

FLEX - Bully Prevention in the Lecture Hall

5 minutes - Try #s 31-35 on Review

Match each equation to its corresponding graph. Then identify KEY Quadratic features that helped you determine each match.

31. C
 $y = -2x^2 - 8x - 5$

$(0, -5)$

$\frac{-(-8)}{2(-2)} = \frac{8}{-4} = -2$

C

32. B
 $y = (-3x + 9)(x - 1)$

$-3x + 9 = 0$
 $-3x = -9$
 $x = 3$

$x - 1 = 0$
 $x = 1$

$x = 3$

33.
 $y = 2x^2 - 3$

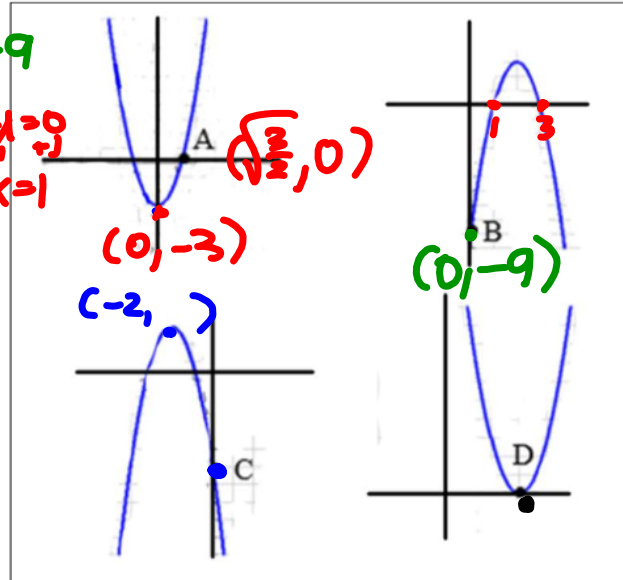
$y = 2(x - 0)^2 - 3$

$(0, -3)$

$0 = 2x^2 - 3$

$\frac{3}{2} = 2x^2$
 $\frac{3}{4} = x^2$
 $\sqrt{\frac{3}{4}} = \sqrt{x^2}$

34. D
 $y = 3(x - 3)^2 + 0$
 $(3, 0)$



Using the equations and graphs you matched above identify the coordinates for each of the given points.

Use the equations to verify that they are accurate.

35. A $(1.2, 0)$
 $(\frac{\sqrt{3}}{2}, 0)$

B $(0, -9)$

C $(0, -5)$

D $(3, 0)$

Whiteboards

The profit, $p(x)$, for a company is given by the function

$P(x) = -0.2x^2 + 50x - 250$, where x is the number of units produced

Identify a , b , and c

$$a = -0.2$$

$$b = +50$$

$$c = -250$$

$f(x) = ax^2 + bx + c$. Give a value for a so that $f(x)$ opens up and is wider than: $g(x) = 5x^2 + 7x - 1$

$$\begin{array}{c} 1 \\ a=5 \end{array}$$

$$a = 4, 3, 2, 1, \frac{3}{4}, \frac{1}{2}, 2.7 \text{ etc...}$$

The profit, $p(x)$ for a company is given by the function

^{"y"}
 $P(x) = -0.2x^2 + 50x - 250$, where x is the number of units produced
 profit = \downarrow \downarrow
 # units # units

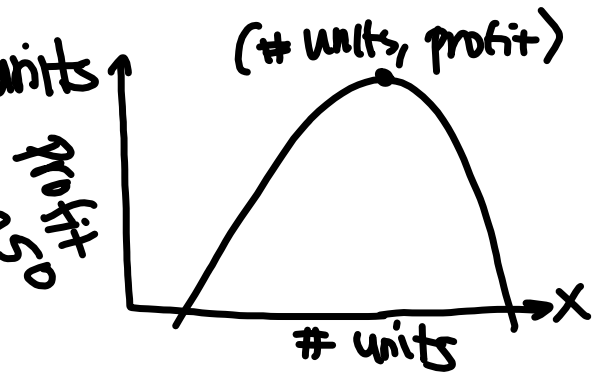
A - How many units should be produced to yield a maximum profit?

$$-\frac{50}{2(-0.2)} = 125 \text{ units}$$

B - What is the maximum profit?

