

TOPIC: QUADRATIC EQUATIONS AND APPLICATIONS

Solving Quadratic Equations by Factoring

◆ A **quadratic equation** is an equation that can be written in the form:

New

$$ax^2 + bx + c = 0$$

(Standard Form)

► To solve a quadratic equation, write in standard form, factor, then set each factor equal to ____ & solve for x .

New

Solving Quadratic Equations by Factoring

$$x^2 + 10x + 21 = 0$$

Factor: $(x + \quad)(x + \quad) = 0$

Set each factor = 0: $\underline{\hspace{2cm}} = 0$ $\underline{\hspace{2cm}} = 0$
(Zero Product Property)

Check answers:

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EXAMPLE

Solve the quadratic equation by factoring.

$$-x^2 = 3x - 4$$

Factors of $a \cdot c =$ _____	Sum of factors

HOW TO: Solve Quad Eqns by Factoring

- 1) Write in **standard form**
- 2) Factor using any method
- 3) Set each factor = 0, solve for x
- 4) Check answers by plugging into orig. eqn

PRACTICE

Use the zero product rule to solve the following equations for x .

(A) $(x - 5)(x + 3) = 0$

(B) $2(x - 4)(x + 6) = 0$

PRACTICE

Solve the following quadratic equations.

(A) $2x^2 - 10x = 0$

(B) $2x^2 = 5x + 3$

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Applications of Quadratic Equations

- ◆ Recall: To solve a quadratic eqn, write in standard form, factor, then set each factor equal to 0 & solve for x .
- ▶ To solve quadratic equation word problems, we apply our problem-solving steps.

EXAMPLE

A rectangular garden has an area of 96 square meters. If the width is 4 meters less than the length, what are the dimensions of the garden?

Recall

Problem Solving Steps

- 1) Understand problem
- 2) Build equation
- 3) Solve equation
- 4) State answer
- 5) Check solution

$$ax^2 + bx + c = 0$$

Standard Form

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Quadratic Applications Example: Motion

EXAMPLE

A ball is tossed upward from the ground. Its height in meters after t seconds is modeled by $y(t)$. When does the ball hit the ground?

$$y(t) = -9t^2 + 27t$$

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Quadratic Applications Example: Area

EXAMPLE

The base of a right triangle is 4 cm longer than its height. If the area of the triangle is 70 cm^2 , what is the base and height of this triangle?

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Quadratic Applications Example: Pythagorean Theorem

EXAMPLE

The legs of a right triangle measure 7 m and 24 m. The hypotenuse is 2 meters longer than a certain measure x . What is the value of x ?

EXAMPLE

Two cyclists leave the same spot at the same time. One cyclist rides north x miles, and the other heads east 10 miles further than the cyclist riding north. If the distance between them is 20 miles more than x , how far did each cyclist ride?

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Quadratic Applications Example: Consecutive Integers

EXAMPLE

The square of a number is 15 more than the product of the number and the next consecutive integer. Find the number.