

Name:

Date:

Topic/Objective: Solve Quadratics by

Class/Period:

factoring

Questions/Main Ideas:

Notes:

How do you solve polynomial equations in factored form?

Vocabulary:

- Quadratic Function
- Parabola
- Roots

A quadratic function is a nonlinear function

Zero Product Property

Let a and b be real numbers

If  $ab=0$ , then  $a=0$  or  $b=0$

The zero product property is used to solve an equation when one side is equal to zero. The other side has factors.

$$(x - 4)(x + 2) = 0$$

The solution to the equation is called

Solve the equation:  $(x - 4)(x + 2) = 0$

$$\begin{array}{r} x - 4 = 0 \\ +4 \quad +4 \\ \hline x = 4 \end{array}$$

$$\begin{array}{r} x + 2 = 0 \\ -2 \quad -2 \\ \hline x = -2 \end{array}$$

4, -2

Solve the equation:  $(x - 5)(x - 1) = 0$

$$\begin{array}{r} x - 5 = 0 \\ +5 \quad +5 \\ \hline x = 5 \end{array}$$

$$\begin{array}{r} x - 1 = 0 \\ +1 \quad +1 \\ \hline x = 1 \end{array}$$

(5, 1)

Steps to solving a quadratic by factoring:

Step 1: Make sure it equals zero

Step 2: FACTOR!!

Step 3: Split the factor groups so that each parenthesis is equal to zero.

Solve by factoring:  $12x^2 + 42x$

Step 1: Make sure it equals 0. If it does not equal zero set it equal to zero.  $12x^2 + 42x = 0$

Step 2: factor

$12$        $42$   
     $\wedge$        $\wedge$   
     $6$   $2$        $7$   $6$   
     $\wedge$        $\wedge$   
     $3$   $2$        $3$   $2$

$$12x^2 = 2 \cdot 2 \cdot 3 \cdot x \cdot x$$

$$42x = 2 \cdot 3 \cdot 7 \cdot x$$

$$6x(2x + 7) = 0$$

Step 3: Split the factor groups so each parenthesis is equal to zero.

$$6x = 0$$

$$2x + 7 = 0$$

Step 4: solve:

$$\frac{6x}{6} = \frac{0}{6}$$

$$\boxed{x = 0}$$

$$2x + 7 = 0$$

$$\frac{-7 - 7}{2} = \frac{-7}{2}$$

$$\boxed{x = -\frac{7}{2}}$$

Solve:  $2x^2 + 8x = 0$

$$\begin{array}{r} \hat{2} \hat{1} \quad \hat{4} \hat{2} \\ \underline{2 \quad 2} \end{array}$$

$$2x^2 = \hat{2} \cdot \hat{1} \cdot \hat{x} \cdot \hat{x}$$

$$8x = \hat{2} \cdot \hat{2} \cdot \hat{2} \cdot \hat{x}$$

$$2x(x+4) = 0$$

$$\frac{2x}{2} = \frac{0}{2}$$

$$\boxed{x = 0}$$

$$x+4 = 0$$

$$\underline{-4 \quad -4}$$

$$\boxed{x = -4}$$

Solve:

$$6n^2 = 15n$$

$$\underline{-15n \quad -15n}$$

$$6n^2 - 15n = 0$$

$$\begin{array}{r} \hat{3} \hat{2} \quad \hat{3} \hat{5} \\ \underline{3 \quad 3} \end{array}$$

$$6n^2 = \hat{3} \hat{2} \cdot \hat{n} \cdot \hat{n}$$

$$-15n = \hat{3} \cdot \hat{5} \cdot \hat{-1} \cdot \hat{n}$$

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

$$\frac{3n}{3} = \frac{0}{3}$$

$$\boxed{n = 0}$$

$$2n-5 = 0$$

$$\underline{+5 \quad +5}$$

$$\frac{2n}{2} = \frac{5}{2} \quad \boxed{n = 5/2}$$

Solve by factoring:

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

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

$$\begin{array}{r} -5 \quad x \\ \underline{-1 \quad x} \\ 4 \quad 5 \end{array}$$

$$\begin{array}{r} -5 \\ -1 \overline{) 5} \end{array}$$

$$(x-1)(x+5) = 0$$

$$x-1 = 0$$

$$\underline{+1 \quad +1}$$

$$\boxed{x = 1}$$

$$x+5 = 0$$

$$\underline{-5 \quad -5}$$

$$\boxed{x = -5}$$

Solve by factoring:

$$-x^2 - 7x + 8$$

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

$$\star -1 = 0$$

$$-(x^2 + 7x - 8) = 0$$

$$-(x-1)(x+8) = 0$$

$$\begin{array}{r}
 -8 \\
 \frac{x}{-1} \quad \frac{x}{8} \\
 \times \\
 \hline
 7
 \end{array}$$

$$\begin{array}{r}
 -8 \\
 -1 \overline{) 8} \\
 \hline
 \phantom{0}
 \end{array}$$

$$x-1=0 \quad x+8=0$$

$$\boxed{x=1}$$

$$\boxed{x=-8}$$

Your favorite one...

Solve by Factoring:

$$27x^2 - 72x + 48$$

$$27x^2 = (3 \cdot 3 \cdot 3 \cdot x \cdot x)$$

$$-72x = (3 \cdot 3 \cdot 2 \cdot 2 \cdot 2 \cdot -1 \cdot x)$$

$$48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot (3)$$

$$3(9x^2 - 24x + 16)$$

$$\begin{array}{r}
 144 \\
 3 \frac{9x}{-124} \quad \frac{9x}{-124} \\
 \times \\
 \hline
 -24
 \end{array}$$

$$\begin{array}{r}
 144 \\
 -12 \overline{) -12} \\
 \hline
 \phantom{0}
 \end{array}$$

$$3(3x-4)(3x-4) = 0$$

OR

$$3(3x-4)^2 = 0$$

$$3 \neq 0$$

$$3x-4 = 0$$

$$+4 \quad +4$$

$$\frac{3x}{3} = \frac{4}{3}$$

$$\boxed{x = \frac{4}{3}}$$