Objective: Solve a quadratic equation by factoring.

Concept

Complete the table with values for v and w that will make each equation true.

$v \cdot w = 100$

v	w
2	50
1	100
4	25
5	20
10	10

$v \cdot w = 0$

v	w
0	5
2	0
7	0
0	−5
0	0

How are the solutions to $v \cdot w = 100$ different from the solutions to $v \cdot w = 0$?

The solutions to $v \cdot w = 100$ are all different numbers, whereas the solutions to $v \cdot w = 0$ all have a factor of 0.

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Concept

Zero Product Property

If the product of two factors is zero, then at least one of the factors must be equal to zero.

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

Examples

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

This is an example because you have a product equal to zero. Using the ZPP, either $x + 3 = 0$ *or* $x - 2 = 0$.

$x(x + 10) = 0$

This is an example because you have a product equal to zero. Using the ZPP, either $x = 0$ *or* $x + 10 = 0$.

Not Examples

$(x + 3)(x - 2) = 7$

This is NOT an example because you have a product equal to 7.

$x + 10 = 0$

This is NOT an example because you do not have a product.

Objective: Solve a quadratic equation by factoring.

Explain when you can use the Zero Product Property to solve an equation.

The Zero Product Property can be used if a product of factors equals 0.

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Concept

Steps to Solve a Quadratic Equation by Factoring

1. Write the equation is standard form, $ax^2 + bx + c = 0$.

2. Factor the polynomial completely, including any greatest common factor.

3. Use the Zero Product Property.

4. Solve for the values of the variable, x.

5. State the solution.

Objective: Solve a quadratic equation by factoring.

Ex) Solve the equation by factoring.

$$3x^2 = 15x$$

(1) $-15x \quad -15x$

$$3x^2 - 15x = 0$$

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

(3) $3x = 0$ or $x - 5 = 0$

(4) $\frac{3x}{3} = \frac{0}{3}$ $\quad +5 \quad +5$

$x = 0$ $\quad x = 5$

(5) solutions: $x = 0, 5$

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Ex) Solve the equation by factoring.

$$5x^2 + 6 = -17x$$

(1) $+17x \quad +17x$

$$5x^2 + 17x + 6 = 0$$

$5x \cdot x$; $2 \cdot 3$, $1 \cdot 6$

(2) $(5x + 2)(x + 3) = 0$

check: $5x^2 + 15x + 6$, $+2x$, $+17x$

(3) $5x + 2 = 0$ or $x + 3 = 0$

(4) $-2 \quad -2$; $-3 \quad -3$

$\frac{5x}{5} = \frac{-2}{5}$; $x = -3$

$x = -\frac{2}{5}$

(5) solutions: $x = -3, -\frac{2}{5}$

Objective: Solve a quadratic equation by factoring.

Ex) Solve the equation by factoring.

① $9x^2 - 1 = 0$

$3x \cdot 3x \quad -1 \cdot 1$

②

$(3x - 1)(3x + 1) = 0$

check.

$9x^2 + 3x - 1$

$-3x$

0

③ $3x - 1 = 0$ or $3x + 1 = 0$

④ $+1 \quad +1$ $\quad -1 \quad -1$

$\frac{3x}{3} = \frac{1}{3}$ $\quad \frac{3x}{3} = \frac{-1}{3}$

$x = \frac{1}{3}$ $\quad x = -\frac{1}{3}$

⑤ solutions: $x = -\frac{1}{3}, \frac{1}{3}$