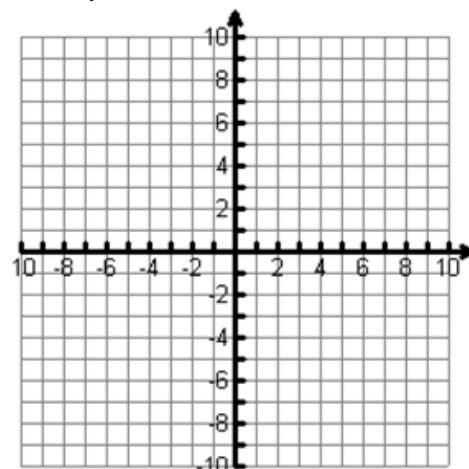
18   If the graph of the parent function of the absolute function, $y = |x|$ is shifted 2 units left and 4 units up, what is the equation of the shifted graph?
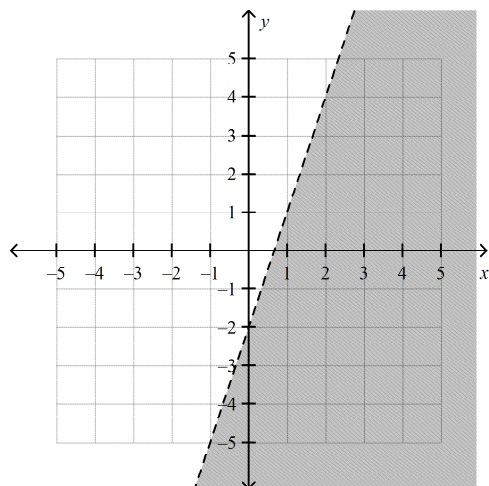
Graph the absolute value equation.
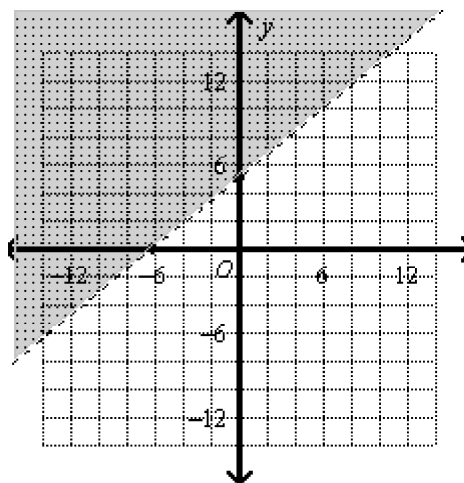
19   $y = -|2x + 3|$

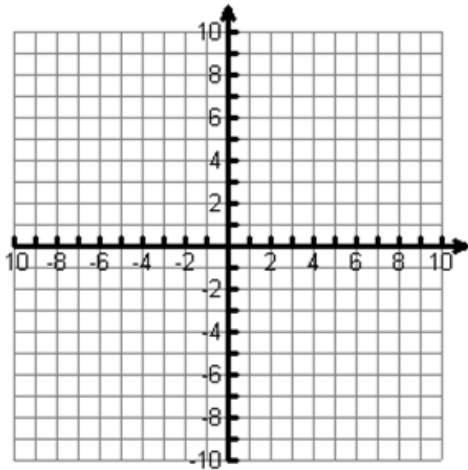21   Graph $4x + 2y \leq -6$.
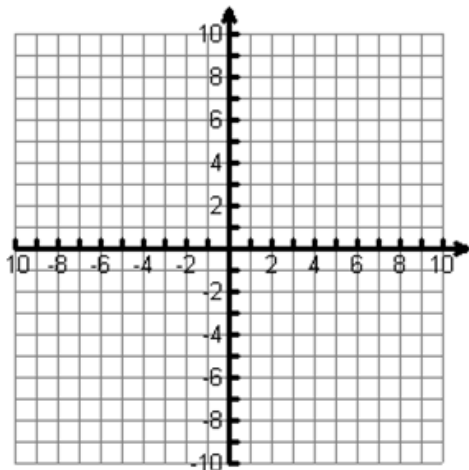
Write an inequality for the graph.

