Get out Practice Test #2

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

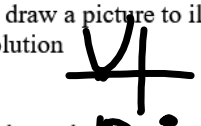
   b) Factoring

   c) Completing the Square

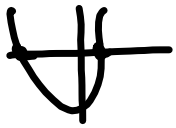
   d) Quadratic Formula

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.

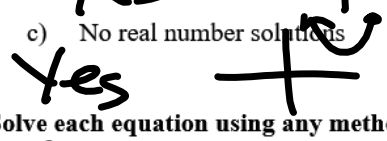
   a) Only one solution — Yes

   b) Two real solutions — yes

   c) No real number solutions — Yes

   d) Three real solutions — NO

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

$3x^2-6x-15=0$ / 3

$-15 \quad +15$

$a=1, b=-2, c=-5$

$x^2-2x-5=0$

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

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

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

$\frac{5}{5} \quad \frac{5}{5}$

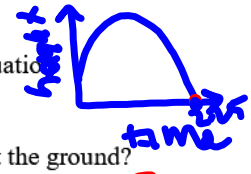
$\sqrt{(x-6)^2} = \pm\sqrt{10}$

$x-6 = \pm\sqrt{10}$

$+6 \quad +6$

$x = 6 \pm \sqrt{10}$

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.



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

$f(2) = -16(2)^2 + 20(2) + 36$ $t = 2$

(2, 12) 12 ft

b). When will the ball hit the ground?

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

$a = -16$, $b = 20$, $c = 36$

$t = 2.25$

c) At what height was the ball thrown from?

36 ft

d) When did the ball reach its maximum height?

(time)

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

e) What is the maximum height?

(42.25 height)

$f(0.625) = -16(0.625)^2 + 20(0.625) + 36$

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

a b

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

$f(0) = 3(0)^2 + 6(0) - 8 = -8$

$f(-2) = 3(-2)^2 + 6(-2) - 8 = -8$

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

13. $x^2 + 16x + c$ 64

$(x+8)^2$ $\left(\frac{16}{2}\right)^2 = (8)^2$

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

$\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4$

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

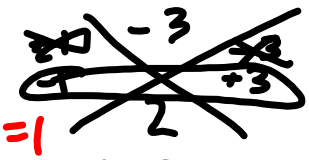
Standard Form:

Vertex Form:

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

a) Factored Form:

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



b) Vertex Form: $a = 1$

$(-1, -4)$

$\frac{b}{2a}$ k

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

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

$1 - 2 - 3$

$1 - 5$

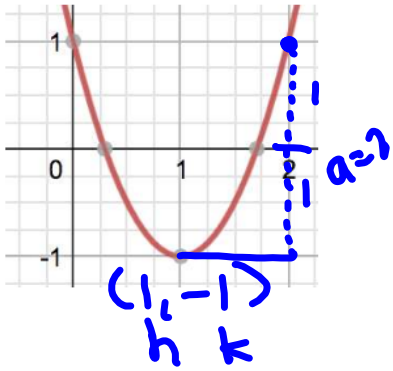
-4

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

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

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

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



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

$x=-5$
$+5 \quad +5$
$(x+5)=0$

$3(x)=(\frac{2}{3})3$
$3x=2$
$-2 \quad -2$
$(3x-2)=0$

$x \quad +5$
$3x \quad 3x^2+15x$
$-2 \quad -2x-10$

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

Simplify, no negative exponents allowed.

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

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

$24a^{\frac{3}{2}+\frac{3}{4}}b^{3+\frac{1}{3}}=24a^{\frac{9}{4}}b^{\frac{10}{3}}$

20. $\frac{16x^2y^{\frac{1}{4}}z^{\frac{1}{3}}}{48x^{\frac{3}{4}}y^{\frac{1}{2}}z^{\frac{1}{3}}}=\frac{1x^{\frac{5}{4}}}{3y^{\frac{1}{4}}}$

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

$\sqrt{45}$
$5 \quad 9$
$3 \quad 3$

$3+3\sqrt{5}$
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:

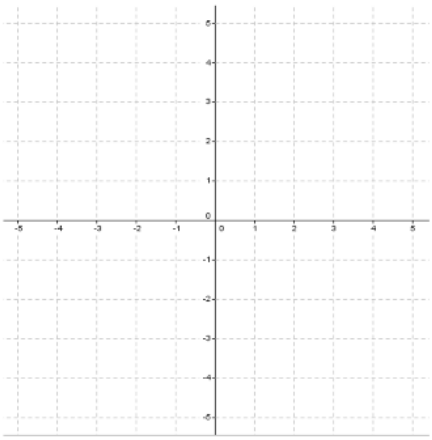
b) Vertex:

c) Direction of Opening:

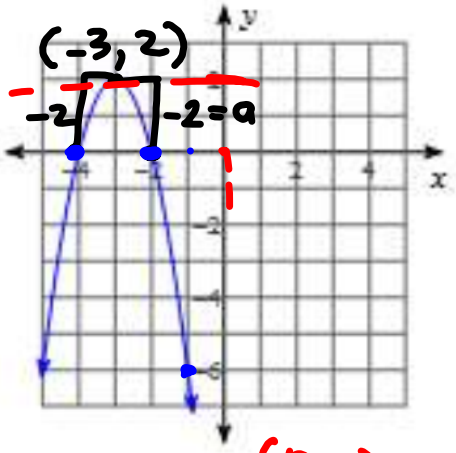
d) Minimum or Maximum:

e) y-intercept:

f) x-intercept(s):



23.



a) State the vertex: (-3, 2) (h, k)

b) Find the equation of the parabola: $y = a(x-h)^2 + k$

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

c) State the zeros: (-4, 0) (-2, 0) x = -4, x = -2, (x+4)(x+2)

d) State the y-intercept: $y = -2(0+3)^2 + 2$ (0, -16)

e) State the domain: $-2(3)^2 + 2$, $-2(9) + 2$, $-18 + 2$, -16; $(-\infty, \infty)$

f) State the range: $(-\infty, 2]$

g) Find $f(-1)$: $y = -2(-1+3)^2 + 2$; (-1, -6)

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

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

_____.

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

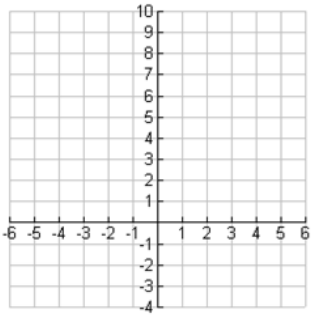
A)

B)

C)

D)

E)



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

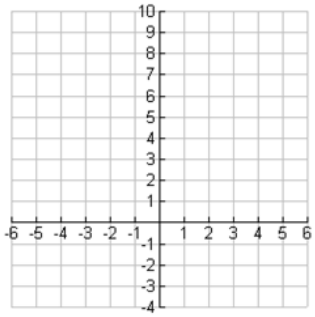
A)

B)

C)

D)

E)



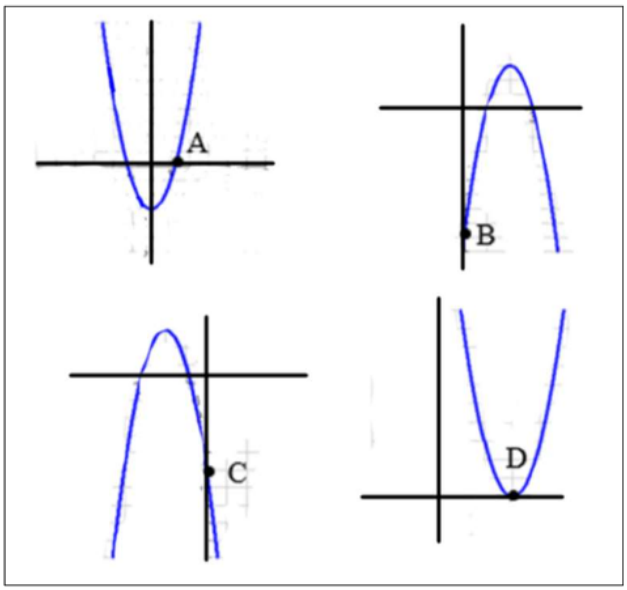
29. Write a quadratic equation given the following: Vertex (-1, 1) and a point (2, 4).

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

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

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

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



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

34. $y = 3(x - 3)^2$

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 (,) B (,) C (,) D (,)

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

1. What does it mean to "solve" a quadratic equation? Explain in a few sentences.

find which x-values make the equation true (x-intercepts)

2. What is the difference between a quadratic functions and a linear function? Explain in a few sentences.

quadratic has x^2 (degree 2) linear is just x (degree 1)

3. Decide whether each of the following methods ***always***, ***sometimes***, or ***never*** work for solving quadratic equations.

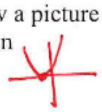
a) Square Root Method sometimes when no x-value

b) Factoring sometimes when you can factor

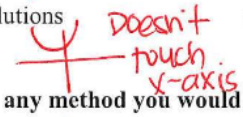
c) Completing the Square

d) Quadratic Formula Always

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 Yes  touches once

b) Two real solutions Yes  touches twice

c) No real number solutions Yes  Doesn't touch x-axis

d) Three real solutions NO

Solve each equation using any method you would like.

