Post-It

Check!!!

2/11/2020

Solve by completing the square.

$$x^2 - 14x - 59 = -27$$

$$x^2 - 14x - 59 = -27$$
$$+59 \quad +59$$

$$x^2 - 14x = 32$$

$$\frac{\ }{2} = (-7)^2 = 49$$

$$x^2 - 14x + 49 = 32 + 49$$

$$(x-7)^2 = 81$$

$$x - 7 = \pm 9$$

$$x - 7 = 9 \text{ and } x - 7 = -9$$
$$+7 \quad +7 \qquad\qquad +7 \quad +7$$

$$x = 16 \text{ and } -2$$

Essential Question 2/11/2020

- How can I solve quadratic equations by using the Quadratic Formula?

Learning Target

Solve Quadratic Equations by Quadratic Formula

Opening: Solving by Quadratic Formula

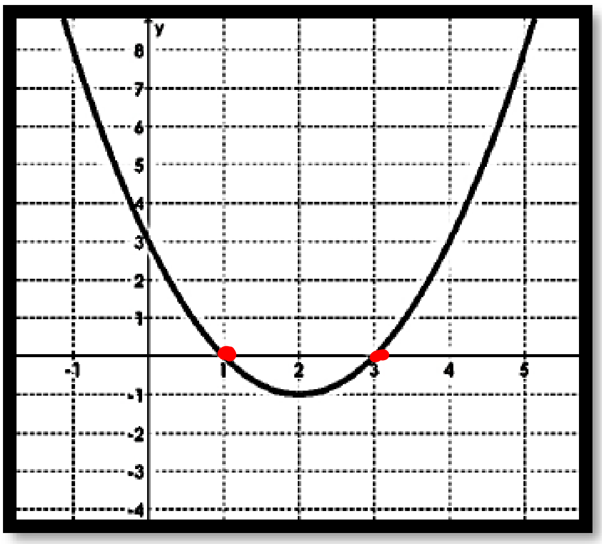
Exploring the Nature of Roots

In this task you will investigate the number of real solutions to a quadratic equation.

Standard(s): MGSE9–12.A.REI.4b Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, factoring, completing the square, and the quadratic formula, as appropriate to the initial form of the equation (limit to real number solutions).

Determine the number of real solutions (roots/x-intercepts) for the following graphs:

