NAME: _____ PERIOD: _____

UNIT 5

QUADRATIC FUNCTIONS

Packet 2

SOLVING

Notes and Practice – Solving – By Inspection

Notes and Practice – Solving – The Discriminant

Notes and Practice – Solving – Quadratic Formula

Notes and Practice – Solving – By Factoring

Notes and Practice – Solving – Mixed Practice

Solving by Inspection: (Isolating x)

Ex1. $4x^2 - 5 = -1$

Ex2. $\frac{x^2}{6} - 4 = 10$

Ex3. $5(x - 7)^2 = 135$

You Try:

4. $x^2 = 9$

5. $x^2 - 16 = 0$

6. $12 - 2x^2 = 4$

7. $x^2 - 144 = 0$

8. $2x^2 = 2$

9. $16 - x^2 = -9$

10. $3x^2 - 1 = 5$

11. $x^2 - 3 = 1$

12. $3x^2 - 1 = 5$

13. $\frac{x^2}{4} - 3 = 33$

14. $(x + 3)^2 = 9$

15. $x^2 = 36$

16. $x^2 - 81 = 0$ 17. $5(x-3)^2 = 500$ 18. $-4x^2 = -36$

The Discriminant: $b^2 - 4ac$

The Discriminant can be used to determine how many real solutions (roots) an algebraic equation will have.

Standard Form: $y = ax^2 + bx + c$

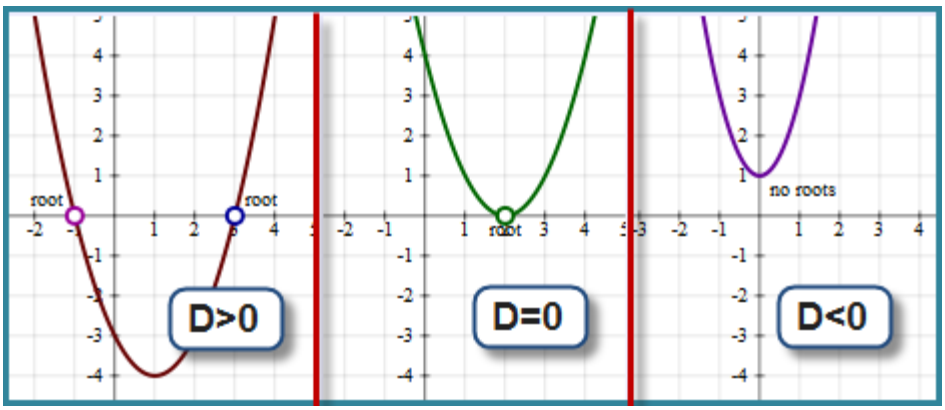
Discriminant: $b^2 - 4ac$

If the discriminant is > 0 (positive)	There are 2 Real Solutions and 0 Imaginary Solutions
If the discriminant is = 0	There is 1 Real Solution and 0 Imaginary Solutions
If the discriminant is < 0 (negative)	There are 0 Real Solutions and 2 Imaginary Solutions

What does it mean to be real or imaginary??

Real Solutions will result in a graphed function that intersects the x-axis and Imaginary solutions will not.

Need a picture??



2 Real Solutions **1 Real Solution** **0 Real Solutions**

There are several terms that mean the same thing:

- **Solution**
- **Roots**
- **Zeros**

These also represent the x-intercepts on a graph.

Given the discriminant below, how many solutions would there be?

1. Discriminant = 9

_____ Real Solutions

2. Discriminant = -18

_____ Real Solutions

3. Discriminant = 0

_____ Real Solutions

_____ Imaginary Solutions _____ Imaginary Solutions _____ Imaginary Solutions

2

The Discriminant: $b^2 - 4ac$

STEP 1: Make sure you are in standard form. $ax^2 + bx + c = 0$

STEP 2: Identify a, b, c

STEP 3: Substitute into the discriminant formula. $b^2 - 4ac$

STEP 4: Use the discriminant to determine the number and type of solutions.

