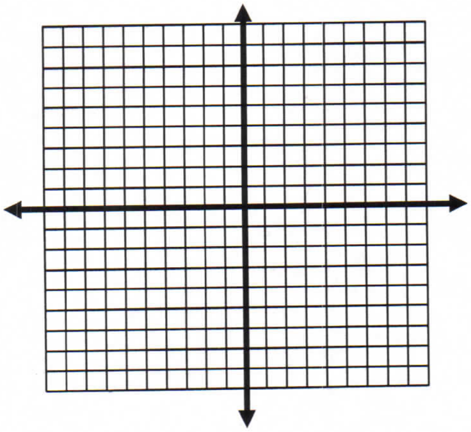
Algebra 1
Chapter 9 Test Version A
Show All Work For Credit!!!

Name: ______________________________

1. $y = x^2 + 4x + 5$



Axis of Symmetry: ____________

Vertex: ____________________

Zeros: ____________________

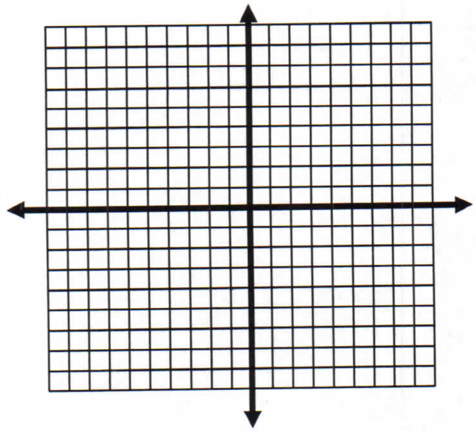
Opens Up or Down: ____________

Max or Min: ________________

Domain: ____________________

Range: _____________________

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



Axis of Symmetry: __________

Vertex: ________________

Zeros: __________________

Opens Up or Down: ________

Max or Min: ______________

Domain: ________________

Range: _________________

<u>Solve By Zero Product Property:</u>

3. $y = x^2 + 16x + 15$

4. $y = 5x^2 + 19x - 4$

Solve by the Quadratic Formula:

7. $x^2 + 8x + 11 = y$

8. $2x^2 + 4x - 70 = y$

9. The height of a fireworks rocket in meters can be approximated by $h(t) = -16t^2 + 56t + 2$ where h is the height in meters and t is the time in seconds.

a. Find the time it takes the rocket to reach the ground after it has been launched.

b. Find out what the maximum height of the rocket is.

10. The height of a flare can be approximated by the function $h(t) = -16t^2 - 8t + 120$ where h is the height in feet and t is the time in seconds.

a. Find the time it takes the flare to hit the ground.

b. Find the maximum height of the flare.

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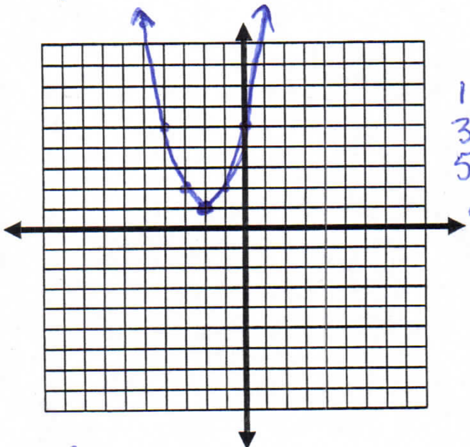
Name: Key

1. $y = x^2 + 4x + 5$



$1(a) = 1$
$3(a) = 3$
$5(a) = 5$
$a=1$

Axis of symmetry: $x = \frac{-b}{2a} \rightarrow x = \frac{-4}{2} = \boxed{-2}$

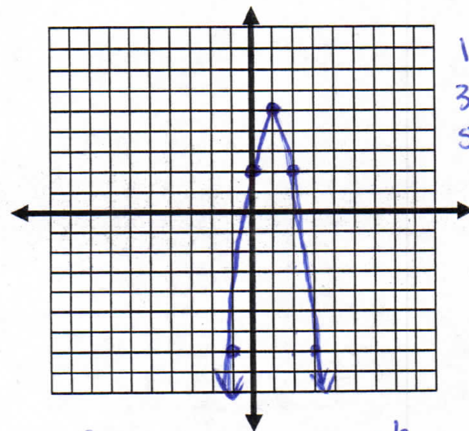
vertex: $y = (-2)^2 + 4(-2) + 5$

$y = 4 + -8 + 5$

$y = -4 + 5$

$y = 1 \rightarrow$ vertex: $\boxed{(-2, 1)}$

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



$1(a) = -3$
$3(a) = -9$
$5(a) = -15$
$a = -3$

Axis of symmetry: $x = \frac{-b}{2a} \rightarrow x = \frac{-6}{-6} = \boxed{1}$

vertex: $y = -3(1)^2 + 6(1) + 2$

$y = -3 + 6 + 2$

$y = 5 \rightarrow$ vertex: $\boxed{(1, 5)}$

*zeros

$x = \frac{-6 \pm \sqrt{(6)^2 - 4(-3)(2)}}{-6} \rightarrow \sqrt{36+24} = \sqrt{60} = \sqrt{4}\sqrt{15} = 2\sqrt{15}$

