Name: _____   Algebra 2

Mid Term Review

Chapter 1

Define and provide an example for each as needed:

Parent function:

Transformation:

Translation:

Reflection:

Vertical stretch:

Vertical shrink:

Function:

Domain:

Range:

Slope:

Scatter plot:

Line of fit:

Line of best fit:

Correlation coefficient:

Slope:

Slope-intercept form:

Point-slope form:

Scatter plot:

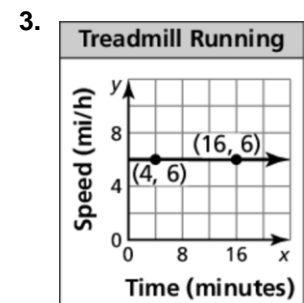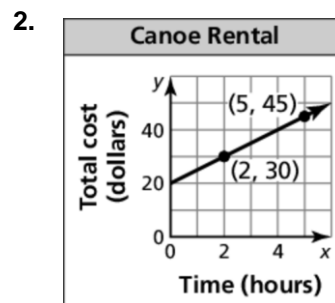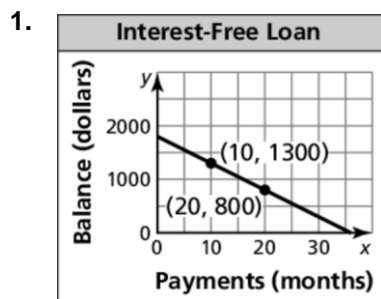**Linear equation in three variables:**

System of three linear equations:

Solution of a system of three linear equations:

Ordered triple:

System of two linear equations:

Write an equation of the line and interpret the slope and *y*-intercept.

1.

Interest-Free Loan

Balance (dollars)

2000

1000

(10, 1300)

(20, 800)

0
0   10   20   30   *x*

Payments (months)

2.

Canoe Rental

Total cost (dollars)

40

20

(5, 45)

(2, 30)

0
0   2   4   *x*

Time (hours)

3.

Treadmill Running

Speed (mi/h)

8

4

(16, 6)

(4, 6)

0
0   8   16   *x*

Time (minutes)

Solve the system. Check your solution, if possible.

4. $x + y + 3z = -4$

$-x - y - 2z = 5$

$2x - z = -3$

5. $x - 3y - z = -9$

$-2x + y + 2z = 3$

$2x + y + 3z = 8$

6. $x + y + z = 7$

$x - y + 2z = 7$

$2x + 3z = 14$

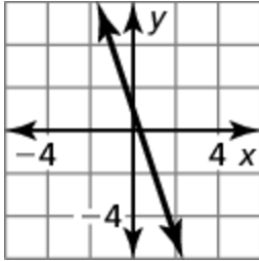**7.** $-x - y - 2z = 9$

$-2x - 2y - z = 1$

$-x - y + z = -10$

Match the transformation of $f(x) = x$ **with its graph. Then write a rule for** *g*.
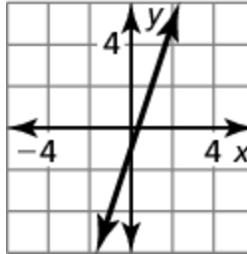
8. $g(x) = -f(x) + 3$

9. $g(x) = 3f(x) - 1$

10. $g(x) = -3f(x) + 1$

A.

B.

C.

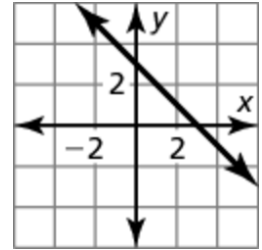**11.** A Major League Baseball stadium sells three types of tickets. Reserved tickets are sold for $20 each, field-level tickets are sold for $50 each, and box seat tickets are sold for $100 each. You purchase 10 total tickets for $370. You have twice as many reserved tickets as field-level tickets. How many tickets of each do you have?