$$P(125) = -0.2(125)^2 + 50(125) - 250$$

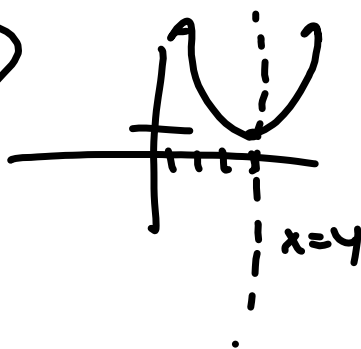
$$= 2,875$$



Identify the vertex and axis of symmetry of the quadratic equation $y = -5(x - 4)^2 + 1$

Vertex: $(\underline{4}, 1)$

AOS: $x = 4$



Describe the transformations of the function

$$f(x) = -3(x + 2)^2 + 5$$

Handwritten annotations for the function $f(x) = -3(x + 2)^2 + 5$:

- A curved arrow points from the coefficient -3 to the word "stretch".
- An arrow points from the 2 inside the parentheses to the left, indicating a horizontal shift of 2 units left.
- An arrow points from the constant 5 to the right, indicating a vertical shift of 5 units up.

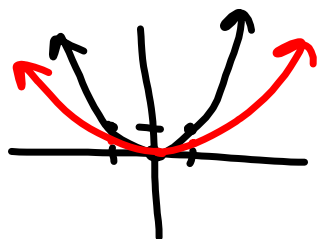
$$V: (-2, 5)$$

$$AOS: x = -2$$

Describe the transformations of the function

$$f(x) = 0.5(x - 9)^2 + 1$$

0.5 → a ↑ 1
Compression



The height h (in feet) of a ball thrown by a child is given by the function $h(t) = -0.5t^2 + 4t + 2$ where t is time in seconds

$$h(0) = -0.5(0)^2 + 4(0) + 2 = 0 + 0 + 2 = 2 \text{ feet}$$

What is the starting height of the ball?

Which number can be used for c to make each function a perfect square trinomial?

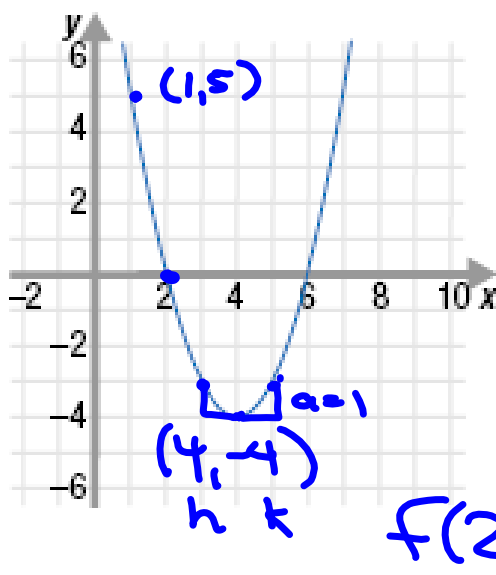
$$f(x) = x^2 + 6x + c \quad c = 9$$

$$(x+3)^2 \quad \left(\frac{6}{2}\right)^2 = 3^2 = 9$$

$$f(x) = x^2 - 10x + c \quad c = 25$$

$$- \quad \left(\frac{-10}{2}\right)^2 = (-5)^2 = 25$$

Write the equation of the parabola in vertex form



$$y = a(x-h)^2 + k$$

$$y = (x-4)^2 - 4$$

What is the y-intercept?