20   Write an inequality to represent the graph.

22

23 Solve the system $\begin{cases} -5x + 4y = 6 \\ \quad 3x - y = 2 \end{cases}$ by graphing.

24 Two snow resorts offer private lessons to their customers. Big Time Ski Mountain charges $5 per hour plus $50 insurance. Powder Hills charges $10 per hour plus $30 insurance. Determine the number of hours for which the cost of lessons is the same for both resorts. Use a graph to find the solution.
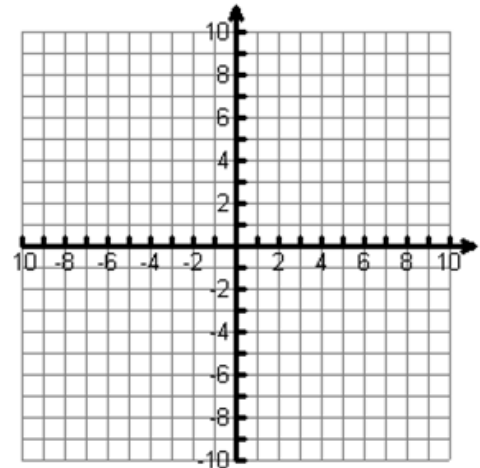
25 Solve the system of equations.

$\begin{cases} -3x - 4y = 9 \\ 9x + 10y = -3 \end{cases}$

26 Solve the system.

$\begin{cases} -4y = -20 - 8x \\ y = 2x + 5 \end{cases}$

27 Solve the system.

$\begin{cases} 3y = -33 - 12x \\ y = -4x - 11 \end{cases}$

Solve the system by the method of substitution.

28 $\begin{cases} -3x - 3y + 2z = -7 \\ \qquad\qquad\quad z = 1 \\ -2x - 3y + z = -6 \end{cases}$
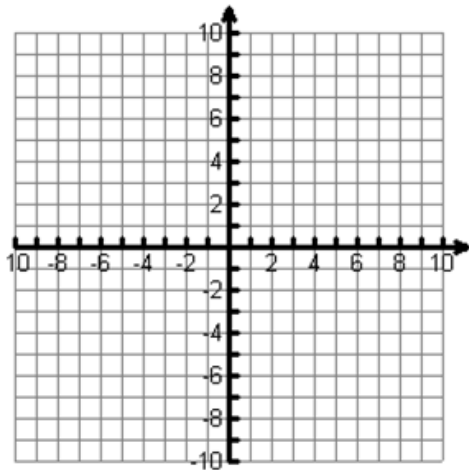
Name: _____

高ID: A

29 $\begin{cases} x + y + 3z = -4 \\ -x - y - 2z = 5 \\ 2x - z = -3 \end{cases}$

31 $\begin{cases} x \geq 4 \\ y > 1 \end{cases}$

Solve the system of inequalities by graphing.

30 $\begin{cases} y \leq -3x - 1 \\ y > 3x - 2 \end{cases}$

32 Describe the transformations of $g(x) = (x-7)^2 + 6$ relative to the graph of the parent function $f(x) = x^2$. Then graph the function $g(x) = (x-7)^2 + 6$.

