diate Algebra
ics Review

Name Answer Key

T THIS POINT YOU SHOULD BE ABLE TO:

- **Graph a quadratic function given in *standard form* and identify the key characteristics.**

Examples:

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

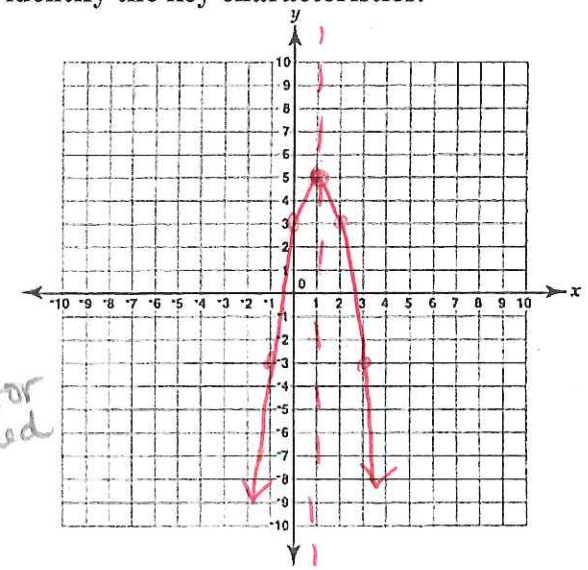
Vertex: (1, 5)

Axis of Symmetry: $x = 1$

Max/min: max

x-intercepts/roots/zeros: $x \approx -.6$ & $x \approx 2.6$ * used calculator & rounded

y – intercept: 3



- **Graph a quadratic function given in *vertex form* and identify the key characteristics.**

Example:

1. $y = 2(x-1)^2 - 8$

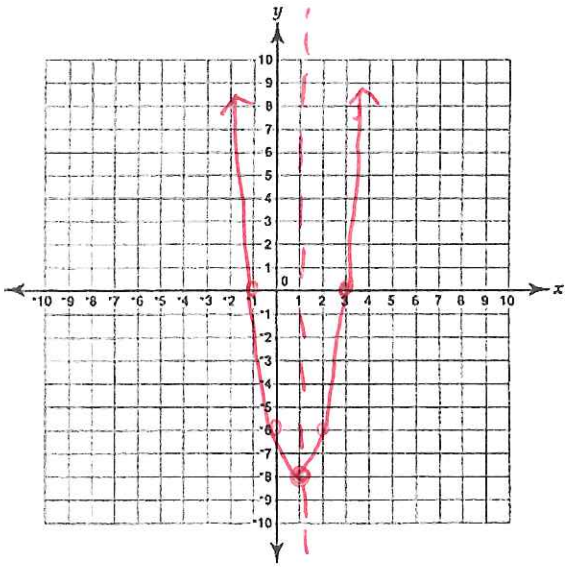
Vertex: (1, -8)

Axis of Symmetry: $x = 1$

Max/min: min

x-intercepts/roots/zeros: $x = -1$ & $x = 3$

y – intercept: -6



- **Graph a quadratic function given in *intercept form* and identify the key characteristics.**

Example:

1. $y = -(x-1)(x+7)$

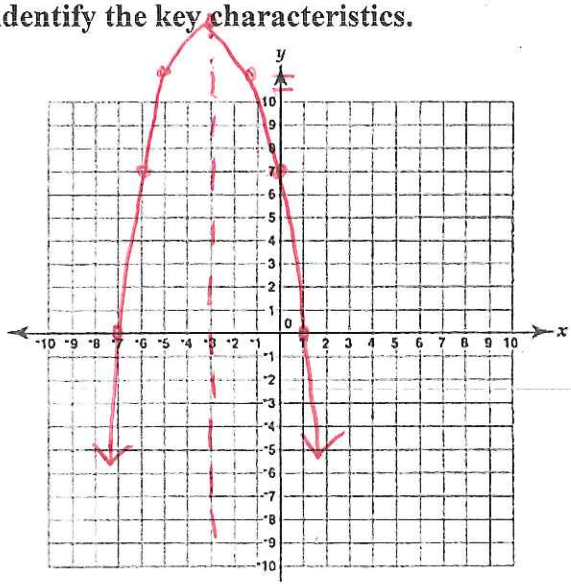
Vertex: (-3, 16)

Axis of Symmetry: $x = -3$

Max/min: max

x-intercepts/roots/zeros: $x = -7$ & $x = 1$

y – intercept: 7



AT THIS POINT YOU SHOULD BE ABLE TO (Part 2):

- **Change forms of quadratic equations between standard, vertex, and factored forms.**

Complete the square to rewrite each equation given in standard form to vertex form.

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

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

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

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

2. $y = x^2 - 8x - 21$

$16 + y + 21 = x^2 - 8x + 16$

$y + 37 = (x-4)^2$

$y = (x-4)^2 - 37$

3. $y = 2x^2 + 12x - 10$

$18 + y + 10 = 2(x^2 + 6x + 9)$

$y + 28 = 2(x+3)^2$

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

4. $y = -3x^2 + 12x - 6$

$-12 + y + 6 = -3(x^2 - 4x + 4)$

$y - 6 = -3(x-2)^2$

$y = -3(x-2)^2 + 6$

Rewrite each quadratic function given in vertex form to standard form.

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

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

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

2. $y = (x-5)^2 - 6$

$y = x^2 - 10x + 25 - 6$

$y = x^2 - 10x + 19$

3. $y = -(x-9)^2 + 1$

$y = -1(x^2 - 18x + 81) + 1$

$y = -x^2 + 18x - 81 + 1$

$y = -x^2 + 18x - 80$

4. $y = 2(x+4)^2$

$y = 2(x^2 + 8x + 16)$

$y = 2x^2 + 16x + 32$

Rewrite a quadratic function in factored form into standard form.