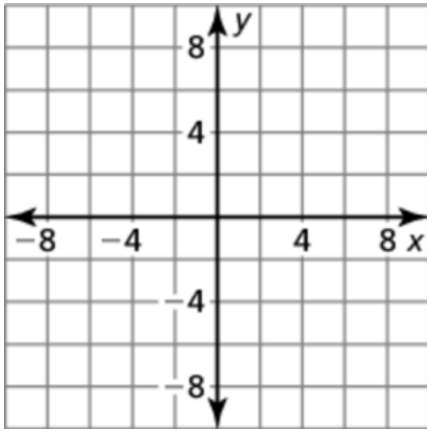**Graph the function and its parent function. Then describe the transformation.**

12. $f(x) = 2x^2$
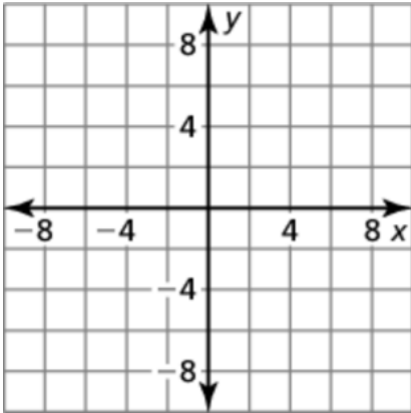
13. $f(x) = -x + 6$
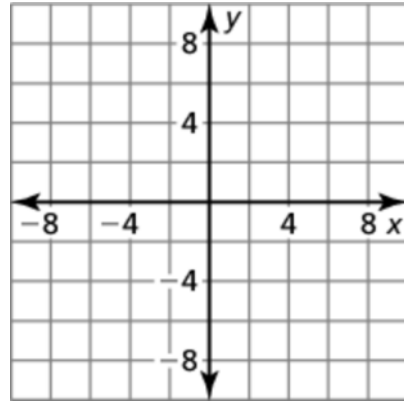
14. $f(x) = -3|x|$

15. The table below shows the height of a football over time after it has been kicked in the air. What type of function can you use to model the data? Estimate the height of the football after 4 seconds.

Time (seconds), x	0	0.5	1	1.5	2	2.5
Height (feet), y	3	31	51	63	67	63

Write a function *g* whose graph represents the indicated transformation of the graph *f*.

16. $f(x) = -2|x - 1|$; reflection in the *y*-axis

17. $f(x) = 2x + 5$; translation 2 units up

18. Let the graph of *g* be a vertical stretch by a factor of 3, followed by a translation 2 units up of the graph of $f(x) = x^2$. Write a rule for *g*.

19. You and your friend are hitting golf balls. The height (in feet) of your ball *t* seconds after you hit the ball can be modeled by the equation $f(t) = -16t^2 + 50t$. The height (in feet) of your friend's ball *t* seconds after your friend hits the ball can be modeled by the equation $g(t) = -16t^2 + 50t + 2$. Describe the transformation from the graph of *f* to the graph of *g*. Describe a situation in which this could occur. How high will your ball be 3 seconds after you hit it?

Chapter 2

Define and provide an example of each as necessary:

Quadratic function:

Parabola:

Vertex of a parabola:

Vertex form:

Transformations:

Axis of symmetry:

Standard form:

Minimum value:

Maximum value:

Intercept form:

X-intercept:

**Average rate of change:**

System of three linear equations:

1. A parabola has an axis of symmetry $y = -4$ and passes through the point $(2, -1)$. Find another point that lies on the graph of the parabola.

2. Let the graph of g be a horizontal shrink by a factor of $\frac{1}{3}$, followed by a translation 1 unit up of the graph of $f(x) = x^2$. Write a rule for g.

3. Let the graph of g be a translation 2 units up and 2 units right, followed by a reflection in the y-axis of the graph of $f(x) = -(x + 3)^2 - 2$. Write a rule for g.

4. Your class council determined that its profit from the upcoming homecoming dance is directly related to the ticket price for the dance. Looking at past dances, the council determined that the profit p can be modeled by the function $p(t) = -12t^2 + 480t + 30$, where t represents the price of each ticket. What should be the price of a ticket to the homecoming dance to maximize the council's profit?

