

Your Name

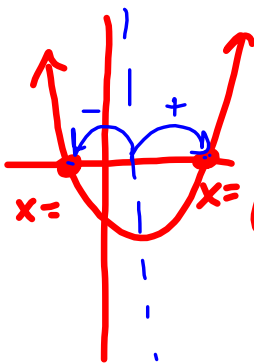
Mrs. Theo

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Notes

## Quadratic Formula

Quadratic  
Formula



When you can't factor or it would take a long time to find the factors, you can ALWAYS find the x-intercept solutions using

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

*two Answers*

$$x = \quad \text{and} \quad x =$$

*(x,0) and (x,0)*

The  $\pm \sqrt{(b^2 - 4ac)}/2a$  is how much to the left and right of the Axis of Symmetry you go to reach the x-intercept points! *Why?*

Quad  
Formula

Real  
Roots

ex.  $3x^2 - 7x - 8 = 0$

$a=3$   
 $b=-7$   
 $c=-8$

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

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(3)(-8)}}{2(3)}$$

$-7^2$  and  $(-7)^2$   
 $-49$  and  $49$

$$x = \frac{7 \pm \sqrt{49 + 96}}{6}$$

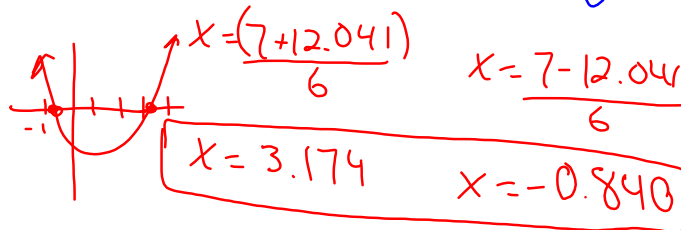
$$x = \frac{7 \pm \sqrt{145}}{6}$$

Discriminant is NOT a perfect square.

2 Irrational Solutions

Split into two answers

$$x = \frac{7 + \sqrt{145}}{6} \text{ and } x = \frac{7 - \sqrt{145}}{6}$$



Quad Formula  
Imaginary  
Complex Roots

ex.  $2x^2 + 1 = 2x$

① Equation must equal 0 to solve. Move everything to one side

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

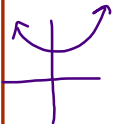
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

② determine a, b, c

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

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

Discriminant is negative. Imaginary Solutions



does not cross x axis

$$x = \frac{2 \pm \sqrt{-4}}{4}$$

No Solution

ex.  $-2k^2 + 7k = -9$

$$\frac{+9 \quad +9}{-2k^2 + 7k + 9 = 0}$$

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

$$b = 7$$

$$c = 9 \quad k = \frac{-(-7) \pm \sqrt{(7)^2 - 4(-2)(9)}}{2(-2)}$$

$$k = \frac{-7 \pm \sqrt{49 + 72}}{-4}$$

$$k = \frac{-7 \pm \sqrt{121}}{-4}$$

Discriminant  
is positive  
2 Rational Roots

$$k = \frac{-7 + 11}{-4} \quad \text{and} \quad k = \frac{-7 - 11}{-4}$$

$$k = -1 \quad k = 4.5$$

Homework: Use the quadratic formula to solve (if possible). Check the discriminant to verify solution type.

1.  $x^2 - 49 = 0$

2.  $x^2 - 5x - 36 = 0$

$$a = 1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$b = -5 \quad x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-36)}}{2(1)}$$
$$c = -36$$
$$x = \frac{5 \pm \sqrt{25 + 144}}{2} \quad \left. \begin{array}{l} x = \frac{5 + 13}{2} \\ x = \frac{5 - 13}{2} \end{array} \right\}$$
$$x = \frac{5 \pm \sqrt{169}}{2} \quad \left. \begin{array}{l} x = 9 \\ x = -4 \end{array} \right\}$$

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

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

5.  $2x^2 + 5x - 7 = 0$

6.  $n^2 - n - 20 = 0$

7.  $3t^2 + 2t - 3 = 0$

8.  $1.5p^2 - 9p + 22 = 0$

Homework: Use the quadratic formula to solve.

1.  $x^2 - 49 = 0$       1. 2 Rational Solutions:  $x = 7$  and  $x = -7$
2.  $x^2 - 5x - 36 = 0$       2. 2 Rational Solutions:  $x = -4$  and  $x = 9$
3.  $x^2 - 7x = -3$       3. 2 Irrational Sol:  $x = (7 \pm \sqrt{37})/2$   
 $x = 6.541$  and  $x = 0.459$
4.  $2x^2 + 5x + 4 = 0$       4. 2 Imaginary Solutions:  $x = (-5 \pm \sqrt{-7})/4$   
 No real solution
5.  $2x^2 + 5x - 7 = 0$       5. 2 Rational Solutions:  $x = -3.5$  and  $x = 1$
6.  $n^2 - n - 20 = 0$       6. 2 Rational Solutions:  $n = 5$  and  $n = -4$
7.  $3t^2 + 2t - 3 = 0$       7. 2 Irrational Solutions:  $t = (-1 \pm \sqrt{10})/3$   
 $t = 0.721$  and  $t = -1.387$
8.  $1.5p^2 - 9p - 22 = 0$       8. 2 Irrational Solutions:  $p = (9 \pm 2\sqrt{33})/3$   
 $p = 6.830$  and  $p = -0.830$