1. $y = (x+5)(x-9)$

$y = x^2 - 4x - 45$

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

$y = 2x^2 - 11x - 21$

3. $y = -(x-1)(x+6)$

$y = -1(x^2 + 5x - 6)$

$y = -x^2 - 5x + 6$

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

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

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

AT THIS POINT YOU SHOULD BE ABLE TO (Part 3):

- **Solve a quadratic equation by factoring**

Examples:

1. $x^2 - 4x - 21 = 0$

$(x-7)(x+3)=0$

$x=7$ $x=-3$

2. $7x^2 + 20x = 3$

$7x^2+20x-3=0$

$(7x-1)(x+3)=0$

$x=\frac{1}{7}$ $x=-3$

- **Solve a quadratic equation by completing the square/square roots.**

Examples:

1. $x^2 - 4x - 6 = 0$

$x^2-4x+4=6+4$

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

$x-2=\pm\sqrt{10}$

$x=2\pm\sqrt{10}$

2. $\frac{3x^2}{3} = \frac{363}{3}$

$\sqrt{x^2}=\sqrt{121}$

$x=\pm 11$

- **Solve a quadratic equation using the quadratic formula.**

Examples:

1. $5x^2 + 28x - 12 = 0$

$a=5$ $b=28$ $c=-12$

$x=\frac{-28\pm\sqrt{28^2-4(5)(-12)}}{2(5)}$

$x=\frac{-28\pm\sqrt{1024}}{10}$

$x=\frac{-28\pm 32}{10}$ $x=.4$ $x=-6$

2. $2x^2 - 4x - 3 = 0$

$a=2$ $b=-4$ $c=-3$

$x=\frac{4\pm\sqrt{(-4)^2-4(2)(-3)}}{2(2)}$

$x=\frac{4\pm\sqrt{40}}{4}$

*Solve each quadratic equation. You must use the **A) quadratic formula, B) completing the square**, and **C) factoring** each at least one time. Round to the nearest tenth if necessary.*

1. $x^2 + 6x - 16 = 0$

$(x+8)(x-2)=0$

$x=-8$ $x=2$

2. $x^2 + 12x + 4 = 0$

$x^2+12x+36=-4+36$

$\sqrt{(x+6)^2}=\sqrt{32}$

$x+6=\pm 5.7$

$x=-.3$ $x=-11.7$

3. $x^2 - 8x + 5 = 0$

$x^2-8x+16=-5+16$

$\sqrt{(x-4)^2}=\sqrt{11}$

$x-4=\pm 3.3$

$x=7.3$ $x=.7$

4. $3x^2 - 12x - 7 = 0$

$a=3$ $b=-12$ $c=-7$

$x=\frac{12\pm\sqrt{(-12)^2-4(3)(-7)}}{2(3)}$

$x=\frac{12\pm\sqrt{228}}{6}$ $x=4.5$

$x=\frac{12\pm 15.1}{6}$ $x=-.5$

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

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

$x=\frac{1}{2}$ $x=-3$

6. $-2x^2 - 12x - 9 = 0$

$a=-2$ $b=-12$ $c=-9$

$x=\frac{12\pm\sqrt{(-12)^2-4(-2)(-9)}}{2(-2)}$

$x=\frac{12\pm\sqrt{72}}{-4}$ $x=-5.1$

$x=\frac{12\pm 8.5}{4}$ $x=-.9$

- **Solve a system of equations.**

Example:

$x^2 + y^2 = 5$

$y = 3x + 5$

* Substitution

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

$x^2 + 9x^2 + 30x + 25 = 5$

$10x^2 + 30x + 20 = 0$

$10(x^2 + 3x + 2) = 0$

$10(x+2)(x+1) = 0$

$x = -2 \quad x = -1$

$y = (3)(-2) + 5$

$y = -1$

$(-2, -1)$

$y = 3(-1) + 5$

$y = 2$

$(-1, 2)$

- **Solve application problems.**

Examples:

1. A rocket is fired vertically into the air from the ground at an initial velocity of 50 feet per second. Its path is modeled by: $h(t) = -16t^2 + 50t$.

   A) Find the highest point reached by the rocket. ≈ 39 ft

   B) At what time is it at this maximum height? ≈ 1.6 Seconds

   C) How long does it take for the rocket to hit the ground? ≈ 3.1 Seconds

   D) When does the rocket pass through 20 feet? Why are there two answers?

   .5 Seconds & 2.7 Seconds

   ↓ on the way up and then again on the way down

2. An acorn is dropped from a tree and it is modeled by: $y = -16t^2 + 96$

   A) What is the height of the acorn after 1.25 seconds?

   $y = -16(1.25)^2 + 96$

   $y = 71$

   71 ft

   B) When does it hit the ground?

   ≈ 2.4 Seconds

   C) How high was the tree that the acorn fell from? Explain your reasoning.

   96 ft. This is the y-intercept / starting height

3. You throw a football into the air towards your friend and it is modeled by the equation $h = -16t^2 + 20t + 6$ where h = height (feet), t = time(seconds)

   A) What is the height of the ball after .5 seconds? How about after 1.25 seconds?

   $h = -16(.5)^2 + 20(.5) + 6$

   $h = 12$ 12 ft

   $h = -16(1.25)^2 + 20(1.25) + 6$

   $h = 6$ 6 ft

   B) When should the ball reach the ground?

   1.5 Seconds

   C) What is the maximum height the ball reaches

   ≈ 12.3 ft