5. Graph $f(x) = -(x - 2)^2 + 4$.

   Label the vertex and axis of symmetry. Describe where the function is increasing and decreasing.
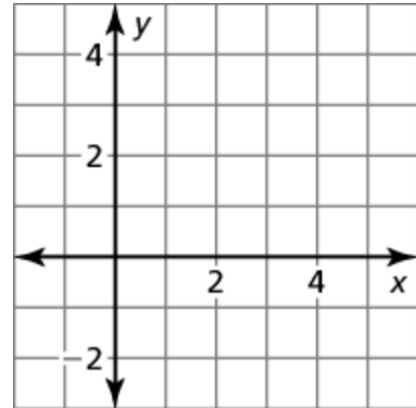
6. Graph $g(x) = \frac{1}{2}x^2 + 2x + 4$.

   Label the vertex and axis of symmetry. Describe where the function is increasing and decreasing.
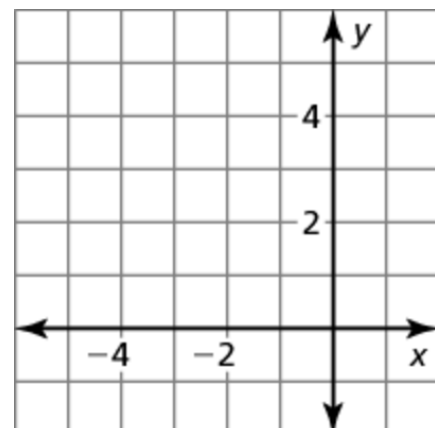
Chapter 3

Define the following terms (provide examples as needed):

Quadratic equation in one variable:

Root of an equation:

Zero of a function:

Properties of square roots:

Factoring:

Rationalizing the denominator:

Imaginary unit i:

Complex number:

Imaginary number:

Pure imaginary number:

Completing the square:

Perfect square trinomial:

Vertex form:

Quadratic Formula:

Discriminant:

System of nonlinear equations:

System of linear equations:

Circle:

Quadratic inequality in two variables:

Quadratic inequality in one variable:

Linear inequality in two variables:

Solve the equation using any method.

   1. $x^2 + 12x + 35 = 0$ **2.** $3x^2 - 48 = 0$

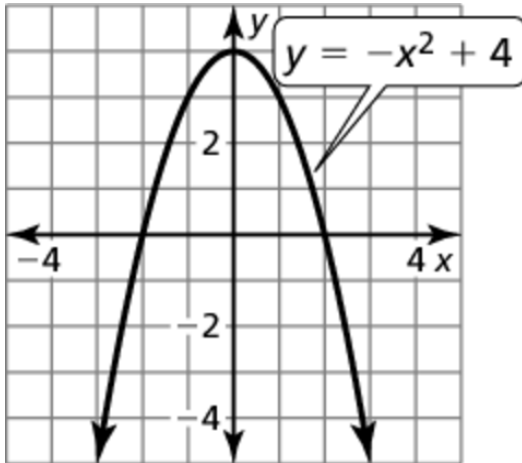   **3.** $x^2 + 10x + 25 = 64$ **4.** $-3x^2 - 5x = 5$
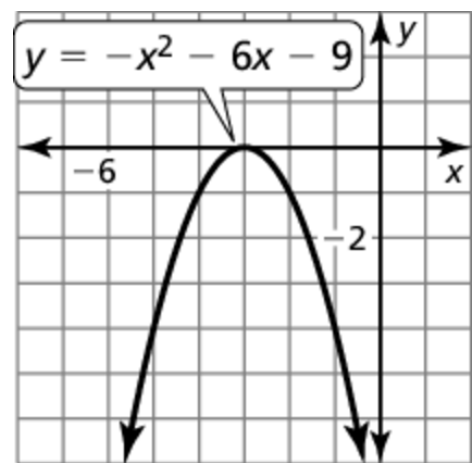

   5. $4x^2 + 3x - 10 = 0$ **6.** $36x^2 + 49 = 0$

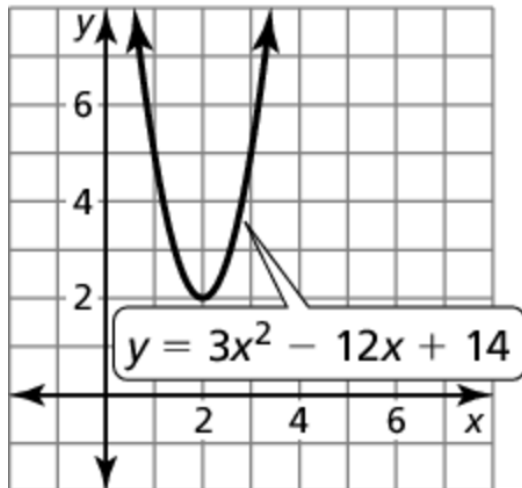**Use the graph to determine the number and type of solutions of the quadratic equation.**

7.

