

Unit 5 Quadratics Review

Given the graph of a quadratic, state all the important information.

1.

Opens: up

Axis of Symmetry: $x = -3$

Vertex: $(-3, -5)$

Max/Min: min

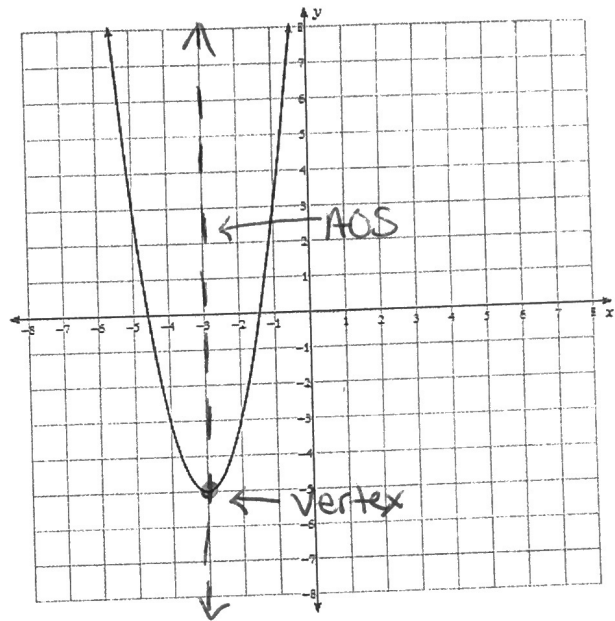
Domain: $(-\infty, \infty)$

Range: $[-5, \infty)$

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow \infty$

As $x \rightarrow \infty, f(x) \rightarrow \infty$



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

Opens: down

Axis of Symmetry: $x = 2$

Vertex: $(2, 6)$

Max/Min: max

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

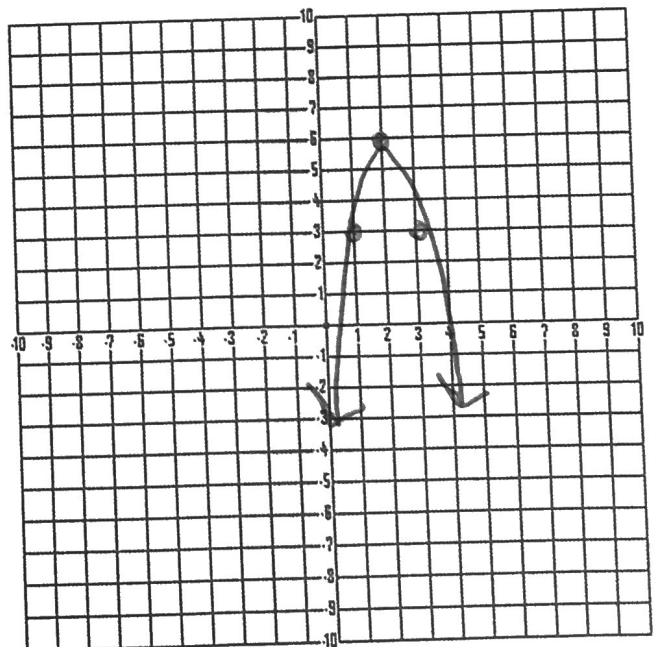
Range: $(-\infty, 6]$

End Behavior:

As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

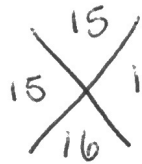
As $x \rightarrow \infty, f(x) \rightarrow -\infty$

x	y
1	3
2	6
3	3

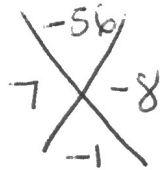


Solve the following quadratic equations using any method.

$$3. \quad \begin{array}{r} 11x^2 + 13x = 8x^2 - 5 - 3x \\ -8x^2 + 3x \quad -8x^2 + 3x \\ \hline 3x^2 + 16x + 5 = 0 \\ 3x^2 + 15x + 1x + 5 = 0 \\ 3x(x+5) + 1(x+5) = 0 \\ (3x+1)(x+5) \\ \boxed{x = -\frac{1}{3}, x = -5} \end{array}$$

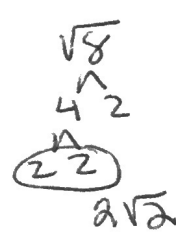


$$4. \quad \begin{array}{r} x^2 - 7x - 55 = -6x + 1 \\ +6x - 1 \quad +6x - 1 \\ \hline x^2 - x - 56 = 0 \\ x^2 + 7x - 8x - 56 = 0 \\ x(x+7) - 8(x+7) = 0 \\ x-8=0 \quad x+7=0 \\ \boxed{x = 8, x = -7} \end{array}$$