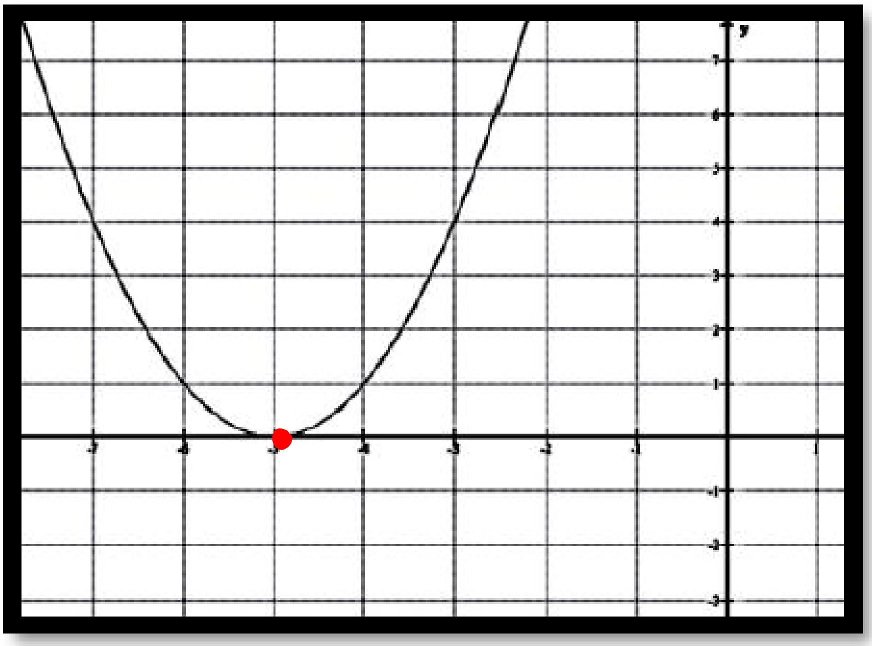
1. $f(x) = x^2 - 4x + 3$



How many x-intercepts: 2

Roots: X= 1 and 3

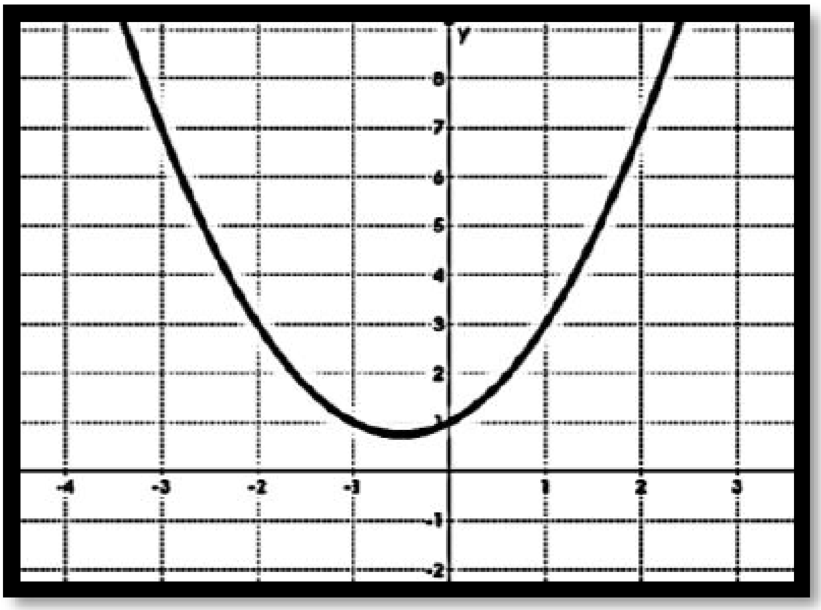
2. $f(x) = x^2 + 10x + 25$



How many x-intercepts: X=-5

Roots: 1 root

3. $f(x) = x^2 + x + 1$



How many x-intercepts: no real root

Roots: no solution

The Discriminant

Given a quadratic function in standard form: $ax^2 + bx + c = 0$, where $a \neq 0$,

- The **discriminant** is found by using: $b^2 - 4ac$
- The discriminant can be used to determine the real number of solutions for a quadratic equation.

Interpretation of the Discriminant ($b^2 - 4ac$)

- If $b^2 - 4ac$ is positive: 2 roots
- If $b^2 - 4ac$ is zero: 1 root
- If $b^2 - 4ac$ is negative: no root

Practice: Find the discriminant for the previous three functions:

a.) $f(x) = x^2 - 4x + 3$

a = 1 b = -4 c = 3

$b^2 - 4ac$

Discriminant: $(-4)^2 - (4 \cdot 1 \cdot 3) = 4$

#. of real solutions: 2

b.) $f(x) = x^2 + 10x + 25$

a = 1 b = 10 c = 25

Discriminant: $(10)^2 - (4 \cdot 1 \cdot 25) = 0$

# of real zeros: 1

c.) $f(x) = x^2 + x + 1$

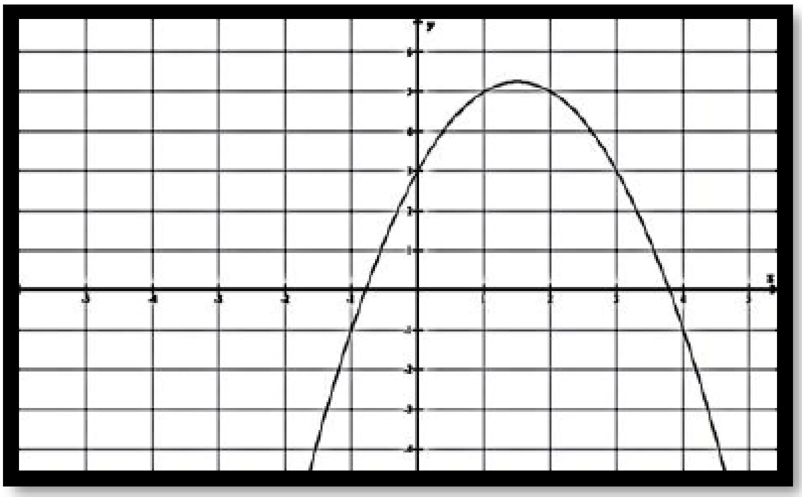
a = 1 b = 1 c = 1

Discriminant: $(1)^2 - (4 \cdot 1 \cdot 1) = -3$

# of real roots: none

Practice: We do **Not in Notes**

Determine whether the discriminant would be greater than, less than, or equal to zero.

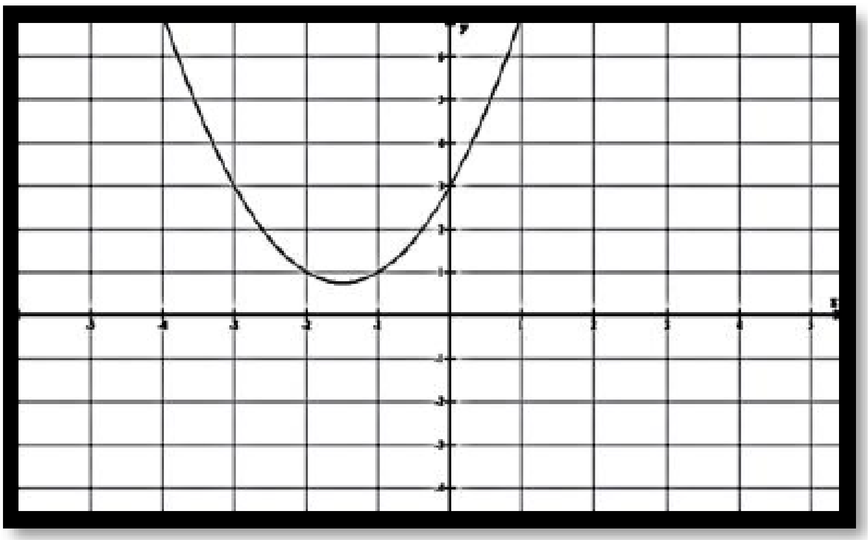


Discriminant: >0 2 roots

Practice: You do

Not in Notes

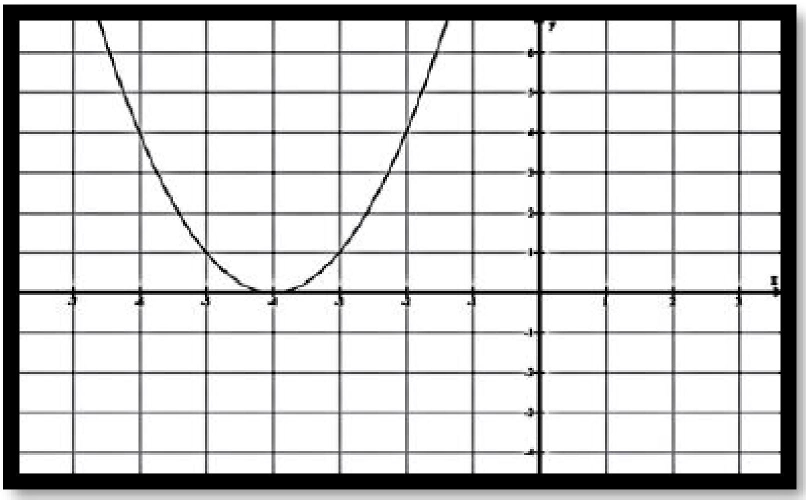
Determine whether the discriminant would be greater than, less than, or equal to zero.



Discriminant: < 0 no solution

Practice: You do Not in Notes

Determine whether the discriminant would be greater than, less than, or equal to zero.