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

$\frac{9k^2}{3} + \frac{3k}{3} - \frac{6}{3} = \frac{0}{3}$

$(3k^2 + k - 2) = 0$ (-6, 3, -2, 1)

$(3k^2 + 3k)(-2k - 2) = 0$

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

$(k+1)(3k-2) = 0$

$k+1=0$ $3k-2=0$

$-1 \quad -1 \quad +2 \quad +2$

$\frac{3k}{3} = \frac{2}{3}$

$k = -1$, $k = \frac{2}{3}$

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

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

$(w-7)(w-2) = 0$

$w - 7 = 0 \quad w - 2 = 0$

$w = 7, \; w = 2$

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

$+8 \quad +8$

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

$\sqrt{x^2} = \pm\sqrt{2}$

$x = \pm\sqrt{2}$

8. $3x^2 - 6x = 15$ $a=1$ $b=-2$ $c=-5$ (-5, ?, ?, -2)

$\frac{3x^2 - 6x - 15}{3} = 0$ $x^2 - 2x - 5 = 0$

$\frac{2 \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)}$

$\frac{2 \pm \sqrt{24}}{2} = \frac{2 \pm 2\sqrt{6}}{2} = 1 \pm \sqrt{6} = x$

$\sqrt{24} = 2\sqrt{6}$ (24, 12, 6, 4, 3, 2, 2, 2)

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

$2x(x-5) = 0$

$\frac{2x}{2} = \frac{0}{2} \quad x - 5 = 0$

$+5 \quad +5$

$x = 0 \quad x = 5$

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

$\frac{5}{5} \quad \frac{50}{5}$

$\sqrt{(x-6)^2} = \pm\sqrt{10}$

$x - 6 = \pm\sqrt{10}$

$+6 \quad +6$

$x = 6 \pm \sqrt{10}$

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.

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

$f(2) = -16(2)^2 + 20(2) + 36$

$= 12$ feet

b). When will the ball hit the ground?

$\frac{0}{4} = \frac{-16t^2}{4} + \frac{20t}{4} + \frac{36}{4}$

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

$\frac{-5 \pm \sqrt{5^2 - 4(-4)(9)}}{2(-4)}$ $\frac{-5 \pm \sqrt{169}}{-8}$

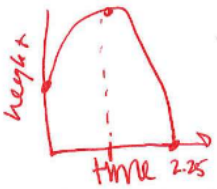
$\frac{-5+13}{-8}$ $\frac{-5-13}{-8}$ $\frac{+8}{-8} = -1 \to$ no

$\frac{-18}{-8} = \frac{9}{4} = 2.25$ seconds

c) At what height was the ball thrown from?

36 feet (0, 36) y-int

d) When did the ball reach its maximum height? vertex



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

e) What is the maximum height? (k)

$f(0.625) = -16(0.625)^2 + 20(0.625) + 36$

$= 42.25$ feet

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

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

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

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

$= (x+8)^2$

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

$(x-2)^2$

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:

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

-3, 3, -1, 2

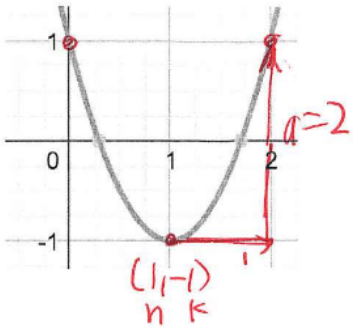
b) Vertex Form: h k $(-1, -4)$ $a = 1$

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

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

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

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



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

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

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

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

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

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

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

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

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

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

Simplify, no negative exponents allowed.

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

$8a^{\frac{3}{2}+\frac{3}{4}}b^{3}$

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

20. $\frac{16x^2y^{\frac{1}{4}}z^{\frac{1}{8}}}{48x^{\frac{3}{4}}y^{\frac{1}{2}}z^{\frac{1}{3}}}$

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

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

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

$\sqrt{45} = 3\sqrt{5}$

$3+3\sqrt{5}$

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

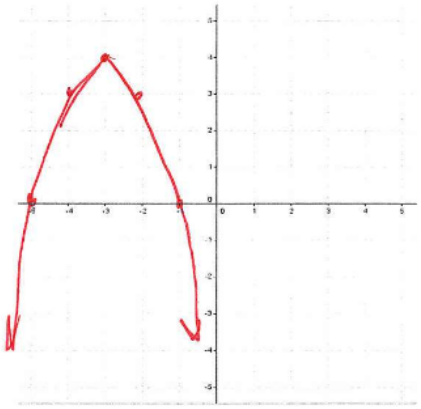
e) y-intercept:

$(0, -5)$

f) x-intercept(s):