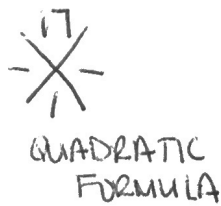


$$5. \quad \begin{array}{r} 3(x-2)^2 + 11 = 32 \\ -11 \quad -11 \\ \hline 3(x-2)^2 = 21 \\ \frac{3}{3} \quad \frac{21}{3} \\ (x-2)^2 = 7 \\ \sqrt{(x-2)^2} = \pm\sqrt{7} \\ x-2 = \pm\sqrt{7} \\ \boxed{x = 2 \pm \sqrt{7}} \end{array}$$

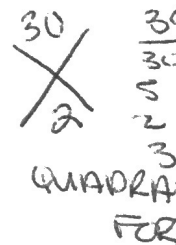
$$6. \quad \begin{array}{r} 5(x-3)^2 + 26 = -14 \\ -26 \quad -26 \\ \hline 5(x-3)^2 = -40 \\ \frac{5}{5} \quad \frac{-40}{5} \\ (x-3)^2 = -8 \\ \sqrt{(x-3)^2} = \pm\sqrt{8} \\ x-3 = \pm\sqrt{8} \\ x-3 = \pm i\sqrt{8} \\ \boxed{x = 3 \pm 2i\sqrt{2}} \end{array}$$



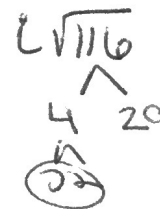
$$7. \quad \begin{array}{r} 12x^2 - 9x + 29 = 12 + 11x^2 \\ -11x^2 \quad -12 \quad -12 \quad -11x^2 \\ \hline x^2 - 9x + 17 = 0 \\ x = \frac{9 \pm \sqrt{(-9)^2 - 4(1)(17)}}{2(1)} \\ \boxed{x = \frac{9 \pm \sqrt{13}}{2}} \end{array}$$



$$8. \quad \begin{array}{r} 9x^2 + 4x + 12 = 7 + 3x^2 + 2x \\ 6x^2 + 2x + 5 = 0 \\ x = \frac{-2 \pm \sqrt{2^2 - 4(6)(5)}}{2(6)} \\ x = \frac{-2 \pm \sqrt{-116}}{12} \\ x = \frac{-2 \pm 2i\sqrt{29}}{12} \end{array}$$



$$\boxed{x = \frac{-1 \pm i\sqrt{29}}{6}}$$



9. Your friend challenges you to throw a baseball as high as you can. You release the ball 6 feet above the ground with an upward velocity of 32 feet/second. The equation that describes the flight of the ball is $h(t) = -16t^2 + 32t + 20$, where h is the height of the ball and t is the time in seconds.

a) What is the initial height of the baseball? $t = 0$

$$H = 16(0)^2 + 32(0) + 20$$

$$H = 0 + 0 + 20$$

$$H = 20$$

Initial height is 20 feet

b) How long after the throw does the ball reach its highest point?

$$t = -\frac{b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} = +1$$

1 second to reach max height

c) What is the maximum height the ball reaches?

$$t = 1$$

$$H = -16(1)^2 + 32(1) + 20$$

$$= -16 + 32 + 20$$

$$= 16 + 20 = 36$$

The maximum height the ball reaches is 36 feet.

d) Find the total time the ball is in the air.

$$H = 0$$

$$0 = -16t^2 + 32t + 20$$

$$0 = -8(2t^2 - 4t - 5)$$

$$0 = \frac{4 \pm \sqrt{4^2 - 4(2)(-5)}}{2(2)} = \frac{4 \pm \sqrt{56}}{4}$$

$$\begin{array}{c} -10 \\ \times \\ -4 \end{array}$$

$$\frac{4 + \sqrt{56}}{4} = \text{2.87 seconds}$$

$$\frac{4 - \sqrt{56}}{4} = -.87$$

e) When does the baseball reach a height of 30ft?

$$30 = -16t^2 + 32t + 20$$

$$-30$$

$$-30$$

$$0 = -16t^2 + 32t - 10$$

$$X = \frac{-32 \pm \sqrt{32^2 - 4(-16)(-10)}}{2(-16)}$$

$$2(-16)$$

X = +.39 & 1.61 seconds

