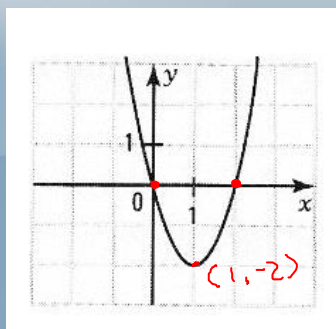


Lesson 16

Quadratic Functions (cont'd)

Quadratic Function – Standard form

Ex. Find the zero(s) of the following function:



Algebraically - Zero(s)

$$f(x) = 2(x-1)^2 - 2$$

$$0 = 2(x-1)^2 - 2$$

$$2 = 2(x-1)^2$$

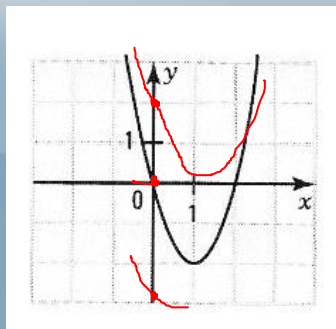
$$1 = (x-1)^2$$

$$\pm 1 = x - 1$$

$$\therefore x = 0; x = 2$$

Quadratic Function – Standard form

Ex. Find the initial value of the following function:



Algebraically - Init Val.

$$f(x) = 2(x-1)^2 - 2$$

$$y = 2(0-1)^2 - 2$$

$$y = 2(-1)^2 - 2$$

$$y = 2(1) - 2$$

$$y = 0$$

Quadratic Function – Standard form

Ex.1 Find the zero(s) of the following function:

$$f(x) = 4(x-3)^2 - 1$$

Step 1: Identify a, h and k $a = 4$ $h = 3$ $k = -1$

Step 2: Use formula to find x_1 and x_2

$$x_1 = h - \sqrt{-\frac{k}{a}} = 3 - \sqrt{-\frac{-1}{4}} = 3 - \frac{1}{2} = 2.5$$

$$x_2 = h + \sqrt{-\frac{k}{a}} = 3 + \sqrt{-\frac{-1}{4}} = 3 + \frac{1}{2} = 3.5$$

Quadratic Function – Standard form

Finding the zero(s) of the Quadratic functions:

Case 1: if $-\frac{k}{a} > 0$ There are two zeros
a + k diff signs

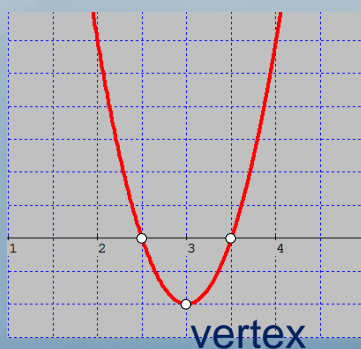
Case 2: if $-\frac{k}{a} = 0$ There is one zero

Case 3: if $-\frac{k}{a} < 0$ There are no zeros
a + k same sign

Quadratic Function – Standard form

Ex.1 Find the zero(s) of the following function:

$$f(x) = 4(x-3)^2 - 1$$



$$\begin{aligned}x_1 &= 2.5 \\x_2 &= 3.5 \\(h, k) &= (3, -1)\end{aligned}$$

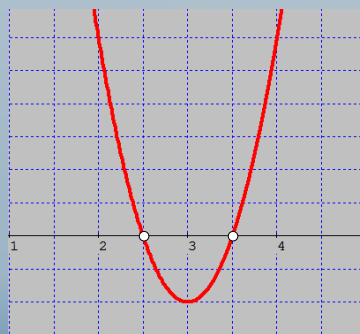
Quadratic Function – Standard form

Finding the zero(s) of the Quadratic functions:

Case 1: if $-\frac{k}{a} > 0$ - there are two zeros

Ex $f(x) = 4(x-3)^2 - 1$

$$-\frac{k}{a} = -\frac{-1}{4} = \frac{1}{4} > 0$$



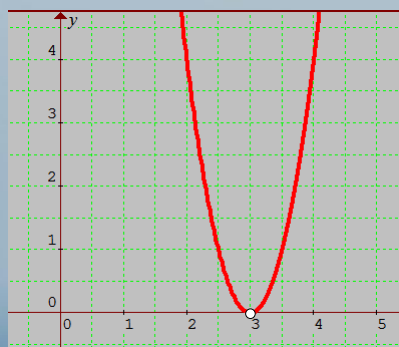
Quadratic Function – Standard form

Finding the zero(s) of the Quadratic functions:

Case 2: if $-\frac{k}{a} = 0$ - there is one zero

Ex $f(x) = 4(x-3)^2$

$$-\frac{k}{a} = -\frac{0}{4} = 0$$



Quadratic Function – Standard form

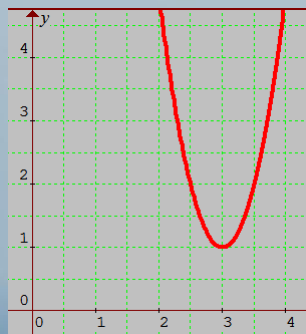
Finding the zero(s) of the Quadratic functions:

Case 3: if $-\frac{k}{a} < 0$ - there are no zeros

Ex $f(x) = 4(x-3)^2 + 1$

$$-\frac{k}{a} = -\frac{1}{4} < 0$$

Since we cannot square root a negative!



Graphing a Quadratic Function – Standard form

Ex. Graph: $f(x) = \frac{1}{2}(x+1)^2 - 2$

Step 1. Determine the vertex: $V(h, k)$

$$V(h, k) = (-1, -2)$$

Step 2. Determine if the parabola opens:

upward (+ a)
downward (- a)



Graphing a Quadratic Function – Standard form

Ex. Graph: $f(x) = \frac{1}{2}(x+1)^2 - 2$

Step 3. Table of Values
(Graphing Calculator)

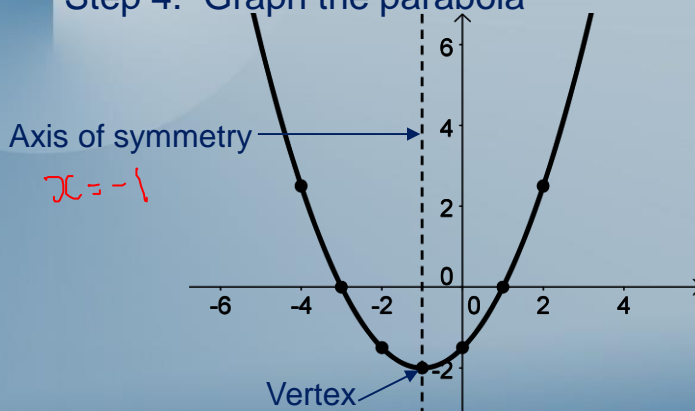
x	y
3	6
2	2.5
1	0
0	-1.5
-1	-2
-2	-1.5
-3	0

Vertex →

Graphing a Quadratic Function – Standard form

Ex. Graph: $f(x) = \frac{1}{2}(x+1)^2 - 2$

Step 4. Graph the parabola



Homework

Workbook

P. 96 #5 - 7