$$(0, 12) \quad x^2 - 4x - 4x + 16 - 4$$

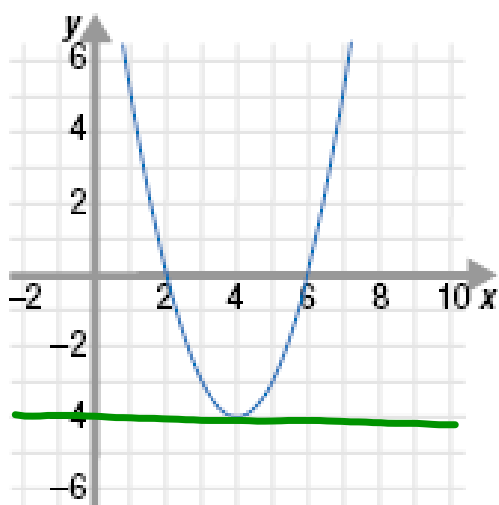
$$x^2 - 8x + 12$$

$$y = (0-4)^2 - 4$$

$$(-4)^2 - 4$$

$$16 - 4$$

State the domain and range of the parabola

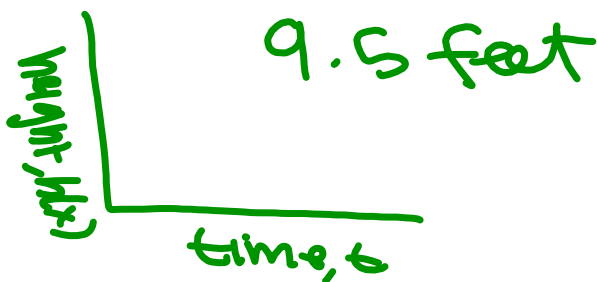


Domain: $(-\infty, \infty)$

Range: $[-4, \infty)$

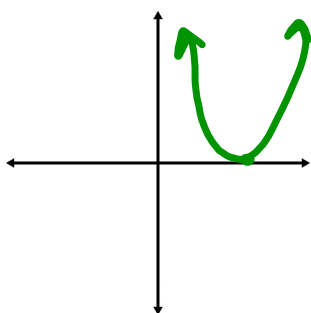
The height h (in feet) of a ball thrown by a child is given by the function $h(t) = -0.5t^2 + 4t + 2$ where t is time in seconds

What is the height of the ball 3 seconds after it has been thrown?
 t

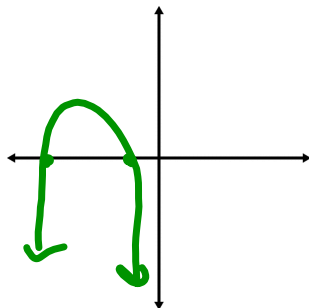


Draw a quadratic function that has:

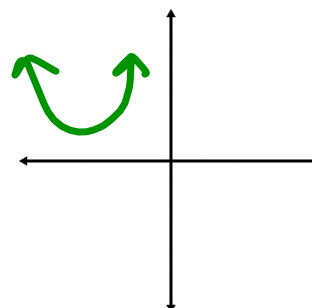
One solution



Two solutions



No real solutions



Write the quadratic equation in vertex form

$$y = 2x^2 + 4x - 10 \quad v: (-1, -12)$$

$a = 2$

$$\frac{-4}{2(2)} = -1$$

$$y = 2(x + 1)^2 - 12$$

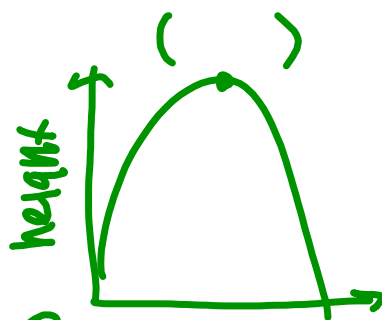
The height h (in feet) of a ball thrown by a child is given by the function $h(t) = -0.5t^2 + 4t + 2$ where t is time in seconds

A - How long does it take for the ball to reach its maximum height?

$$\frac{-4}{2(-.5)} = \frac{-4}{-1} = 4 \text{ seconds}$$

B - What is the maximum height?

$$h(4) = -.5(4)^2 + 4(4) + 2 = 10 \text{ feet}$$



Solve the quadratic equation $3x^2 + 6x = 0$

$$\underline{3x^2 + 6x} = 0$$

$$\begin{aligned} a &= 3 \\ b &= 6 \\ c &= 0 \end{aligned}$$

$$\underline{3x(x+2)} = 0$$

$$\begin{array}{l} \cancel{3}x = 0 \\ \cancel{3} \\ x = 0 \end{array} \quad \begin{array}{l} x + 2 = 0 \\ \cancel{-} \quad \cancel{-} \\ x = -2 \end{array}$$

What is the y-intercept of the quadratic equation
 $y = x^2 + 9x + 20$

$(0, 20)$

Calculate the average rate of change of the function $y = 3x^2 + 2$ over the interval $[1, 3]$

The height h (in feet) of a ball thrown by a child is given by the function $h(x) = -0.5t^2 + 4t + 2$ where t is time in seconds

How long does it take for the ball to hit the ground?

Write the following quadratic equation in factored form

$$y = x^2 + 9x + 20$$

Write the following equation in standard form
and identify the y-intercept

$$y = (x + 1)(x - 8)$$

Find the x-intercepts of the function $y = (x + 9)(x - 4)$

Write the equation in standard form of a parabola that has the solutions -6 and $1/3$.