33 The parent function $f(x) = x^2$ is reflected across the x-axis, vertically stretched by a factor of 5, and translated right 8 units to create g. Use the description to write the quadratic function $g(x)$ in vertex form.
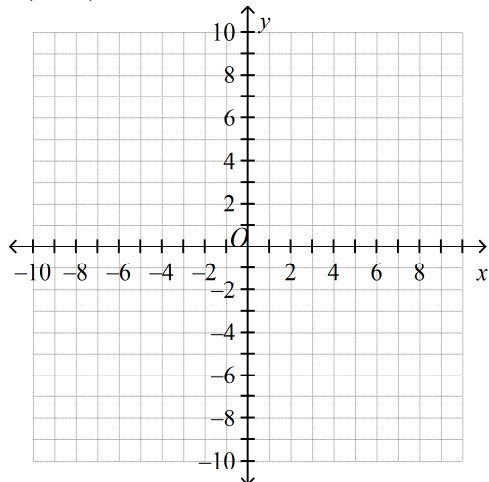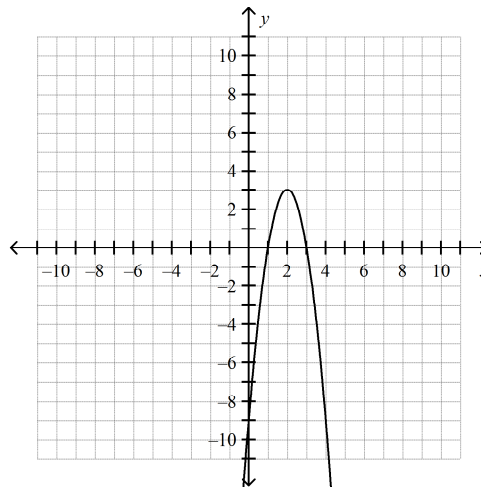
34 Describe the transformations of $g(x) = (x+7)^2 + 5$ relative to the graph of the parent function $f(x) = x^2$. Then graph the function $g(x) = (x+7)^2 + 5$.
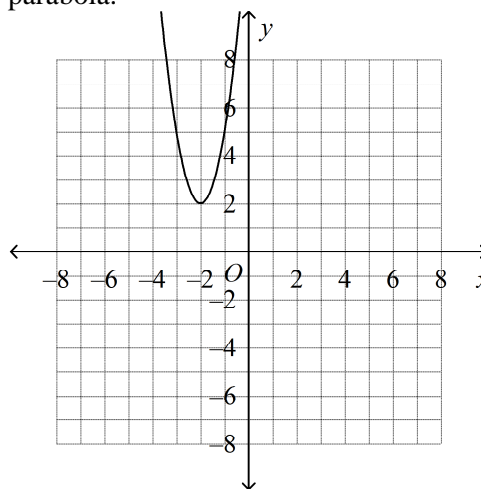

What are the vertex and the axis of symmetry of the equation?

35 $y = -2x^2 + 28x - 16$

36 $y = -2x^2 + 24x - 2$

37 Use the graph to find the vertex and x-intercepts of the quadratic function $y = -3x^2 + 12x - 9$.

38 Use vertex form to write the equation of the parabola.

39 Use vertex form to write the equation of the parabola.

40 Identify the focus and the directrix of the graph of $y = -\dfrac{1}{12}x^2$.

41 Identify the vertex, focus, and directrix of the graph of $y = \dfrac{1}{8}(x-2)^2 + 5$.

42 What are the focus and directrix of the parabola with equation $y = \dfrac{1}{12}x^2$?

43 The height of a curved support beam can be modeled by $f(x) = -\dfrac{x^2}{300} + 12$. Find the height and width of the beam.

44 Factor $x^2 + 21x + 80$.

45 Factor $3x^2 + 17x + 10$.

46 Factor $6x^2 - 7x - 3$.

48 Solve by factoring.
$$4x^2 + 28x - 32 = 0$$

Factor the expression.

47 $9x^2 - 16$

49 The table shows the number of llamas born on llama ranches worldwide since 1988. Find a cubic function to model the data and use it to estimate the number of births in 1999.

Years since 1988	1	3	5	7	9
Llamas born (in thousands)	1.6	20	79.2	203.2	416

50 Complete the square: $x^2 - 14x +$ _____

51 Complete the square and factor the resulting perfect square trinomial: $x^2 - 22x +$ _____

52 Solve $x^2 + 2x - 6 = 0$.

53 Solve by completing the square: $x^2 - 10x + 25 = 54$

What is the expression in factored form?

54 $x^2 - 64$

**What are the solutions of the quadratic equation?**

**55** $3x^2 + 25x + 42 = 0$

56 $5x^2 + 42x + 49 = 0$

57 The equation $h = -4.9t^2 + v_0 t + h_0$ gives the height, in meters, at time t if an object is thrown from a height h_0 with an initial vertical speed of v_0.

