



WORKBOOK

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Subject: Mathematics

Student:

School year:/.....

Topic: Quadratic Equations

Quadratic Equations - Solving by Factoring

❖ Solve $(x - 3)(x - 4) = 0$

Okay, this one is already factored for me. But how do I solve this?

Think: If I multiply two things together and the result is zero, what can I say about those two things? I can say that at least one of them must also be zero.

So $x - 3 = 0$ or $x - 4 = 0$
 $x = 3$ or $x = 4$

And this is the solution they're looking for: $P = \{ 3, 4 \}$



❖ Solve $x^2 + 5x + 6 = 0$

the first thing I have to do is factor: $x^2 + 5x + 6 = (x + 2)(x + 3)$
 Set this equal to zero: $(x + 2)(x + 3) = 0$
 Solve each factor: $x + 2 = 0$ or $x + 3 = 0$
 $x = -2$ or $x = -3$

The solution to $x^2 + 5x + 6 = 0$ is $x = -3, -2$ or $P = \{-3, -2\}$

❖ Solve $x^2 - 3 = 2x$

The first thing I need to do is get all the terms over on one side, with zero on the other side.

$$\begin{aligned} x^2 - 3 &= 2x \\ x^2 - 2x - 3 &= 0 \\ (x - 3)(x + 1) &= 0 \\ x - 3 = 0 \text{ or } x + 1 &= 0 \\ x = 3 \text{ or } x &= -1 \end{aligned}$$

Then the solution to $x^2 - 3 = 2x$ is $x = -1, 3$ $P = \{-1, 3\}$

❖ Solve $x(x + 5) = 0$

❖ Solve $x^2 - 4 = 0$

Quadratic Equations Solving by Taking Square Roots

❖ Solve $x^2 - 4 = 0$

$$\begin{aligned} x^2 - 4 &= 0 \\ x^2 &= 4 \\ \sqrt{x^2} &= \pm\sqrt{4} \\ x &= \pm 2 \end{aligned}$$

Then the solution is $x = \pm 2$

❖ Solve $x^2 - 50 = 0$

$$\begin{aligned} x^2 - 50 &= 0 \\ x^2 &= 50 \\ \sqrt{x^2} &= \pm\sqrt{50} \\ x &= \pm\sqrt{50} \\ &= \pm\sqrt{2 \cdot 25} \\ &= \pm 5\sqrt{2} \end{aligned}$$

Then the solution is $x = \pm 5\sqrt{2}$

❖ Solve $(x - 5)^2 - 100 = 0$

$$\begin{aligned} (x - 5)^2 - 100 &= 0 \\ (x - 5)^2 &= 100 \\ \sqrt{(x - 5)^2} &= \pm\sqrt{100} \\ x - 5 &= \pm 10 \\ x &= 5 \pm 10 \\ x &= 5 - 10 \text{ or } x = 5 + 10 \\ x &= -5 \text{ or } x = 15 \end{aligned}$$

The solution is $x = -5, 15$

❖ Solve $(x - 2)^2 - 12 = 0$

$$\begin{aligned} (x - 2)^2 - 12 &= 0 \\ (x - 2)^2 &= 12 \\ \sqrt{(x - 2)^2} &= \pm\sqrt{12} \\ x - 2 &= \pm\sqrt{4 \cdot 3} \\ &= \pm 2\sqrt{3} \\ x &= 2 \pm 2\sqrt{3} \end{aligned}$$

Then the solution is $x = 2 \pm 2\sqrt{3}$

Quadratic Equations Solving with the Quadratic Formula

The Quadratic Formula: For $ax^2 + bx + c = 0$, the value of x is given by

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

Use the Quadratic Formula to solve:

- a) $x^2 - 4x - 8 = 0$
- b) $x^2 - x - 2 = 0$
- c) $3x^2 - 2x + 5 = 0$

Use the Quadratic Formula to solve:

- a) $-\frac{1}{2}x^2 + 3x + 2 = 0$
- b) $3x^2 - x + 4 = 0$
- c) $0,15x^2 - 0,03x - 2 = 0$
- d) $104x^2 - 166x + 66 = 0$
- e) $4x^2 - 20x - 2 = 0$
- f) $3x^2 - \pi x + 2 = 0$
- g) $x^2 + x - 2x\sqrt{2} - \sqrt{2} = 0$
- h) $x^2 - 2x\sqrt{3} + \sqrt{5} = 0$
- i) $x^2 + x + x\sqrt{3} + \sqrt{3} = 0$