Solving Equations

Solving by Factoring:

Solve $x^2 + 2x + 25 = 11x + 5$

$$x^2 + 2x + 25 = 11x + 5$$
$$-11x \quad -5 \quad -11x \quad -5$$
$$x^2 - 9x + 20 = 0$$

First, set the equation equal to 0 (move everything to one side).

$$(x - 5)(x - 4) = 0$$

Next, factor the quadratic.

$$x - 5 = 0 \quad \text{or} \quad x - 4 = 0$$
$$+5 \quad +5 \qquad +4 \quad +4$$
$$x = 5 \quad \text{or} \quad x = 4$$

Use the Zero Product Property to split into two equations and solve each one separately.

1. $n^2 - 6n - 7 = 0$

2. $r^2 - 9r + 8 = 0$

3. $p^2 = 5p - 6$

4. $4r^2 - 10r - 4 = -7r + 3r^2$

5. $v^2 - 4v - 23 = -7v + 5$

Solve using Quadratic Formula:

$x^2 + 6x + 8 = 0 \rightarrow ax^2 + bx + c = 0$

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

$a = 1$
$b = 6$
$c = 8$

Let us find X value by replacing the coeifficient value:

$$x = \frac{-6 \pm \sqrt{6^2 - 4*1*8}}{2*1} = \frac{-6 \pm \sqrt{36 - 32}}{2}$$

$$= \frac{-6 \pm \sqrt{4}}{2}$$

$$= \frac{-6 \pm 2}{2}$$

There are 2 solutions:

$$x_1 = \frac{-6 + 2}{2} \quad \text{or} \quad x_2 = \frac{-6 - 2}{2}$$

$x_1 = -2$ or $x_2 = -4$

6. $x^2 - 4x - 5 = 0$

7. $x^2 - 6x + 7 = 0$

8. $8w^2 - 8w + 2 = 0$

9. $3w^2 - 12w = -12$

10. $r^2 - 4r + 8 = 5r$

Simplifying Radicals

To simplify a radical, we need to find the greatest perfect square factor of the number under the radical sign (the radicand) and then take the square root of that number.

Ex. 1 : $\sqrt{72}$

$\sqrt{36} \cdot \sqrt{2}$

$6\sqrt{2}$

Ex. 2 : $4\sqrt{90}$

$4 \cdot \sqrt{9} \cdot \sqrt{10}$

$4 \cdot 3 \cdot \sqrt{10}$

$12\sqrt{10}$

Ex. 3 : $\sqrt{48}$

$\sqrt{16}\sqrt{3}$

$4\sqrt{3}$

OR

Ex. 3 : $\sqrt{48}$

$\sqrt{4}\sqrt{12}$

$2\sqrt{12}$ ← This is not simplified completely because 12 is divisible by 4 (another perfect square)

$2\sqrt{4}\sqrt{3}$

$2 \cdot 2 \cdot \sqrt{3}$

$4\sqrt{3}$

Simplify without using a calculator:

1) $\sqrt{160}$

2) $\sqrt{70}$

3) $\sqrt{50}$

4) $\sqrt{24}$

5) $\sqrt{150}$

6) $\sqrt{256}$

7) $\sqrt{32}$

8) $\sqrt{210}$

9) $\sqrt{490}$

10) $\sqrt{729}$

Factoring Polynomials

Factoring Strategies

1) Look for Greatest Common Factor (GCF)

2) # of terms in remaining polynomial

- 4 Terms → factor by grouping
- 3 Terms → factor into product of 2 binomials
- 2 Terms → difference of squares or sum/difference of cubes

1. $x^2 - 9x + 20$

2. $9x^2 + 9x$

3. $x^2 + 16x + 64$

4. $x^2 - 2x - 15$

5. $x^2 - 81$

6. $6x^2 - 11x + 4$

7. $5x^2 + 10x$

8. $10x^2 + 19x + 6$

9. $6x^2 - 15x$

10. $x^2 + 8x + 16$