Suppose a model rocket is shot from a 10-meter elevation at an initial vertical speed of 80 meters per second. How long will it take to hit the ground (where $h = 0$)? Round your answer to the nearest hundredth of a second.

58 Graph $-2i$ on the complex plane.
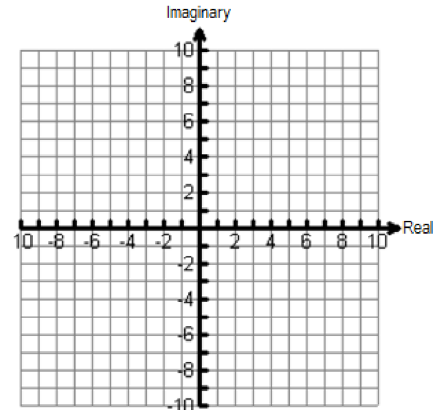
59 Graph $4+2i$ on the complex plane.
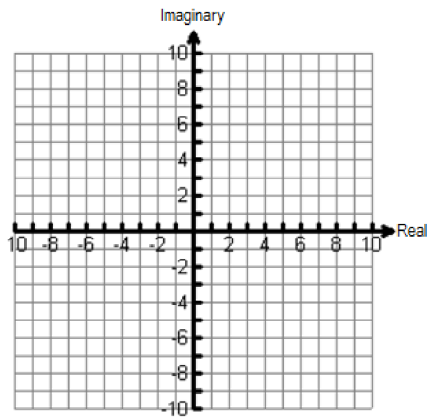
60 Find the absolute value of $-7-9i$.

**61** Multiply $6i(4-6i)$. Write the answer in the form $a+bi$.

62 Simplify $\dfrac{-2+2i}{5+3i}$. Write the answer in the form $a+bi$.

63 Solve $x^2 + 3x - 18 \le -14$ algebraically.

64 The height of a soccer ball that is kicked from the ground can be approximated by the function $y = -16x^2 + 48x$, where y is the height of the soccer ball in feet x seconds after it is kicked. Graph this function. Find the time it takes the soccer ball to reach its maximum height, the soccer ball's maximum height, and the time it takes the soccer ball to return to the ground.

65 A kicker starts a football game by "kicking off". The quadratic function $y = -16x^2 + 60x$ models the football's height after x seconds. How long is the football in the air?

66 Solve $\begin{cases} -8x+4y=-4 \\ y=x^2-4 \end{cases}$ by graphing.

67 $(-2x+4)^{\frac{1}{2}} = (-3-7x)^{\frac{1}{2}}$
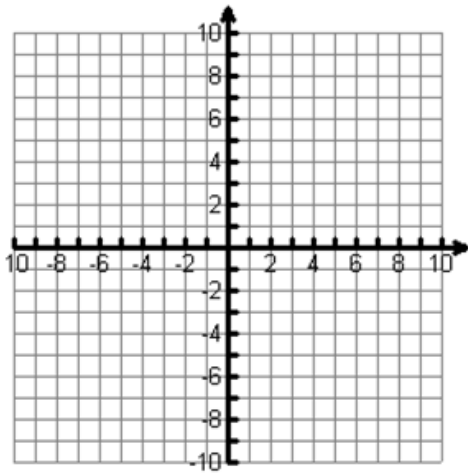
68 Solve $-6+\sqrt{x-5}=-2.$