HW Tracker due tomorrow! Weeks 8-9

Name _____ Hr _____ Math 2A – Practice Test #2 (Ch. 3)

1. What does it mean to “solve” a quadratic equation? Explain in a few sentences.
2. What is the difference between a quadratic functions and a linear function? Explain in a few sentences.
3. Decide whether each of the following methods *always*, *sometimes*, or *never* work for solving quadratic equations.
 - a) Square Root Method
 - b) Factoring
 - c) Completing the Square
 - d) Quadratic Formula
4. Determine whether each of the following are possibilities for the solution set of a quadratic equation. (Yes/No). If yes, draw a picture to illustrate each solution.
 - a) Only one solution
 - b) Two real solutions
 - c) No real number solutions
 - d) Three real solutions

Solve each equation using any method you would like.

5. $9k^2 + 3k - 6 = 0$

6. $w^2 - 9w = -14$

7. $12x^2 - 8 = 16$

8. $3x^2 - 6x = 15$

9. $2x^2 - 10x = 0$

10. $5(x - 6)^2 = 50$

11. A ball is thrown into the air. The height h , in feet, of the ball can be modeled by the equation $f(t) = -16t^2 + 20t + 36$, where t is the time, in seconds, the ball is in the air.
- a). How high off the ground is the ball after 2 seconds? b). When will the ball hit the ground?
- c) At what height was the ball thrown from?
- d) When did the ball reach its maximum height? e) What is the maximum height?
12. Calculate the **average rate of change** of the function $y = 3x^2 + 6x - 8$ on the interval $[-2,0]$

Find a value for c that will make each polynomial a perfect square trinomial.

13. $x^2 + 16x + c$

14. $x^2 - 4x + c$

15. Write the general equation of a quadratic in each of the following forms:

Standard Form:

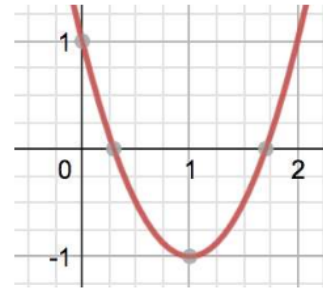
Vertex Form:

16. Given $y = x^2 + 2x - 3$, find the following:

a) Factored Form:

b) Vertex Form:

17. Write a quadratic equation for the given graph. (HINT: Vertex form)



18. Write a quadratic equation with the solutions -5 and $\frac{2}{3}$ in standard form.

Simplify, no negative exponents allowed.

19. $(2a^{\frac{1}{2}}b)^3 (3a^{\frac{3}{4}}b^{\frac{1}{3}})$

20. $\frac{16x^2y^{\frac{1}{4}}z^{\frac{1}{3}}}{48x^4y^{\frac{1}{2}}z^{\frac{1}{3}}}$

21. $\frac{3 + \sqrt{45}}{6}$

22. Sketch the graph of $f(t) = -t^2 - 6t - 5$ by using the answers to parts (a-g) below:

a) Axis of Symmetry:

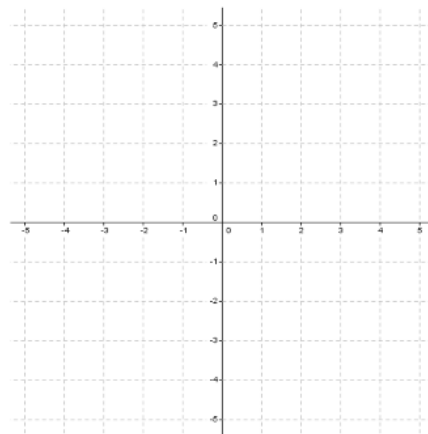
b) Vertex:

c) Direction of Opening:

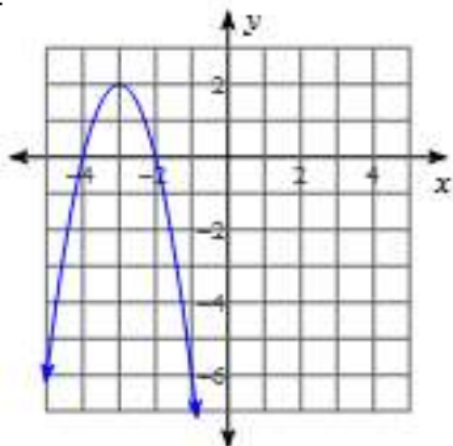
d) Minimum or Maximum:

e) y -intercept:

f) x -intercept(s):



23.