$x = \frac{-6}{-6} \pm \frac{2\sqrt{15}}{-6} \Rightarrow \boxed{x = 1 \pm \frac{\sqrt{15}}{-3}}$

Axis of Symmetry: $x = -2$	Axis of Symmetry: $x = 1$
Vertex: $(-2, 1)$	Vertex: $(1, 5)$
Zeros: NONE *Find these LAST!!!	Zeros: $x = 1 \pm -\frac{\sqrt{15}}{3}$ *Find these Last!!!
Opens Up or Down: Up	Opens Up or Down: Down
Max or Min: min	Max or Min: max
Domain: $(+\infty, -\infty)$	Domain: $(+\infty, -\infty)$
Range: $y \geq 1$	Range: $y \leq 5$

Solve By Zero Product Property:

3. $y = x^2 + 16x + 15$

$0 = x^2 + 16x + 15$

15, 16; $+15$, $+1$

$0 = (x+15)(x+1)$

$x + 15 = 0 \qquad x + 1 = 0$

$-15 \quad -15 \qquad -1 \quad -1$

$\boxed{x = -15 \qquad x = -1}$

4. $y = 5x^2 + 19x - 4 \rightarrow 0 = 5x^2 + 19x - 4$

-20, 19; $+20$, -1

$0 = 5x^2 + 20x - x - 4$

$0 = (5x - x) + (20x - 4)$

$0 = x(5x-1) + 4(5x-1)$

$0 = (x+4)(5x-1)$

$x + 4 = 0 \qquad 5x - 1 = 0$

$-4 \quad -4 \qquad +1 \quad +1$

$5x = 1$

$\boxed{x = -4 \qquad x = 1/5}$

Solve by Completing the Square:

~~5.~~ $y = x^2 - 4x - 6$

~~6.~~ $4x^2 - 7x - 2 = y$

Solve by the Quadratic Formula: $x = \dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

7. $x^2 + 8x + 11 = y$ $a=1, b=8, c=11$

$x = \dfrac{-8 \pm \sqrt{(8)^2 - 4(1)(11)}}{2(1)}$

$\sqrt{64-44} = \sqrt{20} = \sqrt{4}\cdot\sqrt{5} = 2\sqrt{5}$

$x = \dfrac{-8 \pm 2\sqrt{5}}{2} \rightarrow x = \dfrac{-8}{2} \pm \dfrac{2\sqrt{5}}{2}$

$\boxed{x = -4 \pm \sqrt{5}}$

8. $2x^2 + 4x - 70 = y$ $x = \dfrac{-4 \pm \sqrt{(4)^2 - 4(2)(-70)}}{2(2)}$

$\sqrt{16+560} = \sqrt{576} = 24$

$x = \dfrac{-4 \pm 24}{4} \rightarrow x = \dfrac{-4}{4} \pm \dfrac{24}{4}$

$x = -1 \pm 6 \rightarrow \boxed{x = 5, x = -7}$

9. The height of a fireworks rocket in meters can be approximated by $h(t) = -16t^2 + 56t + 2$ where h is the height in meters and t is the time in seconds.

a. Find the time it takes the rocket to reach the ground after it has been launched. $\boxed{3.54 \text{ seconds}}$

b. Find out what the maximum height of the rocket is. $\boxed{51 \text{ feet}}$

a. $0 = -16t^2 + 56t + 2$ (a)

$0 = -2(8t^2 - 28t - 1)$

It takes the rocket 3.54 seconds to reach the ground

*Does not factor ↳ use quad. formula

-8, -28

$t = \dfrac{-56 \pm \sqrt{(56)^2 - 4(-16)(2)}}{-32} =$

$t = \dfrac{-56 \pm 57.13}{-32} \Rightarrow x = -0.04,\ \boxed{x = 3.54}$

b. $x = \dfrac{-b}{2a} \Rightarrow x = \dfrac{-56}{-32} \Rightarrow x = 1.75$

$h(1.75) = -16(1.75)^2 + 56(1.75) + 2$

$h(1.75) = -49 + 98 + 2$

$h(1.75) = \boxed{51}$

max height of rocket is 51 feet

10. The height of a flare can be approximated by the function $h(t) = -16t^2 - 8t + 120$ where h is the height in feet and t is the time in seconds.

a. Find the time it takes the flare to hit the ground. $\boxed{2.5 \text{ seconds}}$

b. Find the maximum height of the flare. $\boxed{121 \text{ feet}}$

a. $0 = -16t^2 - 8t + 120$

$0 = -8(2t^2 + t - 15)$

-30, $+6$, -5, 1

$(2t^2 + 6t) + (-5t - 15)$

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

$-8(2t-5)(t+3) = 0$

$2t - 5 = 0,\ t + 3 = 0 \Rightarrow \boxed{t = 5/2},\ t = -3$

b. $x = \dfrac{-b}{2a} \Rightarrow x = \dfrac{8}{-32} \Rightarrow x = -\dfrac{1}{4}$

$y = -16(-.25)^2 - 8(-0.25) + 120$

$y = -1 + 2 + 120$

$\boxed{y = 121}$

Not a good question, this tells us that the flare reaches max height 0.25 secs BEFORE it is launched! Therefore, the answer should actually be 120 feet, the height from where it was launched.