Warm- Up

Solve by Factoring.

1. $n^2 + 12n + 32 = 0$

$(n+8)(n+4)=0$

$n+8=0 \quad n=-8$

$n+4=0 \quad n=-4$

$\{-8;-4\}$

2. $4b^2 + 15 = 16b$

$4b^2-16b+15=0$

$(2b-3)(2b-5)=0$

$b=3/2 \quad b=5/2$

3. What are two other names for solutions? (Without your notes!) Zeros Roots

Quadratic Schedule

M	T	W	T	F
	Factoring	• Quadratic Formula • Taking Sq. Rts	• Graphing Quad Functions	• Calculators • Review
• Quiz! • Completing the square	• Vertex Form	• Vertex Form • Transformations	• Core Assesment • Review	TEST!

Objective

Today we will:

- Determine how many and what type of solutions a quadratic equation has.
- Solve by applying the Quadratic Formula
- Solve by taking square roots

Agenda

- Notes/Guided Practice
- Wrap-Up
- Lesson Check
- Intro to Graphing

Solutions

- Also Called "Roots" or "Zeros"

- Can be found by:
  - Factoring
  - Taking square roots
  - Quadratic Formula
  - Completing the square
  - Graphing

What is the Discriminant and what does it tell us?

How does this relate to graphs?

How does the number of solutions relate to the degree of the function?

Why are solutions sometimes real/imaginary?

When can we solve by taking square roots?

Discriminant

$$D = b^2 - 4ac$$

- Tells us **how many** and **what type** of solutions

If D > 0 Two distinct Real Solutions

If D < 0 Two imaginary Solutions

If D = 0 One double Real Solution

$(x+7)(x+7)=0$

$x=-7 \quad x=-7$

Examples

$b^2 - 4ac$

1) $3r^2 - 7r - 10 = 0$

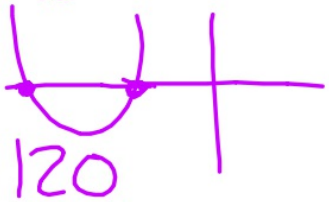
$a=3 \quad b=-7 \quad c=-10$

$D=(-7)^2-4(3)(-10)$

$D=49+120$

$D=169$

2 real



2) $6b^2 + 10b + 7 = 0$

$D=10^2-4(6)(7)$

$D=100-168$

$D=-68$

2 imaginary

3) $5x^2 + 10x + 5 = 0$

$D=10^2-4(5)(5)$

$100-100$

$D=0$

One double Real

You Try

1) $-2b^2 + 8b - 8 = 0$

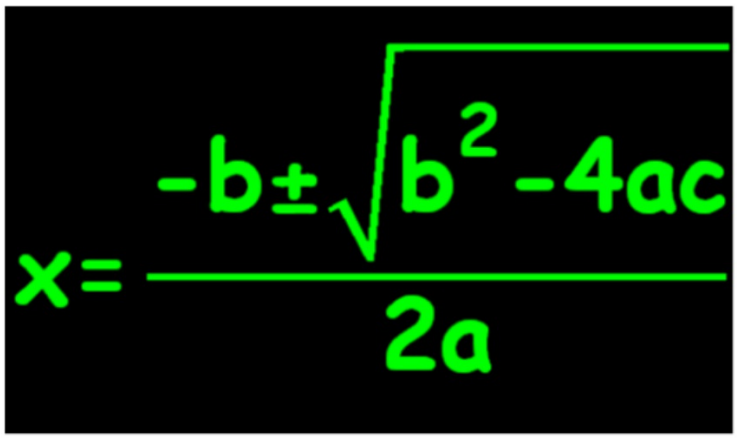
2) $-9x^2 - x - 8 = 0$

3) $-5x^2 = 1 + 6x$

4)