- a) State the vertex:
- b) Find the equation of the parabola:
- c) State the zeros:
- d) State the y-intercept:
- e) State the domain:
- f) State the range:
- g) Find $f(-1)$

Find vertex form if needed. Then write a verbal expression for each equation describing the transformation from the parent function.

24. $y = -(x - 7)^2 + 3$

25. $y = x^2 - 6x + 4$.

26. Answer the following questions about the function that has solutions of -2 and 4 .

Factored form:

Standard form:

Vertex form:

Axis of symmetry:

Direction of Opening

y-intercept

For each of the parabolas, complete the following:

- A) Find the other two equivalent forms of each equation: (**Hint:** standard form, vertex form, and factored form.)
- B) State or find the vertex
- C) Find the y -intercept.
- D) Find the x -intercept(s), if any. (**Hint:** try factoring, square root method or the quadratic formula)
- E) Graph

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

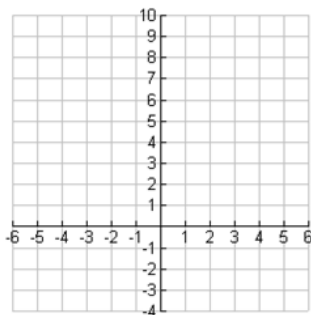
A)

B)

C)

D)

E)



28. $y = (x + 1)(x - 3)$

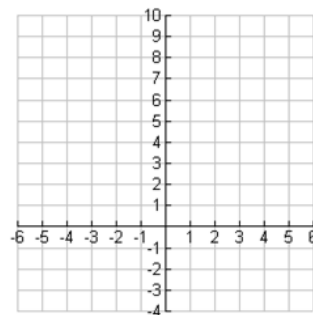
A)

B)

C)

D)

E)



29. Write a quadratic equation given the following: Vertex $(-1, 1)$ and a point $(2, 4)$.

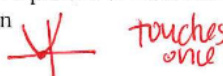

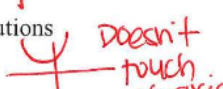
30. Given $f(x) = ax^2 + bx + c$. State a value for a that makes $f(x)$ opens down and wider than: $g(x) = 2x^2 + 5x + 3$.

Name Key Hr _____ Math 2A – Practice Test #2 (Ch. 3)

- What does it mean to "solve" a quadratic equation? Explain in a few sentences.
find which x-values make the equation true (x-intercepts)
- What is the difference between a quadratic function and a linear function? Explain in a few sentences.
quadratic has x^2 (degree 2), linear is just x (degree 1)
- Decide whether each of the following methods *always*, *sometimes*, or *never* work for solving quadratic equations.

- | | |
|--|---|
| a) Square Root Method <i>sometimes</i>
<i>when no x-value</i> | b) Factoring <i>sometimes</i>
<i>when you can factor</i> |
| c) Completing the Square | d) Quadratic Formula <i>Always</i> |

- Determine whether each of the following are possibilities for the solution set of a quadratic equation. (Yes/No). If yes, draw a picture to illustrate each solution.

- | | |
|--|--|
| a) Only one solution
<i>Yes</i>  <i>touches once</i> | b) Two real solutions
<i>Yes</i>  <i>touches twice</i> |
| c) No real number solutions
<i>Yes</i>  <i>doesn't touch x-axis</i> | d) Three real solutions
<i>NO</i> |

Solve each equation using any method you would like.

5. $9k^2 + 3k - 6 = 0$
 $(\frac{3}{3}k^2 + k - 2) = 0$
 $(3k^2 + 3k - 2k - 2) = 0$
 $3k(k+1) - 2(k+1) = 0$
 $(k+1)(3k-2) = 0$
 $k+1=0$ or $3k-2=0$
 $k = -1$ or $k = \frac{2}{3}$

6. $w^2 - 9w = -14$
 $w^2 - 9w + 14 = 0$
 $(w-7)(w-2) = 0$
 $w-7=0$ or $w-2=0$
 $w = 7, w = 2$

7. $12x^2 - 8 = 16$
 $+8 +8$

8. $3x^2 - 6x = 15$ $a=1$ $b=-2$ $c=-5$
 $3x^2 - 6x - 15 = 0$ $x^2 - 2x - 5 = 0$

$\frac{12x^2}{12} = \frac{24}{12}$
 $\sqrt{x^2} = \sqrt{2}$
 $x = \pm\sqrt{2}$

$2 \pm \sqrt{(-2)^2 - 4(1)(-5)}$
 $\frac{2 \pm \sqrt{24}}{2} = \frac{2 \pm 2\sqrt{6}}{2} = 1 \pm \sqrt{6} = x$