69 Multiply $(-6+4i)(8+i).$

70 $(-5x+10)^{\frac{1}{4}} = (-4-8x)^{\frac{1}{4}}$

71 Find the absolute value $|-7-9i|.$

72 Let $f(x) = -5x+4$ and $g(x) = -2x-7$. Find $f(x) - g(x).$

73 Let $f(x) = 3x+2$ and $g(x) = 7x+6$. Find $f \cdot g$ and its domain.

74 Given $f(x) = x^3$ and $g(x) = 8x + 9$, find $g(f(2))$.

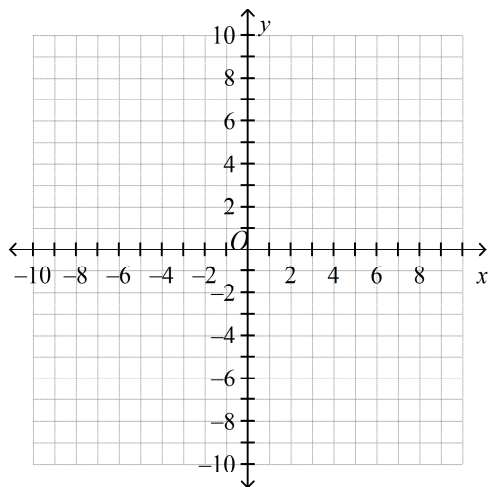**76** How does the graph of $y = \sqrt{2x}$ compare to its square root parent function, $y = \sqrt{x}$?

75 How does the graph of $y = 2\sqrt{x}$ compare to its square root parent function, $y = \sqrt{x}$?

77 If the x in a square root parent function, $y = \sqrt{x}$ is replaced with $x + 8$, how is the graph changed?

Problem

78 Graph the square root function and its inverse. Determine the domain and range of both functions.

$y = \sqrt{x + 3}$

Algebra II A CBE 2019-2020 Study Guide
Answer Section

MULTIPLE CHOICE

   1 ANS: B   STA: (7)(I)
   2 ANS: J   STA: (2)(A)| (7)(I)
   3 ANS: D   STA: (2)(A)| (7)(I)
   4 ANS: H   STA: TX TEKS 2A.1B | TX TEKS 2A.5C | TX TEKS 2A.6B | TX TEKS 2A.8A

SHORT ANSWER

   5 ANS:
   domain: $\left\{x|x \text{ is a real number}\right\}$ range: $\left\{y|y \geq -4\right\}$

   STA: (7)(I)
   6 ANS:
   $10x - 8$

   STA: (7)(B)
   7 ANS:
   $x - 4$; all real numbers except $x \neq -4$

   STA: (7)(B)
   8 ANS:
   $g(f(3)) = 111$
   9 ANS:
   $f^{-1}(x) = \dfrac{5}{2}x - 5$

   STA: (2)(B)| (2)(C)| (2)(D)| (7)(I)
   10 ANS:
   $f^{-1}(x) = 3(x + 5)$
   11 ANS:
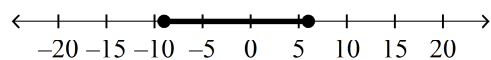 $1\dfrac{1}{3}$

   STA: (6)(D)| (6)(E)
   12 ANS:
   $x = \dfrac{5}{3}$ or $x = \dfrac{1}{27}$

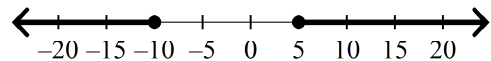   STA: (6)(D)| (6)(E)

13 ANS:
$-9 \le x \le 6$

STA: (6)(F)
14 ANS:
$x \le -10 \text{ or } x \ge 5$

STA: (6)(F)
15 ANS:
$|w - 24| \le 0.16$

STA: (6)(F)
16 ANS:
to the right
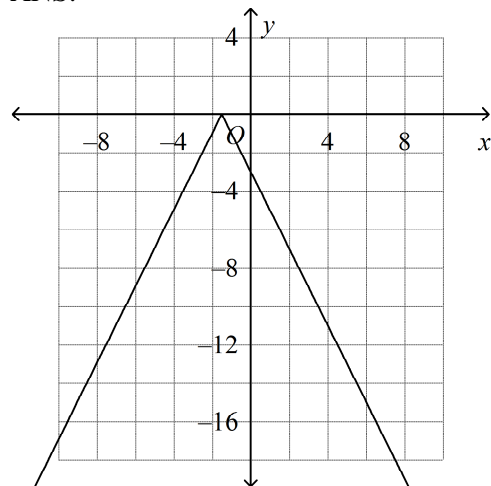
STA: 2A.4(A)
17 ANS:
$y = |x - 2| + 4$