$x = -5, \quad x = -1$

$(-5, 0) \quad (-1, 0)$



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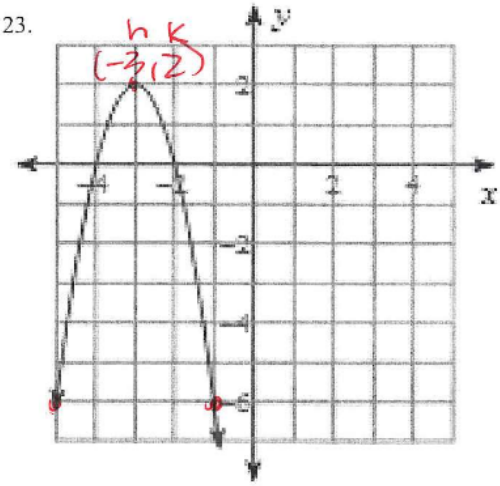


a) State the vertex: (-3,2)

b) Find the equation of the parabola: $a=-2$ (h k: $(-3,2)$)
$y=-2(x+3)^2+2$ 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 $f(-1)$ $y=-2(-1+3)^2+2$ $(-1,-6)$
$-2(4)+2$ $-8+2=-6$

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. $y=x^2-6x+4$. $\frac{6}{2(1)}=3$ $(3,-5)$ $3^2-6(3)+4$

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

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

Factored form: $y=(x+2)(x-4)$

Standard form: $y=x^2-2x-8$

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

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

Axis of symmetry: $\frac{-b}{2a}=\frac{2}{2(1)}=1$
$x=1$

Direction of Opening: up

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) $y = -x^2+4x-11$ $-(x^2-4x+4)+3$

$-x^2+4x-4+3$

B) $(2,3)$

C) $(0,-1)$

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

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

1 / 4 — no factored form

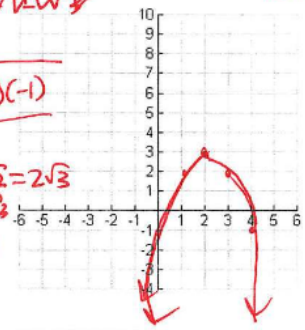
E)

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

$\frac{-4 \pm \sqrt{12}}{-2}$ $\sqrt{12} = 2\sqrt{3}$

$\frac{-4 \pm 2\sqrt{3}}{-2}$

$+2 \pm \sqrt{3} =$ (3.73, 0) (.26, 0) D



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

$y = x^2-2x+1-3-1$

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

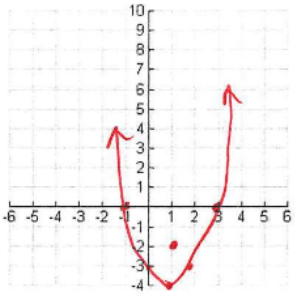
A) $y = x^2-2x-3$

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). h k x y

$4 = a(2+1)^2+1$

$4 = 9a+1$

$-1 \quad -1$

$\frac{3}{9} = \frac{9a}{9}$ $a = \frac{1}{3}$

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

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

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

anything negative 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

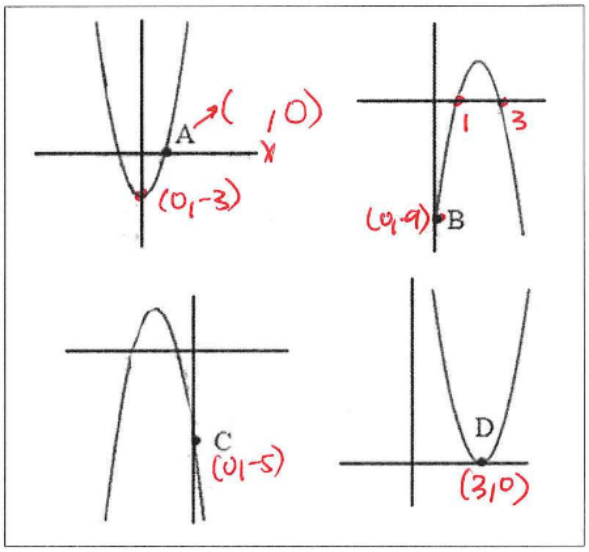
$y = (-3x + 9)(x - 1)$

$x = 3 \quad x = 1$

$y = -3x^2 + 2x - 9$

y-int $(0, -9)$

x-int $(3, 0)(1, 0)$



33. A

$y = 2x^2 - 3$

up

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

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 $(1.2, 0)$

$0 = 2x^2 - 3$

$+3 \quad +3$

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

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

$x = \pm 1.2$

B $(0, -9)$

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

$y = (9)(-1)$

$y = -9$

C $(0, -5)$

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

$y = 0 - 5$

$y = -5$

D $(3, 0)$

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

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

$0 = x - 3$

$+3 \quad +3$

$3 = x$