9. $2x^2 - 10x = 0$
 $2x(x-5) = 0$
 $\frac{2x}{2} = 0$ or $x-5 = 0$
 $x = 0$ or $x = 5$

10. $\frac{5}{5}(x-6)^2 = \frac{50}{5}$
 $\sqrt{(x-6)^2} = \sqrt{10}$
 $x-6 = \pm\sqrt{10} + 6$
 $x = 6 \pm \sqrt{10}$

11. A ball is thrown into the air. The height h , in feet, of the ball can be modeled by the equation $f(t) = -16t^2 + 20t + 36$, where t is the time, in seconds, the ball is in the air.

$f(t)$

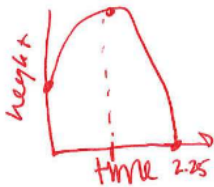
a). How high off the ground is the ball after 2 seconds?

$$f(2) = -16(2)^2 + 20(2) + 36 = 12 \text{ feet}$$

c) At what height was the ball thrown from?

36 feet (0, 36) y-int

d) When did the ball reach its maximum height?



$$-\frac{20}{2(-16)} = 0.625 \text{ seconds}$$

b). When will the ball hit the ground?

$$0 = -16t^2 + 20t + 36$$

$$0 = -4t^2 + 5t + 9$$

2.25 seconds

$$t = \frac{-5 \pm \sqrt{5^2 - 4(-4)(9)}}{2(-4)} = \frac{-5 \pm \sqrt{164}}{-8}$$

$$\frac{-5 + 13}{-8} = \frac{-5 - 13}{-8} = \frac{-18}{-8} = 2.25$$

e) What is the maximum height?

$$K) f(0.625) = -16(0.625)^2 + 20(0.625) + 36 = 42.25 \text{ feet}$$

12. Calculate the average rate of change of the function $y = 3x^2 + 6x - 8$ on the interval $[-2, 0]$

$$\frac{f(0) - f(-2)}{0 - (-2)} = \frac{-8 - 8}{2} = \frac{-16}{2} = -8$$

Find a value for c that will make each polynomial a perfect square trinomial.

13. $x^2 + 16x + c$ $\boxed{64}$ $(\frac{16}{2})^2 = 8^2$
 $= (x + 8)^2$

14. $x^2 - 4x + c$ $\boxed{4}$ $(\frac{-4}{2})^2 = (-2)^2 = 4$
 $(x - 2)^2$

15. Write the general equation of a quadratic in each of the following forms:

Standard Form:

$$y = ax^2 + bx + c$$

Vertex Form:

$$y = a(x-h)^2 + k$$

16. Given $y = x^2 + 2x - 3$, find the following:

a) Factored Form:

$$y = (x+3)(x-1)$$

$$\frac{-3}{2} \times \frac{-1}{2}$$

b) Vertex Form: h k $a=1$

$$\frac{-2}{2(1)} = \frac{-2}{2} = -1$$

$$(-1)^2 + 2(-1) - 3 = 1 - 2 - 3 = -4$$

$$y = (x-1)^2 - 4$$

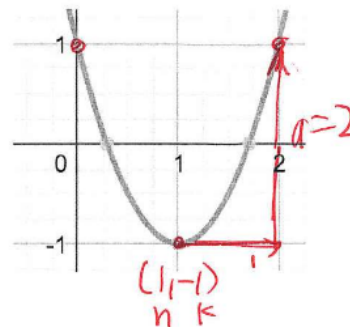
17. Write a quadratic equation for the given graph. (HINT: Vertex form)

$$y = 2(x-1)^2 - 1 \quad \text{or} \quad y = 2(x-1)(x-1) - 1$$

$$= 2(x^2 - 2x + 1) - 1$$

$$= 2x^2 - 4x + 2 - 1$$

$$y = 2x^2 - 4x + 1$$



18. Write a quadratic equation with the solutions -5 and $\frac{2}{3}$ in standard form.

$$x = -5 \quad x = \frac{2}{3}$$

$$x + 5 = 0 \quad 3x - 2 = 0$$

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

$$y = 3x^2 - 2x + 15x - 10$$

$$y = 3x^2 + 13x - 10$$

Simplify, no negative exponents allowed.