Ex 1. $5x^2 - 8x + 2 = 0$ **Ex 2.** $4x + 3x^2 + 6 = 0$ **Ex 3.** $4x^2 - 4x = -1$

You Try:

1. $2x^2 + 7x + 3 = 0$ 2. $x^2 + 8x + 12 = 0$ 3. $7x^2 - 4x - 3 = 0$

4. $5x^2 = 10x - 5$ 5. $3x^2 + 5 = -7x$ 6. $5 - x^2 - 3x = 0$

Solving using the Quadratic Formula: Standard Form

When using the quadratic formula you are finding solutions which represent the x-intercepts on the graph of a quadratic function.

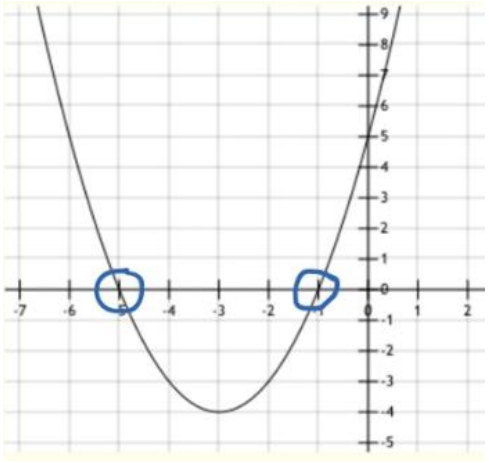
Standard Form: $y = ax^2 + bx + c$ **Quadratic Formula:** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Example 1: $x^2 + 6x + 5 = 0$

a = _____

b = _____

c = _____

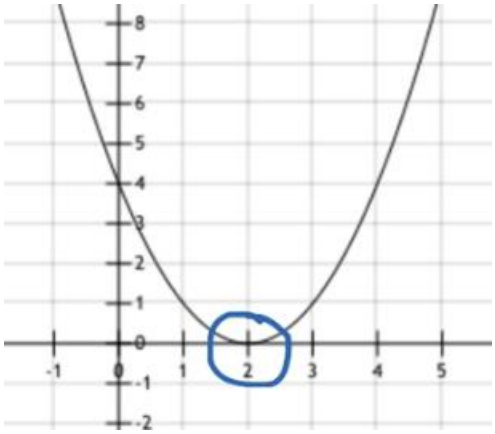


Example 2: $x^2 - 4x + 4 = 0$

a = _____

b = _____

c = _____

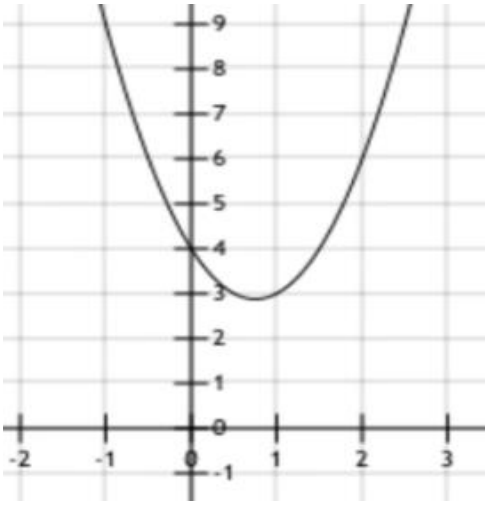


Example 3: $2x^2 - 3x + 4 = 0$

a = _____

b = _____

c = _____



4

You Try:

Use the quadratic formula to find the solutions to the following.

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

a = ___ b = ___ c = ___

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

a = ___ b = ___ c = ___

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

a = ___ b = ___ c = ___

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

a = ___ b = ___ c = ___

5. $2x^2 - 4x + 14 = 0$

a = ___ b = ___ c = ___

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

a = ___ b = ___ c = ___

Solving using the Quadratic Formula: Not in Standard Form

Standard Form: $y = ax^2 + bx + c$ **Quadratic Formula:** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Step 1: Put in Standard Form. $ax^2 + bx + c = 0$
Step 2: Identify a, b, and c
Step 3: Use the Quadratic Formula and Solve. Simplify if needed.

