

Unit 8: Quadratics Study Guide

1. $ax^2 + bx + c = 0$
2. $y = a(x-h)^2 + k$
3. The "a" value. If it's negative, we have a max graph. If it's positive, we have a min.
4. $x = \frac{-b}{2a}$

5. a) $a=1$ $b=0$ $c=-4$

$$x = \frac{0}{2(1)} = 0$$

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

A.O.S: $x=0$

vertex: $(0, -4)$

b) $a=1$ $b=-2$ $c=-4$

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

$$\begin{aligned} y &= 1^2 - 2(1) - 4 \\ &= 1 - 2 - 4 \\ &= -5 \end{aligned}$$

A.O.S: $x=1$

vertex: $(1, -5)$

c) $a=-2$ $b=-4$ $c=6$

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

$$\begin{aligned} y &= -2(-1)^2 - 4(-1) + 6 \\ &= -2(1) + 4 + 6 \\ &= -2 + 10 \\ &= 8 \end{aligned}$$

AOS $x=-1$

vertex: $(-1, 8)$

$$d) a = -1 \quad b = 0 \quad c = 0$$

$$x = \frac{0}{2(-1)} = 0$$

$$y = 0^2 = 0$$

$$\text{AOS: } x = 0$$

$$\text{vertex: } (0, 0)$$

6. We find a solution (x-int, root, zero) for x . We can do this by factoring, quadratic formula, or graphing (find intersections).

$$7. a) x^2 + x - 42 = 0$$

$$(x+7)(x-6) = 0$$

$$x = -7 \quad x = 6$$

$$b) c^2 - 5c = 0$$

$$c(c-5) = 0$$

$$c = 0 \quad c = 5$$

$$c) n^2 - 9n + 18 = 0$$

$$(n-6)(n-3) = 0$$

$$n = 6 \quad n = 3$$

$$d) m^2 - 4m = 0$$

$$m(m-4) = 0$$

$$m = 0 \quad m = 4$$

$$e) -x^2 + 22x - 96 = 0$$

$$x^2 - 22x + 96 = 0$$

$$(x-16)(x-6) = 0$$

$$x = 16 \quad x = 6$$

$$f) 3(x^2 + 4x + 3) = 0$$

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

$$x = -1 \quad x = -3$$

$$g) 4c^2 - 16 = 0$$

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

$$4(c+2)(c-2) = 0$$

$$c = -2 \quad c = 2$$

$$8. a) \text{vertex: } (2, -4)$$

$$\text{AOS: } x = 2$$

$$b) \text{vertex: } (-5, -7)$$

$$\text{AOS: } x = -5$$

9. Set equal to zero
 $y_1 =$ equation
 $y_2 =$ zero
 find intersection

- a) $x = -0.25$ and $x = 0.6$
- b) $x = 0.5$ and $x = 5$
- c) $x = -5$ and $x = 2$

10. ~~Quadratic~~

a) $x^2 - 4x + 5$

x-int: none

y-int: $(0, 5)$

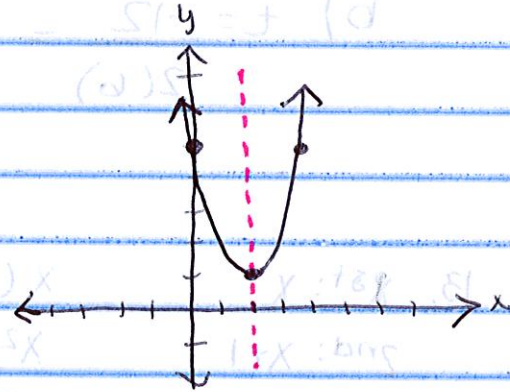
AOS: $x = \frac{4}{2} = 2$

vertex: $(2, 1)$

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

$$= 4 - 8 + 5$$

$$= 1$$



b) $x^2 - 8x + 15 = 0$

x-int: $5, 3$

y-int: $(0, 15)$

AOS: $x = \frac{8}{2} = 4$

vertex: $(4, -1)$

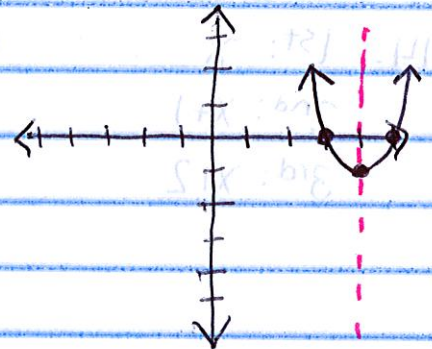
$(x-5)(x-3) = 0$

$x = 5 \quad x = 3$

$$y = (4)^2 - 8(4) + 15$$

$$= 16 - 32 + 15$$

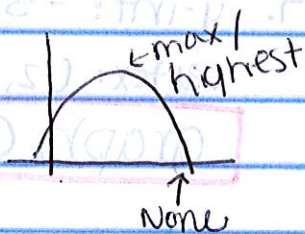
$$= -1$$



11. $M(t) = -2t^2 + 14t$

$t =$ time = x

$M =$ medicine = y



a) $t = \frac{-14}{2(-2)} = \frac{-14}{-4} = 3.5$ hours

b) $M(t) = -2(3.5)^2 + 14(3.5)$

meds = 24.5

c) $-2t^2 + 14t = 0$

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

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

$t = 0 \quad t = 7$

7 hours

12. $h(t) = -6t^2 + 12t + 48$ a) $-6t^2 + 12t + 48 = 0$
 $t = \text{time (x)}$ $-6(t^2 - 2t - 8) = 0$ 4 seconds
 $h = \text{height (y)}$ $-6(t-4)(t+2) = 0$
 $t = 4 \quad t = -2$

b) $t = \frac{-12}{2(-6)} = \frac{-12}{-12} = 1 \text{ sec}$ 1 sec c) $h(t) = -6(1)^2 + 12(1) + 48$
 $= -6 + 12 + 48$
 $= 54 \text{ meters}$ 54 meters

13. 1st: x $x(x+1) = 10(x+2) - 34$ $(x-7)(x-2) = 0$
 2nd: $x+1$ $x^2 + x = 10x + 20 - 34$ $x = 7 \quad x = 2$
 3rd: $x+2$ $x^2 - 9x + 14 = 0$ smallest = 2

14. 1st: x $(x+1)(x+2) = 2x + 4$ $(x+2)(x-1) = 0$
 2nd: $x+1$ $x^2 + 2x + 1x + 2 = 2x + 4$ $x+2 = 0 \quad x-1 = 0$
 3rd: $x+2$ $x^2 + 3x + 2 = 2x + 4$ $x = -2 \quad x = 1$
 $x^2 + x - 2 = 0$ largest = 3

15. $A = \frac{bh}{2}$ $x(2x-8) = 12$ $2(x^2 - 4x - 12) = 0$ Base: 6
height: $2x-8$ $2(x-6)(x+2) = 0$ height: 4
base: x $x = 6 \quad x = -2$

16. $y = 3x^2 + 12x - 6$ vertex: $(-2, -18)$
 $x = \frac{-12}{2(3)} = \frac{-12}{6} = -2$ graph D
 $y = 3(-2)^2 + 12(-2) - 6$
 $y = -18$

17. y-int: -5
 vertex: $(-2, -13)$
graph C