STA: 2A.4(A)
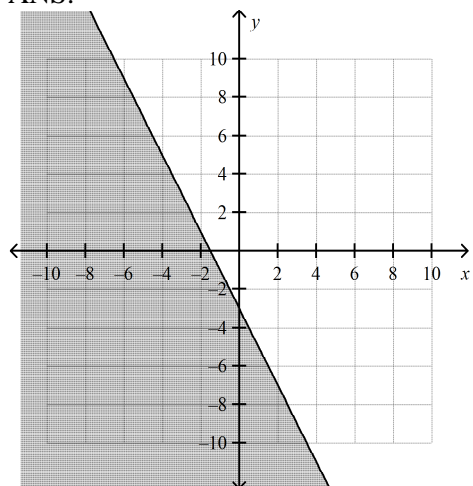**18** ANS:
$y = |x + 2| + 4$

STA: 2A.4(A)
19 ANS:

STA: TX TEKS 2A.1A | TX TEKS 2A.4A
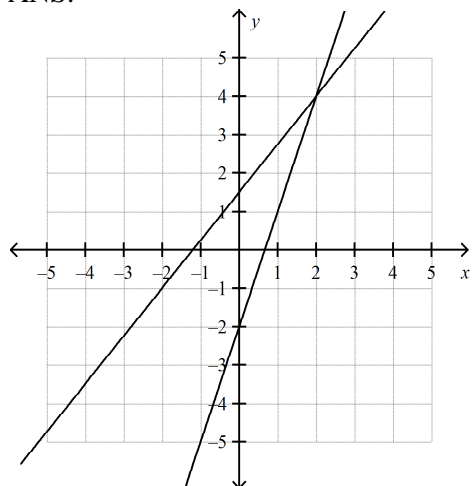**20** ANS:
$y < 3x - 2$

21 ANS:

22 ANS:

$5x - 6y < -30$

STA: (2)(A)| (6)(C)| (6)(F)

23 ANS:

The solution to the system is (2, 4).

24 ANS:

4 hours

25 ANS:

(13, −12)

26 ANS:

$\left\{ (x, y) \mid y = 2x + 5 \right\}$

27 ANS:

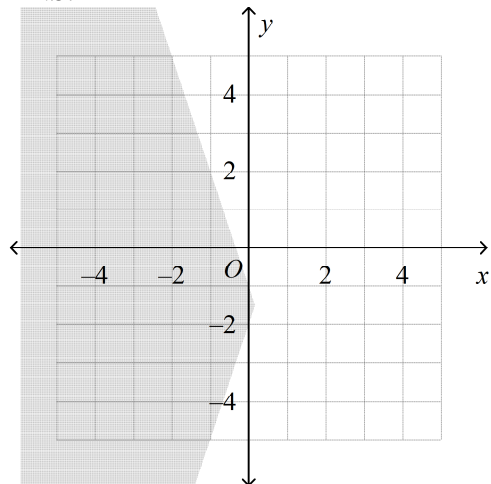$\left\{ (x, y) \mid y = -4x - 11 \right\}$

28 ANS:

(2, 1, 1)

