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Factor Quadratic Equations

A.14

Example

Which are the solutions to the equation below?

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

- A** $x = -7$ or $x = -3$
B $x = -7$ or $x = 3$
C $x = 7$ or $x = -3$
D $x = 7$ or $x = 3$

Thinking It Through

Solve Factor the left-hand side of the equation:

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

$$(x - \square)(x - \square)$$

Both factors will have $-$ because the sum of the last terms must be -10 and their product is $+21$.

Factors of 21 are 3 and 7. Try those first:

$$(x - 3)(x - 7) = x^2 - 10x + 21.$$

Then set each factor equal to 0 and solve:

$$x - 3 = 0 \text{ or } x - 7 = 0$$

$$x = 3 \text{ or } x = 7$$

So the correct answer is *choice D*.

Assemble — **Check It** Check the values of x in the original equation:

$$x = 7$$

$$7^2 - 10(7) + 21 = 49 - 70 + 21 = 0 \quad \checkmark$$

$$x = 3$$

$$3^2 - 10(3) + 21 = 9 - 30 + 21 = 0 \quad \checkmark$$

Review

- A **quadratic equation** has a variable raised to the second power as the highest power on a variable.
- If the product of two quantities is zero, one of those quantities must equal 0. In algebraic terms, if $ab = 0$, then $a = 0$ or $b = 0$.
- To solve a quadratic equation, first factor the equation. Then set each factor equal to 0 and solve for the variable.
- Quadratic equations have 0, 1, or 2 solutions.
- If you have an equation in the form $x^2 = a$, the solution is $x = \pm\sqrt{a}$. For example, if $x^2 = 16$, $x = \pm 4$.

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DIRECTIONS Read and solve each question. Then circle the letter of the best answer.

1 Which is the solution set for $x^2 + x - 12 = 0$?

- A $\{-4, 3\}$
- B $\{-3, 4\}$
- C $\{-6, 2\}$
- D $\{-2, 6\}$

2 What are the solutions to the equation below?

$$\frac{2}{5}x^2 - 10 = 0$$

- F $x = -5$ and $x = 5$
- G $x = -5$ and $x = 2$
- H $x = -2$ and $x = 5$
- J $x = -2$ and $x = 2$



Solve for x^2 . Then take the square root.

3 Which of the following is a solution to the equation

$$x^2 + 6x + 8 = 0?$$

- A -4
- B -3
- C 2
- D 4



Check your answer in the original equation.

4 What are the solutions to the equation below?

$$x^2 + 9x = 10$$

- F $x = -10$ and $x = 1$
- G $x = -5$ and $x = 2$
- H $x = -5$ and $x = 2$
- J $x = -1$ and $x = 10$



First set the right side of the equation equal to 0.

5 Which of the following is a solution to the equation

$$5x^2 = \frac{20}{9}?$$

- A $\frac{2}{3}$
- B $\frac{3}{2}$
- C $\frac{4}{3}$
- D $\frac{20}{3}$

6 Which is the solution set for

$$x^2 - 5 = 4x?$$

- F $\{-5, 1\}$
- G $\{-2, -2\}$
- H $\{-1, 5\}$
- J $\{2, 2\}$