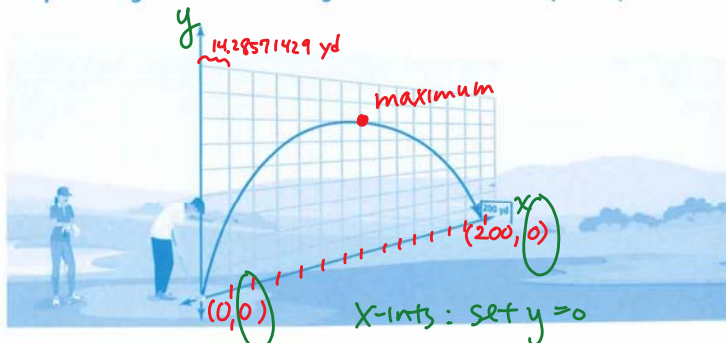


**EXPLORE & REASON**

The path of a golf ball hit from the ground resembles the shape of a parabola.



A. What point represents the golf ball before it is hit off the ground?

→ (0,0)



B. What point represents the golf ball when it lands on the ground?

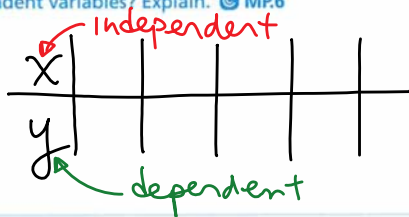
→ (200, 0)

C. **Look for Relationships** Explain how the points in Part A and B are related to the ball's distance from the ground. © MP.7

200 yds away....

**HABITS OF MIND**

**Communicate Precisely** In a table, how are independent variables different from dependent variables? Explain. © MP.6



Parabolas ---  $y = a(x-h)^2 + k$   $\left\{ \begin{array}{l} v: (h, k) \end{array} \right.$   $y = ax^2 + bx + c$   $\left\{ \begin{array}{l} \text{a.o.s: } x = -b \\ \text{w-int} \end{array} \right.$

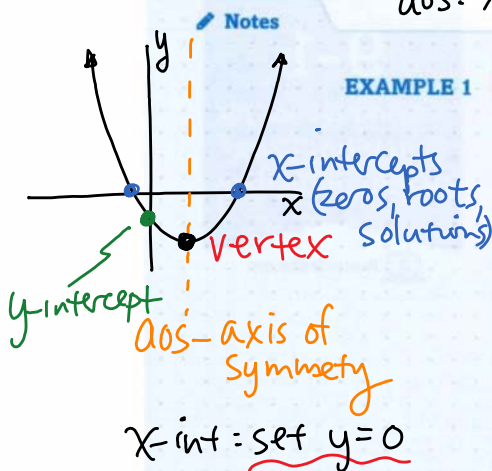
Parabolas ---

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

$v: (h, k)$   
 $aos: x = h$

$$y = ax^2 + bx + c$$

$aos: x = -\frac{b}{2a}$  (y-int)  
 $vertex: (-\frac{b}{2a}, \dots)$



**EXAMPLE 1 Try It! Recognize Solutions of Quadratic Equations**

1. What are the solutions of each equation?

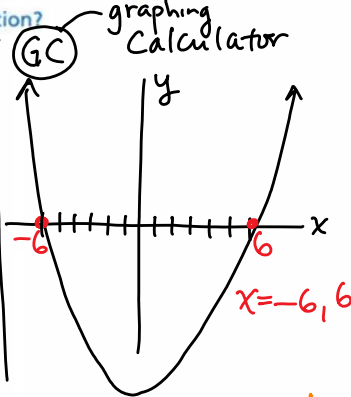
a.  $x^2 - 36 = 0$

Factor: diff of squares

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

$x-6=0$  or  $x+6=0$   
 $+6 +6$  |  $-6 -6$   
 $x=6$  |  $x=-6$

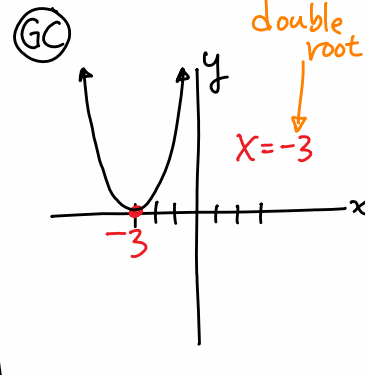
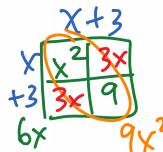
Zero Product Property



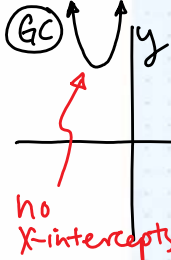
b.  $x^2 + 6x + 9 = 0$

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

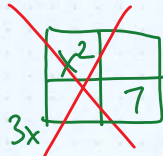
$x+3=0$  |  $x+3=0$   
 $-3 -3$   
 $x=-3$



c.  $x^2 + 3x + 7 = 0$



no solution



**EXAMPLE 2 Try It! Solve Quadratic Equations Using Tables**

2. Find the solutions for  $4x^2 + 3x - 7 = 0$  using a table. If approximating, give the answer to the nearest tenth.

GC → Table

x	y
1	0
2	15
3	38
4	69
5	108

x	y
...	...
-2	3
-1	-6
...	...

x	y
...	...
-1.8	0.56
-1.7	-0.54
...	...

