Today's Plan:

Learning Target (standard): I will solve quadratic equations by factoring, square root property, completing the square and the quadratic formula.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Solve by Factoring:

$$y^2 - 6y + 9 = 0$$

$$(y-3)(y-3)=0$$

$$(y-3)^2=0$$

$$y=3$$

Solve by Factoring:

$$v^2 + 10 = 7v$$

$v^2 - 7v + 10 = 0$

$(v-5)(v-2) = 0$

$v-5=0$ $v-2=0$

$v=5$ $v=2$

$v = 2, 5$

Solve by Factoring:

$$2x^2 - 9x - 18 = 0$$

$(2x+3)(x-6) = 0$

$x = -\frac{3}{2}, 6$

Solve by Factoring:

$3y^2 - 4y - 4 = 0$

$(3y+2)(y-2)=0$

$y = -\frac{2}{3}, 2$

Solve by Factoring:

$4z^2 - 9z = -2$

$4z^2 - 9z + 2 = 0$

$(4z-1)(z-2)=0$

$z = \frac{1}{4}, 2$

Solve by Factoring:

$$2s^2 - 9s = -9$$

$2s^2 - 9s + 9 = 0$

$(2s - 3)(s - 3) = 0$

$s = \frac{3}{2}, 3$

Quadratic Equations:

- A quadratic equation is an equation of the form $ax^2 + bx + c = 0$, where a, b, and c are constants and $a \neq 0$
- A quadratic equation is in standard form when the polynomial is in descending order and equal to 0.
- Since the degree of the polynomial is 2, a quadratic equation is also called a second-degree equation.
- The first term is known as the quadratic term.
- The second term is known as the linear term.

Methods for Solving Quadratic Equations:

- Factoring
- Square Root Property
- Completing the Square
- Quadratic Formula

Factoring:

- the quadratic equation must be set equal to 0
- the equation must be factorable
- keep the quadratic term positive

$ax^2+bx+c=0$

$$u^2-2u+4=(2u-3)(u+2)$$

$u^2-2u+4=2u^2+4u-3u-6$

$u^2-2u+4=2u^2+u-6$

$0=u^2+3u-10$

$0=(u+5)(u-2)$

$u=-5,2$

Write a quadratic equation that has integer coefficients and has as solutions the given pair of numbers.

-2 and 5

$x = -2, 5$

$(x+2)(x-5) = 0$

$x^2 - 3x - 10 = 0$

Write a quadratic equation that has integer coefficients and has as solutions the given pair of numbers.

$-\frac{5}{6}$ and $\frac{2}{3}$

$x = -\frac{5}{6}, \frac{2}{3}$

$(6x+5)(3x-2) = 0$

$18x^2 + 3x - 10 = 0$

$x = -\frac{5}{6}$

$6x = -5$

$6x + 5 = 0$

$x = \frac{2}{3}$

$3x = 2$

$3x - 2 = 0$

Square Root Property:

- quadratic equation must be in the form of a "square" equals a constant
- solve by taking the square root of both sides
- when you "physically" take a square root, you will have two possible solutions - a positive and a negative one

$$r^2 - 75 = 0$$

Solve by taking square roots:

$$\frac{3(x-4)^2}{3} = \frac{-12}{3}$$

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

a+bi

$x-4 = 2i, -2i$

$x = 4+2i, 4-2i$

Completing the Square:

- quadratic equation must be in the form $ax^2 + bx = c$
- if the leading coefficient is not 1, you must make it 1 $x^2 + \frac{b}{a}x = \frac{c}{a}$
- Take half of the linear term, square it, and add it to both sides

$$x^2 + \frac{b}{a}x + \left(\frac{b}{2a}\right)^2 = \frac{c}{a} + \left(\frac{b}{2a}\right)^2$$

- factor the perfect square trinomial
- solve using the square root property

Solve by completing the square.

$$x^2 + 13 = 2x$$

$\frac{2}{2} = 1^2 = 1$

$x^2 - 2x + 1 = -13 + 1$

$(x-1)^2 = \pm\sqrt{-12}$ -4 -3

$x - 1 = 2\sqrt{3}i, -2\sqrt{3}i$

$x = 1 + 2\sqrt{3}i, 1 - 2\sqrt{3}i$

Quadratic Formula:

$$ax^2 + bx + c = 0$$

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

Solve using the quadratic formula.

$2x^2 + 6x + 5 = 0$

$$x = \frac{-6 \pm \sqrt{6^2 - 4ac}}{2a}$$

$$= \frac{-6 \pm \sqrt{36 - 4(2)(5)}}{2(2)}$$

$$= \frac{-6 \pm \sqrt{36 - 40}}{4}$$

$a+bi$

$$= \frac{-6 \pm \sqrt{-4}}{4}$$

$$= \frac{-6 \pm 2i}{4} \quad = -\frac{6}{4} \pm \frac{2}{4}i$$

$$x = -\frac{3}{2} + \frac{1}{2}i, \; -\frac{3}{2} - \frac{1}{2}i$$

Assignment:

Solving Quadratics

#1-12