SOLVE A QUADRATIC EQUATION BY FACTORING

Solve linear equation

$$3x + 48 = 0$$
$$\underline{\quad -48 \quad -48}$$
$$3x \quad\quad = -48$$
$$x \quad\quad = -16$$

How do you solve $3x^2 + 5x + 2 = 0$?

This is called a quadratic equation.

A quadratic equation is a polynomial equation that contains the power 2 of a variable as the highest power in the equation. The standard form of a quadratic equation is $a^2 + bx + c = 0$, where a, b, c are real numbers and $a \neq 0$.

i.e. $x^2 + 5x + 6 = 0$ is in standard form.

Principle of Zero Products (ZPP)

If $a \cdot b = 0$ then $a = 0$ or $b = 0$.

If the product of two factors is zero then at least one of the factors must be zero. The Zero Product Principle is used to solve a quadratic equation.

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

Step 1.   Factor the quadratic expression that equals 0.

Step 2.   Set each factor equal to 0.

Step 3.   Solve the resulting equations to find each solution.

Step 4.   Check each solution.

$x^2 + 5x + 6 = 0$ The equation is in standard form

$(x + 3)(x + 2) = 0$ Factor

$x + 3 = 0$ or $x + 2 = 0$ Set each factor equal to 0
$\underline{\quad -3 \quad -3 \quad\mid\quad -2 \quad -2}$
$x \quad = -3 \mid x \quad = -2$ Solve each equation

$\boxed{x = -3} \quad \boxed{x = -2}$

1. Solve $(y - 3)(y - 5) = 0$

$y - 3 = 0$ or $y - 5 = 0$ Set each factor equal to 0
$+3+5+5+5$

$\boxed{y = 3}$ or $\boxed{y = 5}$ Solve each equation

2. Solve $7x^2 - 3x = 0$ The equation is in standard form

$x(7x - 3) = 0$ Factor

$x = 0$ or $7x - 3 = 0$ Set each factor equal to zero
$+3+3$

$\boxed{x = 0}$ or $\boxed{x = \dfrac{3}{7}}$ Solve

3. Solve $x^2 = 12 - x$ The equation is not in standard form

$x^2 - 12 + x = 0$

$x^2 + x - 12 = 0$ Factor

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

$x - 3 = 0$ or $x + 4 = 0$ Set each factor equal to 0
$+3+3-4-4$

$\boxed{x = 3}$ ⋮ $\boxed{x = -4}$ Solve each equation for x

Check!   If $x = 3$ If $x = -4$
$\overset{?}{}$
$3^2 \overset{?}{=} 12 - 3$ $(-4)^2 \overset{?}{=} 12 - (-4)$
$9 = 9$ ✓ $16 = 16$ ✓

4. Solve $(x + 3)(x - 2) = 50$

$x^2 - 2x + 3x - 6 = 50$ Remove the parenthesis

$x^2 + x - 56 = 0$ Write in standard form

$(x + 8)(x - 7) = 0$ Factor

$x + 8 = 0$ or $x - 7 = 0$ Set each factor equal to 0
$-8-8+7+7$

$\boxed{x = -8}$ or $\boxed{x = 7}$ Solve each equation for x