$x = 1, -1.7ish$

**HABITS OF MIND**

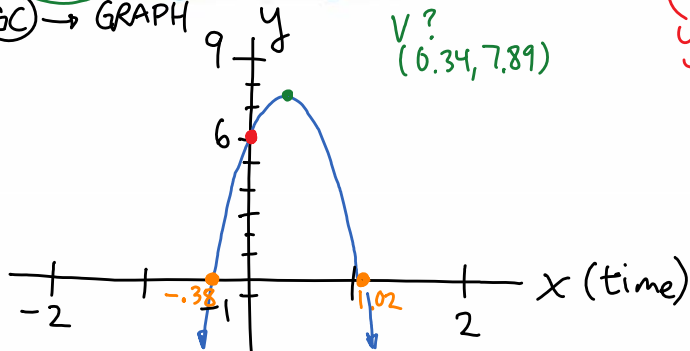
**Communicate Precisely** When is it easier to solve a quadratic equation by graphing? When is it easier to solve a quadratic equation using a table? Justify your answers. © MP.6



**EXAMPLE 3** **Try It!** Use Approximate Solutions

3. At the next tee, a golf ball was hit and modeled by  $-16x^2 + 11x - 6 = 0$ .  
 When will the golf ball hit the ground?

GC → GRAPH



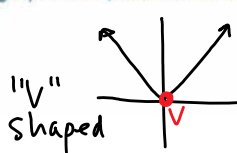
V? (0.34, 7.89)

y-int

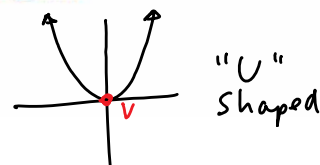
time = 1.02 seconds

**HABITS OF MIND**

**Look for Relationships** How is the graph of an absolute value function related to the graph of a quadratic function? Explain. © MP.7



vs.



**Do You UNDERSTAND?**

1. **ESSENTIAL QUESTION** How can graphs and tables help you solve quadratic equations?

2. **Reason** In a table that shows no exact solutions, how do you know if there are any solutions? How can you find an approximate solution? © MP.2

3. **Error Analysis** Eli says that the solutions to  $x^2 + 100 = 0$  are  $-10$  and  $10$  because  $10^2$  is  $100$ . What is the error that Eli made? © MP.3

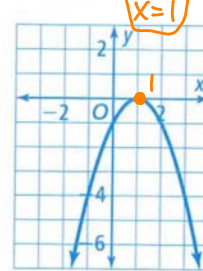
4. **Communicate Precisely** When you graph a quadratic function, the  $y$ -intercept appears to be  $1$ , and the  $x$ -intercepts appear to be  $-4$  and  $2.5$ . Which values represent the solution(s) to the related quadratic equation of the function? How can you verify this? Explain. © MP.6

**Do You KNOW HOW?**

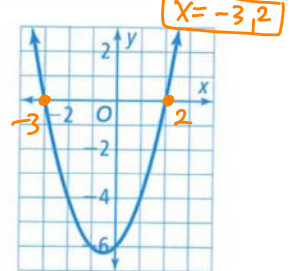
*~ root/zero/x-int*

Use each graph to find the solution of the equation.

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



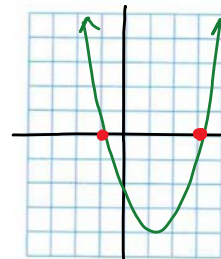
6.  $x^2 + x - 6 = 0$



Solve each quadratic equation by graphing the related function.

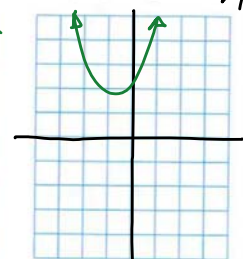
7.  $x^2 - 2x - 3 = 0$

**GC**



$X = -1, 3$

8.  $x^2 + x + 1 = 0$



no solution

*Desmos & Mathway*

Find the solutions of each equation using a table. Round approximate solutions to the nearest tenth.

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

x	y
-4	0
1	0

$X = -4, 1$

10.  $3x^2 - 2x + 1 = 0$

x	y
.2	0
.4	0

$X = \text{no solution} \dots$

11. What are the solutions of  $-5x^2 + 10x + 2 = 0$ ? Round approximate solutions to the nearest tenth.

$X = -0.2, 2.2$

**GC**