$2(x-3)^2 = 17$

Solving by Quadratic Formula



Ex.1 $5n^2 + 9n - 38 = 0$

$a \quad b \quad c$

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

$$\frac{-9 \pm \sqrt{9^2 - 4(5)(-38)}}{2(5)}$$

$$\frac{-9 \pm \sqrt{81 + 760}}{10}$$

$$\frac{-9 \pm \sqrt{841}}{10}$$

$$\frac{-9 \pm 29}{10}$$

$$\frac{-9+29}{10} = \frac{20}{10} = 2$$

$$\frac{-9-29}{10} = = \frac{-38}{10} = \frac{-19}{5}$$

$$\left\{2, -\frac{19}{5}\right\}$$

Ex.2 $6x^2 = -3x + 108$

$-6x^2 \quad -6x^2$

$0 = -6x^2 - 3x + 108$

$a=-6 \quad b=-3 \quad c=108$

$$\frac{3 \pm \sqrt{(-3)^2 - 4(-6)(108)}}{2(-6)}$$

$$\frac{3 \pm \sqrt{9 + 2592}}{-12}$$

$$\frac{3 \pm \sqrt{2601}}{-12}$$

$$\frac{3 \pm 51}{-12}$$

$$\frac{3+51}{-12} = \frac{54}{-12} = -\frac{27}{6} = \left(-\frac{9}{2}\right)$$

$$\frac{3-51}{-12} = \frac{-48}{-12} = (4)$$

You Try $5k^2 + 12k - 81 = 0$

$a=5 \quad b=12 \quad c=-81$

$$\frac{-12 \pm \sqrt{12^2-4(5)(-81)}}{2(5)}$$

$$\frac{-12 \pm \sqrt{144+1620}}{10}$$

$$\frac{-12 \pm \sqrt{1764}}{10}$$

$$\frac{-12 \pm 42}{10}$$

$$\frac{-12+42}{10} \quad \text{or} \quad \frac{-12-42}{10}$$

$$\frac{30}{10} = 3 \qquad \frac{-54}{10} = -\frac{27}{5}$$

Ex.4 $5n^2 = 13 + 4n$

$0 = -5n^2 + 4n + 13$

$a = -5 \quad b = 4 \quad c = 13$

$$\frac{-4 \pm \sqrt{4^2 - 4(-5)(13)}}{2(-5)}$$

$$\frac{-4 \pm \sqrt{16 + 260}}{-10}$$

$$\frac{-4 \pm \sqrt{276}}{-10}$$

$$\frac{-4 \pm \sqrt{4}\sqrt{69}}{-10} = \frac{-4 \pm 2\sqrt{69}}{-10}$$

$$\frac{2 \pm \sqrt{69}}{5} \qquad \frac{-2 \pm \sqrt{69}}{-5}$$

$$\left\{\frac{2+\sqrt{69}}{5}, \frac{2-\sqrt{69}}{5}\right\}$$

You Try $4x^2 - 5 = -4x$

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

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

$$x = \frac{-4 \pm \sqrt{16 + 80}}{8}$$

$$x = \frac{-4 \pm \sqrt{96}}{8}$$

$$x = \frac{-4 \pm \sqrt{16}\sqrt{6}}{8}$$

$$x = \frac{-4 \pm 4\sqrt{6}}{8} = \boxed{\frac{-1 \pm \sqrt{6}}{2}}$$

Ex. 6 $7x^2 + 8 = -4x$

$7x^2+4x+8=0$

$$\frac{-4 \pm \sqrt{4^2-4(7)(8)}}{2(7)}$$

$$\frac{-4 \pm \sqrt{16-224}}{14}$$

$$\frac{-4 \pm \sqrt{-208}}{14}$$

$$\frac{-4 \pm \sqrt{-1}\sqrt{208}}{14}$$

$$\frac{-4 \pm \sqrt{-1}\sqrt{16}\sqrt{13}}{14}$$

$$\frac{-4 \pm 4i\sqrt{13}}{14}$$

$$\boxed{\frac{-2 \pm 2i\sqrt{13}}{7}}$$

You Try $10v^2 = -1 - 2v$

HW #1-7
10

Solving by Taking Square Roots

- Only works if:
  1) There is no b term
  2) It is in vertex form

- Add ± when taking square root of each side!

1. $9n^2 - 2 = 23$

2. $(x+9)^2 + 4 = 68$

You Try

1) $p^2 + 7 = 79$

2) $(x - 13)^2 = 20$

Wrap-Up

What is the Discriminant and what does it tell us?

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Graphing Quadratics