19. $(2a^{\frac{1}{2}}b)^3 (3a^{\frac{3}{4}}b^{\frac{1}{3}})$

$$= 24a^{\frac{9}{4}}b^{\frac{10}{3}}$$

20. $\frac{16x^2y^{\frac{1}{4}}z^{\frac{1}{3}}}{48x^{\frac{3}{4}}y^{\frac{1}{2}}z^{\frac{1}{3}}}$

$$\frac{1}{4} - \frac{2}{4} = -\frac{1}{4}$$

$$\frac{x^{\frac{5}{4}}}{3y^{\frac{1}{4}}}$$

21. $\frac{3 + \sqrt{45}}{6}$

$$\frac{3 + 3\sqrt{5}}{6} = \frac{1 + \sqrt{5}}{2}$$

22. Sketch the graph of $f(t) = -t^2 - 6t - 5$ by using the answers to parts (a-g) below:

a) Axis of Symmetry: $\frac{6}{2(-1)} = \frac{6}{-2} = -3$ $x = -3$

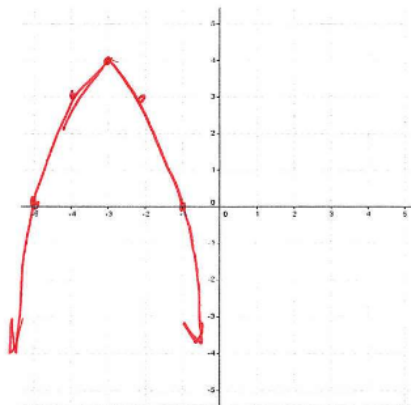
b) Vertex: $(-3, 4)$ $-(-3)^2 - 6(-3) - 5$
 $-9 + 18 - 5$

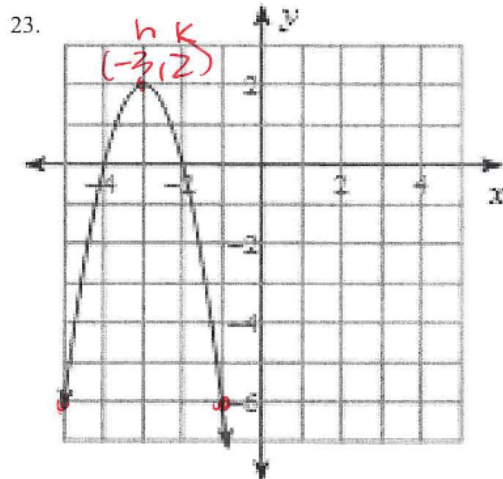
c) Direction of Opening: **Down**

d) Minimum or Maximum: **maximum**

e) y-intercept: $(0, -5)$

f) x-intercept(s): $x = -5, x = -1$
 $(-5, 0) \quad (-1, 0)$





- 23.
- a) State the vertex: $(-3, 2)$
 - b) Find the equation of the parabola: $a = -2$ $(-3, 2)$
 $y = -2(x+3)^2 + 2$ or $y = 2x^2 - 12x - 16$
 - c) State the zeros: $x = -4$ $x = -2$
 - d) State the y-intercept: $(0, -16)$
 $y = -2(0+3)^2 + 2 = -2(9) + 2 = -18 + 2 = -16$
 - e) State the domain: $(-\infty, \infty)$
 - f) State the range: $(-\infty, 2]$
 - g) Find $f(-1)$: $y = -2(-1+3)^2 + 2 = -2(4) + 2 = -8 + 2 = -6$

Find vertex form if needed. Then write a verbal expression for each equation describing the transformation from the parent function.

24. $y = -(x - 7)^2 + 3$

right 7, up 3, reflected down (across x-axis)

25. $y = x^2 - 6x + 4$. $\frac{b}{2a} = 3$. $(3, -5)$ $3^2 - 6(3) + 4$

$y = (x - 3)^2 - 5$ right 3, down 5

26. Answer the following questions about the function that has solutions of -2 and 4. $(x+2)(x-4)$

Factored form:

$y = (x+2)(x-4)$

Standard form:

$y = x^2 - 2x - 8$

Vertex form:

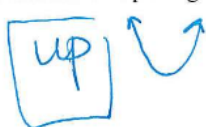
$y = (x-1)^2 - 9$ $\frac{2}{2(1)} = 1$ $1^2 - 2(1) - 8 = 9$

Axis of symmetry:

$-\frac{b}{2a} = \frac{2}{2(1)} = 1$

$x = 1$

Direction of Opening



$(h, k) = (1, -9)$

y-intercept

$(0, c) = (0, -8)$

For each of the parabolas, complete the following:

- A) Find the other two equivalent forms of each equation: (Hint: standard form, vertex form, and factored form.)
- B) State or find the vertex
- C) Find the y-intercept.
- D) Find the x-intercept(s), if any. (Hint: try factoring, square root method or the quadratic formula)
- E) Graph

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

A) $y = -x^2 + 4x - 1$ $-(x^2 - 4x + 4) + 3$
 $-x^2 + 4x - 4 + 3$

B) $(2, 3)$

C) $(0, -1)$

D) Quadratic formula
 $a = -1, b = 4, c = -1$

E) $\frac{-4 \pm \sqrt{4^2 - 4(-1)(-1)}}{2(-1)}$
 $\frac{-4 \pm \sqrt{16 - 4}}{-2}$ $\sqrt{12} = 2\sqrt{3}$
 $\frac{-4 \pm 2\sqrt{3}}{-2}$
 $+ 2 \pm \sqrt{3} = (3.73, 0)$
 $(-2.6, 0)$ \square

no factored form

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

A) $y = x^2 - 2x - 3$

B) $(1, -4)$

C) $(0, -3)$

D) $x = -1, x = 3$ $(-1, 0), (3, 0)$

E)

29. Write a quadratic equation given the following: Vertex $(-1, 1)$ and a point $(2, 4)$.

$4 = a(2+1)^2 + 1$
 $4 = 9a + 1$
 $3 = 9a$ $a = \frac{1}{3}$

$y = \frac{1}{3}(x+1)^2 + 1$

30. Given $f(x) = ax^2 + bx + c$. State a value for a that makes $f(x)$ opens down and wider than: $g(x) = 2x^2 + 5x + 3$.

$a = -\frac{1}{2}, -1,$ anything negative
 $-\frac{1}{4}, -\frac{1}{3}, -\frac{2}{3}$ etc... and less than 2

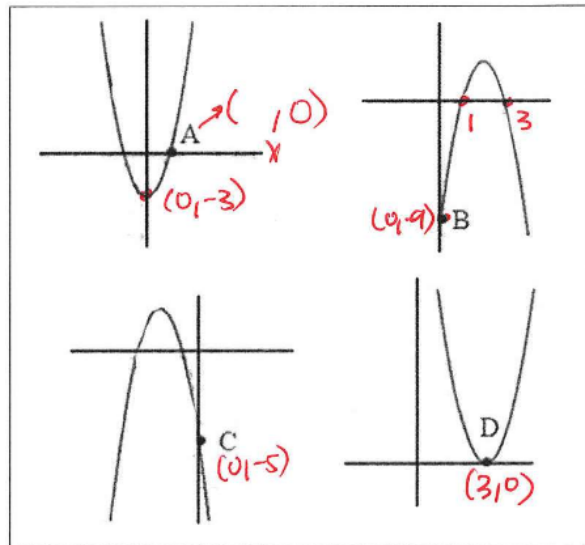
Match each equation to its corresponding graph. Then identify KEY Quadratic features that helped you determine each match.

31. **C**
 $y = -2x^2 - 8x - 5$
 y-int (0, -5)

32. **B**
 $y = (-3x + 9)(x - 1)$
 $x = 3 \quad x = 1$
 $y = -3x^2 + 2x - 9$
 y-int (0, -9)
 x-int (3, 0) (1, 0)

33. **A**
 $y = 2x^2 - 3$
 up \cup
 y-int (0, -3)
 $y = 2(x-0)^2 - 3$
 vertex = (0, -3)

34. **D**
 $y = 3(x-3)^2 + 0$
 vertex (3, 0)
 up \cup



Using the equations and graphs you matched above identify the coordinates for each of the given points.

Use the equations to verify that they are accurate.

35. A (1.2, 0) B (0, -9) C (0, -5) D (3, 0)

$0 = 2x^2 - 3$
 $+3$
 $3 = 2x^2$
 $\frac{3}{2} = \frac{2x^2}{2}$
 $\sqrt{\frac{3}{2}} = \sqrt{x^2}$
 $x = \pm 1.2$

$y = (0+9)(0-1)$
 $y = (9)(-1)$
 $y = -9$

$y = -2(0)^2 - 8(0) - 5$
 $y = 0 - 5$
 $y = -5$

$0 = 3(x-3)^2$
 $\frac{0}{3} = \frac{3(x-3)^2}{3}$
 $\sqrt{0} = \sqrt{(x-3)^2}$
 $0 = x-3$
 $+3$
 $3 = x$

