6.5 Zero-Product Property and Its Applications

ZERO-PRODUCT PROPERTY: If $\boldsymbol{ab = 0}$ then $\boldsymbol{a = 0}$ or $\boldsymbol{b = 0}$.

Proof:

1. If $a = 0$, then the conclusion is true.
2. If $a \neq 0$, then we have $ab = 0$

$$\frac{1}{a}ab = \frac{1}{a} \cdot 0$$

therefore $b = 0$ and the conclusion is true as well. □

Example 1: Solve the equation.

a) $x^2 - 3x - 40 = 0$

The solution set = { }

b) $3x^2 + 2x = 0$

The solution set = { }

c) $y(12y - 5) = 28$

d) $3x^2 = 27$

e) $3x^4 + 15x^3 - 12x^2 - 60x = 0$

f) $(2x - 3)^2 + 18 = -9(2x - 3)$

Factoring is a common strategy when **solving formulas for a variable**.

Example 2: Solve the formula for a specified variable.

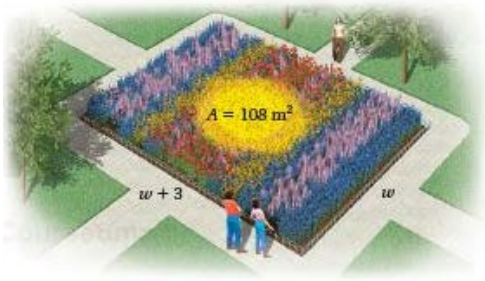
a) $A = 2l\boldsymbol{w} + 2lh + 2\boldsymbol{w}h$, solve for $\boldsymbol{w}$

b) $P = \frac{\boldsymbol{t}+1}{\boldsymbol{t}}$, solve for *t*

c) $X = \frac{nr+\boldsymbol{E}}{n\boldsymbol{E}}$, solve for *E*

Example 3: Find two consecutive integers such that the difference of their squares is 15.

Example 4: A rectangular flower bed is to be 3 m longer than it is wide. The flower bed will have an area of 108 m^2. What will its dimensions be?



Example 5: A picture frame measures 12 cm by 20 cm, and 84 cm^2 of picture shows. Find the width of the frame.