Example 1: $2x^2 - 3x = -2$ **a = _____ b = _____ c = _____**

Example 2: $3 + 2x^2 - 5x = 0$ **a = _____ b = _____ c = _____**

Example 3: $x^2 + 5x = 3x - 4$ **a = _____ b = _____ c = _____**

6

You Try:

Use the quadratic formula to find the solutions to the following. Put them in standard form first.

1. $x^2 - 5 = 2x - 1$ **a = ___ b = ___ c = ___**

2. $3x^2 + 2x = 2x^2 - 1$ **a = ___ b = ___ c = ___**

3. $x^2 + 2x = 15$ **a = ___ b = ___ c = ___**

4. $x^2 + 1 = x + 5$ **a = ___ b = ___ c = ___**

5. $x^2 - 3x = 2x^2$ **a = ___ b = ___ c = ___**

6. $x^2 + 11 = 6x$ **a = ___ b = ___ c = ___**

In your own words, describe what the solutions to a quadratic equation represent.

7

Quick Review of solving by inspection:

1. $x^2 = 25$
2. $x^2 - 49 = 0$
3. $12 - 3x^2 = 24$
4. $\frac{x^2}{4} + 4 = 13$
5. $2x^2 = 32$
6. $(x + 5)^2 = 16$

Quick Review of factoring:

7. $3x - 18$
8. $x^2 - 81$
9. $9x^2 - 81$
10. $2x^2 + x - 6$
11. $x^2 + 10x + 24$
12. $10x^2 - 21x + 9$

8

Solving by Factoring:

STEP 1: Make sure you are in standard form. $ax^2 + bx + c = 0$
STEP 2: Factor fully
STEP 3: Set each factor equal to 0 and solve.

Ex1. $5x - 25 = 0$

Ex2. $x^2 - 64 = 0$

Ex3. $2x^2 + 3x - 20 = 0$

You Try:

1. $x^2 + 5x + 4 = 0$

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

3. $x^2 - 36 = 0$

4. $x^2 + 9x + 14 = 0$

5. $5x^2 + 17x - 12 = 0$

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

7. $2x^2 - 15x - 8 = 0$

8. $x^2 + 13x + 40 = 0$

9. $x^2 - 8x + 12 = 0$

9

Quadratic Formula and Discriminant Review and Practice:

Standard Form: $y = ax^2 + bx + c$ **Discriminant: $b^2 - 4ac$**

Find the Discriminant of the following and identify how many solutions it has and whether or not they are real or imaginary:

1. $2x^2 + 3x + 5 = 0$ **a = ___ b = ___ c = ___** **How many Real Solutions? _____**

How many Imaginary Solutions? _____

2. $x^2 - 4x + 3 = 0$ **a = ___ b = ___ c = ___** **How many Real Solutions? _____**

How many Imaginary Solutions? _____

3. $x^2 + 5x + 2 = 0$ **a = ___ b = ___ c = ___** **How many Real Solutions? _____**

How many Imaginary Solutions? _____

4. $9x^2 + 12x + 4 = 0$ **a = ___ b = ___ c = ___** **How many Real Solutions? _____**

How many Imaginary Solutions? _____

5. $4x^2 - 4x + 1 = 0$ **a = ___ b = ___ c = ___** **How many Real Solutions? _____**

How many Imaginary Solutions? _____

6. $x^2 + 2x + 5 = 0$ a = ___ b = ___ c = ___ **How many Real Solutions?** _____

How many Imaginary Solutions? _____

10

Use the Quadratic Formula to solve the following:

1. $x^2 - 6x + 11 = 0$ a = ___ b = ___ c = ___

2. $2x^2 - 4x + 2 = 0$ a = ___ b = ___ c = ___

3. $x^2 + 2x - 6 = 0$ a = ___ b = ___ c = ___

4. $x^2 - 4 = 0$ a = ___ b = ___ c = ___

5. $-2x^2 = 0$ a = ___ b = ___ c = ___

6. $x^2 - 4x + 4 = 0$ a = ___ b = ___ c = ___