Discriminant: = 0 1 Solution

The Quadratic Formula

We have learned **three methods** for solving quadratics:

- **Factoring** *(Only works if the equation is factorable)*
- **Taking the Square Roots** *(Only works when equations are not in Standard Form)*
- **Completing the Square** *(Only works when a is 1 and b is even)*

What method do you use when your equations are not factorable, but are in standard form, and a may not be 1 and b may not be even?

The Quadratic Formula

for equations in standard form: $y = ax^2 + bx + c$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

x represents the zeros and $b^2 - 4ac$ is the discriminant

Practice with Quadratic Formula - I do

For the quadratic equations below, use the quadratic formula to find the solutions. Write your answer in simplest radical form.

1) $4x^2 - 13x + 3 = 0$ a = 4 b = -13 c = 3

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-13) \pm \sqrt{(-13)^2 - (4 \cdot 4 \cdot 3)}}{2(4)}$$

$$x = \frac{13 \pm 11}{8} = \frac{13+11}{8} \text{ and } \frac{13-11}{8}$$

Discriminant: $121 > 0$

Solutions: 3 and 1/4

Practice with Quadratic Formula - You do

2) $9x^2 + 6x + 1 = 0$ a = 9 b = 6 c = 1

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(6) \pm \sqrt{(6^2) - (4 \cdot 9 \cdot 1)}}{2(9)}$$

$$x = \frac{-6 \pm 0}{18}$$

$$x = -1/3$$

Discriminant: 0

Solutions: 1 solution

Practice with Quadratic Formula - You do

3) $7x^2+8x+3=0$ a = 7 b = 8 c = 3

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$D=(8)^2-(4\cdot7\cdot3)$$
$$=64-84$$
$$=-20<0$$

No Solution

Discriminant: -20

Solutions: No solution

Practice with Quadratic Formula - You do

4) $-3x^2 + 2x = -8$

$-3x^2+2x+8=0$

a = -3 b = 2 c = 8

$D = b^2 - 4ac$

$D = (2)^2 - (4 \cdot -3 \cdot 8)$

$D = 4 + 96$

$D = 100 > 0$

2 solution

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$x = \frac{-2 \pm 10}{2(-3)}$

Discriminant: 100

Solutions: 2 solutions

Let's talk from Day 8 HW!

Decision Making:

I have a non-factorable trinomial where a is 1 and b is odd, which method am I going to use? Quadratic Formula

I have a factorable trinomial where a is NOT 1 and b is odd, which method am I going to use? Big X & Area Model (Box)

I have a non-factorable trinomial where a is 1 and b is even, which method am I going to use? Completing the Squares

I have a binomial squared and its equal to some number, which method am I going to use? Take square root of both sides

Determining the Best Method

Non-Factorable Methods

Completing the Square	Finding Square Roots	Quadratic Formula
$ax^2 + bx + c = 0$, *when* $a = 1$ *and* b *is an even #* **Examples** $x^2 - 6x + 11 = 0$ $x^2 - 2x - 20 = 0$	$ax^2 - c = 0$ Parenthesis in equation **Examples** $2x^2 + 5 = 9$ $5(x + 3)^2 - 5 = 20$ $x^2 - 36 = 0$	$ax^2 + bx + c = 0$ Any equation in standard form Large coefficients **Examples** $3x^2 + 9x - 1 = 0$ $20x^2 + 36x - 17 = 0$

Factorable Methods

A = 1 & A Not 1 (Factor into 2 Binomials)	GCF
$ax^2 + bx + c = 0$, *when* $a = 1$ $ax^2 \pm bx \pm c = 0$, *when* $a > 1$ $x^2 - c = 0$ **Examples** $3x^2 - 20x - 7 = 0$ $x^2 - 3x + 2 = 0$ $x^2 + 5x = -6$ $x^2 - 25 = 0$	$ax^2 + bx = 0$ **Examples** $5x^2 + 20x = 0$ $x^2 - 6x = 8x$

Attachments

- Functions notation.ppt
- Functions Practice HW.docx
- Functions notation notes.ppt