Solving Equations by Factoring

You will learn how to solve equations using factoring and zero product property.
If a polynomial equation can be written in the form *ab* = 0, then the zero property can be applied to solve the equation.

Example 1: Solve each of the following equations.

1) $x^3 - 9x = 0$
2) $x^3 + 12x = 7x^2$
3) $(x+2)(x+3) = 2$

Solution

1) $x^3 - 9x = 0$

$\Rightarrow x(x^2 - 9) = 0$ Factor completely.

$\Rightarrow x(x-3)(x+3) = 0$ Use zero product property.

$x = 0,\ x = 3$ *or* $x = -3$

2) $x^3 + 12x = 7x^2$

$\Rightarrow x^3 - 7x^2 + 12x = 0$ Write a zero equation.

$\Rightarrow x(x^2 - 7x + 12) = 0$ Factor completely.

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

$\Rightarrow x = 0, x = 3$ or $x = 4$ Use zero product property.

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

$\Rightarrow (x+2)(x+3) - 2 = 0$ Write a zero equation.

$\Rightarrow x^2 + 5x + 6 - 2 = 0$ Expand $(x+2)(x+3)$.

$\Rightarrow x^2 + 5x + 4 = 0$ Simplify.

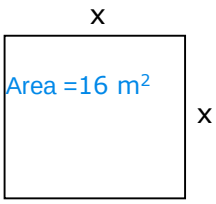
$\Rightarrow (x+1)(x+4) = 0$ Factor completely.

$\Rightarrow x = -1$ or $x = -4$ Solve.

Example 2: A square has an area of 16 m^2. Find the length of each side.

EXPLORE

Let x = the length of each side



PLAN $x^2 = 16$ The formula for the area of a square is $A = s^2$.

SOLVE $x^2 - 16 = 0$

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

$x = 4$ or $x = -4$

EXAMINE –4 m is not a reasonable length for each side of a square.
Therefore, the only possible length for each side is 4 meters.