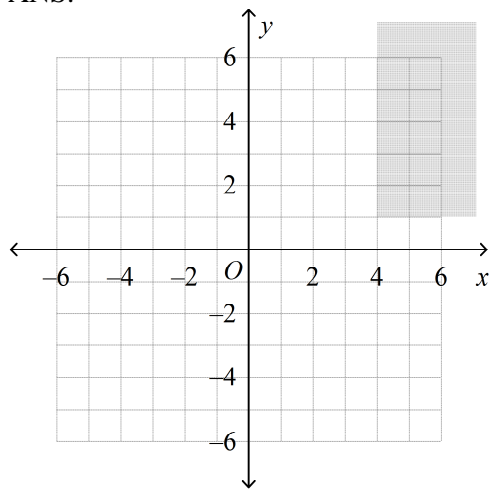STA: TX TEKS 2A.3A | TX TEKS 2A.3B

29 ANS:
(−1, −6, 1)

STA: TX TEKS 2A.3A | TX TEKS 2A.3B

30 ANS:

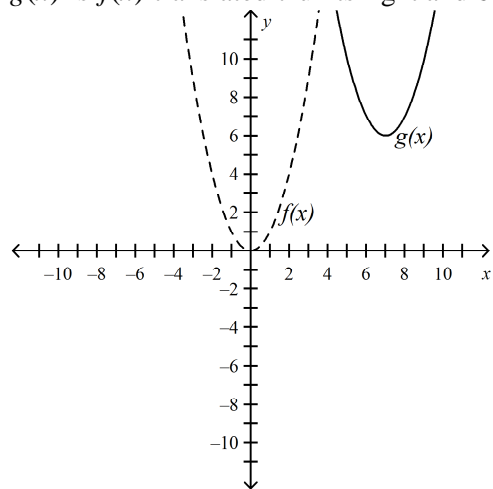STA: TX TEKS 2A.3A | TX TEKS 2A.3B | TX TEKS 2A.3C

31 ANS:

STA: TX TEKS 2A.3A | TX TEKS 2A.3B | TX TEKS 2A.3C

32 ANS:
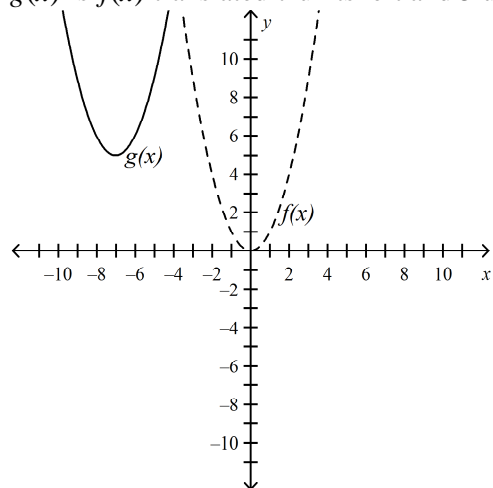$g(x)$ is $f(x)$ translated 7 units right and 6 units up.

33 ANS:
$g(x) = -5(x - 8)^2$

34 ANS:
$g(x)$ is $f(x)$ translated 7 units left and 5 units up.

35 ANS:
vertex: $(7, 82)$
axis of symmetry: $x = 7$

STA: (4)(B)| (4)(D)

36 ANS:
vertex: $(6, 70)$
axis of symmetry: $x = 6$

STA: (4)(B)| (4)(D)

37 ANS:
Vertex: $(2, 3)$
x-intercepts: $(1, 0)$ and $(3, 0)$

38 ANS:

$y = 3(x + 2)^2 + 2$

STA: TX TEKS 2A.4A | TX TEKS 2A.4B | TX TEKS 2A.6C | TX TEKS 2A.7A | TX TEKS 2A.7B | TX TEKS 2A.8A

39 ANS:

$y = -(x + 3)^2 - 2$

STA: TX TEKS 2A.4A | TX TEKS 2A.4B | TX TEKS 2A.6C | TX TEKS 2A.7A | TX TEKS 2A.7B | TX TEKS 2A.8A

40 ANS:

focus $(0, -3)$, directrix at $y = 3$

STA: TX TEKS 2A.5B | TX TEKS 2A.5C | TX TEKS 2A.5D | TX TEKS 2A.5E

41 ANS:

vertex $(2, 5)$, focus $(2, 7)$, directrix at $y = 3$

STA: TX TEKS 2A.5B | TX TEKS 2A.5C | TX TEKS 2A.5D | TX TEKS 2A.5E

42 ANS:

focus: $(0,3)$; directrix: $y = -3$

STA: (4)(B)