$y = -x^2 + 4$

8.

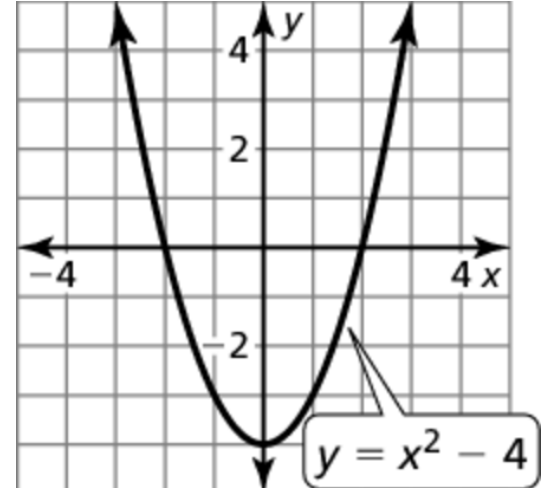$y = -x^2 - 6x - 9$

9.

$y = 3x^2 - 12x + 14$

10.

$y = x^2 - 4$

11. A golf ball is hit from the ground, and its height can be modeled by the equation $h(t) = -16t^2 + 128t$, where $h(t)$ represents the height (in feet) of the ball t seconds after contact. What will the maximum height of the ball be?

12. Write $(1 - i) - (4 - 5i)$ as a complex number in standard form.

13. Write $(-4 + 5i)(5 - i)$ as a complex number in standard form.

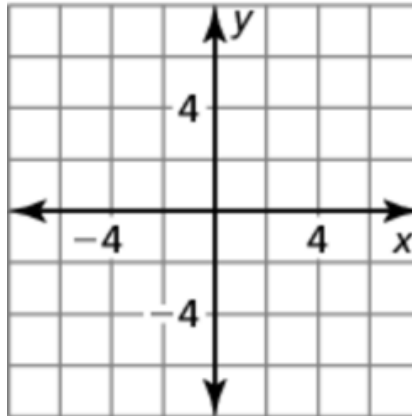**Solve the system of equations.**

14. $-2x^2 + y = 1$
$y = (x - 1)^2 + 3$
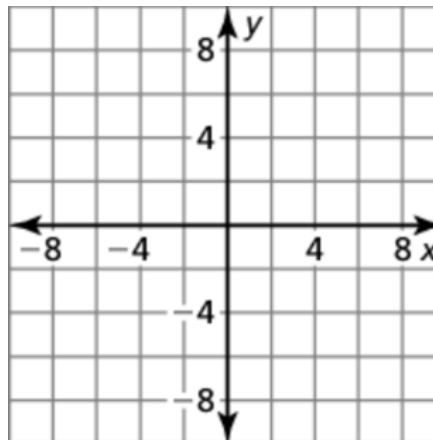
15. $4x - y = 4$
$x^2 - y = -1$

Graph the inequality.

16. $3x^2 - y > 5$

Graph the system of quadratic inequalities.

17. $x + y^2 > 3$
    $-3x + y < 1$

18. A company that produces video games has hired you to set the sale price for its newest game. Based on production costs and consumer demand, the company has concluded that the equation $p(x) = -0.3x^2 + 45x - 1000$ represents the profit p (in dollars) for x individual games sold. What will the company's profit be if it sells 100 games?

19. To begin a basketball game, a referee must toss the ball vertically into the air. This process can be modeled by the equation $h(t) = -16t^2 + 22t + 6$, where h represents the ball's height (in feet) after t seconds. Determine the time interval (in seconds) in which the height of the basketball is greater than 8 feet. Round your answer to the nearest thousandth of a second.