43 ANS:

height = 12 units; width = 120 units

44 ANS:

$(x + 5)(x + 16)$

45 ANS:

$(x + 5)(3x + 2)$

46 ANS:

$(2x - 3)(3x + 1)$

47 ANS:

$(3x + 4)(3x - 4)$

STA: TX TEKS 2A.2A | TX TEKS 2A.8A | TX TEKS 2A.8D

48 ANS:

$-8, 1$

STA: TX TEKS 2A.8A | TX TEKS 2A.8C | TX TEKS 2A.8D

49 ANS:

$L(x) = 0.5x^3 + 0.6x^2 + 0.3x + 0.2$; 741,600 llamas

STA: TX TEKS 2A.1B

50 ANS:

$x^2 - 14x + 49$

51 ANS:

121; $(x - 11)^2$

52 ANS:

$-1 \pm \sqrt{7}$

53 ANS:

$x = 5 \pm 3\sqrt{6}$

54 ANS:

$(x + 8)(x - 8)$

STA: (4)(F)
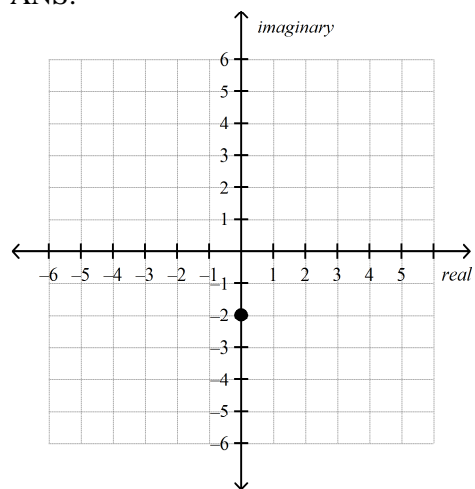
55 ANS:

$-6, -\dfrac{7}{3}$

STA: (4)(F)| (7)(I)
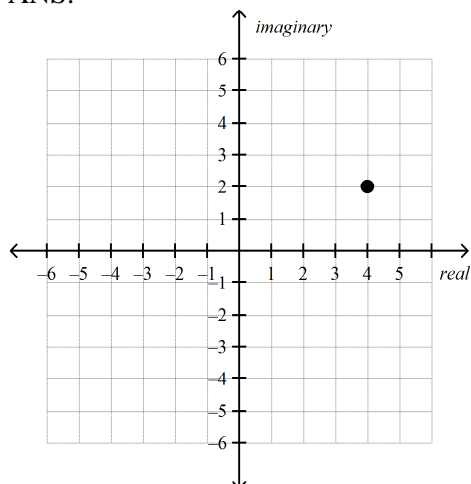
56 ANS:

$-7, -\dfrac{7}{5}$

STA: (4)(F)| (7)(I)

57 ANS:

16.45 seconds

58 ANS:

59 ANS:

60 ANS:
$\sqrt{130}$

61 ANS:
$36 + 24i$

62 ANS:
$-\frac{2}{17} + \frac{8}{17}i$

63 ANS:
$-4 \le x \le 1$

64 ANS:
It takes the ball 1.5 seconds to reach its maximum height. The ball's maximum height is 36 feet.

65 ANS:
3.75 sec

66 ANS:
$(-1, \, -3)$ and $(3, 5)$

67 ANS:
$-\frac{7}{5}$

STA: TX TEKS 2A.9C | TX TEKS 2A.9D | TX TEKS 2A.2A | TX TEKS 2A.9F

68 ANS:
$x = 21$

69 ANS:
$-52 + 26i$

70 ANS:
$-\frac{14}{3}$

STA: TX TEKS 2A.9C | TX TEKS 2A.9D | TX TEKS 2A.2A | TX TEKS 2A.9F

71 ANS:
$\sqrt{130}$

72 ANS:
$-3x + 11$

STA: (7)(B)
73 ANS:
$21x^2 + 32x + 12$; all real numbers

STA: (7)(B)
74 ANS:
$g(f(2)) = 73$
75 ANS:
The graph is stretched vertically by a factor of 2.

STA: 2A.10A
76 ANS:
The graph is compressed horizontally by a factor of ½.

STA: 2A.10A
77 ANS:
The graph is shifted left 8 units.

STA: 2A.10A

PROBLEM

78 ANS:
For $y = \sqrt{x+3}$ the domain is $x \geq -3$ and the range is $y \geq 0$. For the inverse, $y = x^2 - 3$, the domain is $x \geq 0$ and the range is $y \geq -3$.