Objective

The student will be able to:

use the zero product property to solve equations

SOL: A.4c

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Zero Product Property

If $a \cdot b = 0$ then

$a=0$,

$b=0$,

or both a and b equal 0.

1. Solve $(x + 3)(x - 5) = 0$

Using the Zero Product Property, you know that either

$\mathbf{x + 3 = 0}$ or $\mathbf{x - 5 = 0}$

Solve each equation.

$x = -3$ or $x = 5$

$\mathbf{\{-3, 5\}}$

2. Solve $(2a + 4)(a + 7) = 0$

$\mathbf{2a + 4 = 0}$ or $\mathbf{a + 7 = 0}$

$2a = -4$ or $a = -7$

$a = -2$ or $a = -7$

$\mathbf{\{-2, -7\}}$

3. Solve $(3t + 5)(t - 3) = 0$

$3t + 5 = 0$ or $t - 3 = 0$

$3t = -5$ or $t = 3$

$t = -5/3$ or $t = 3$

$\{-5/3, 3\}$

Solve $(y - 3)(2y + 6) = 0$

1. $\{-3, 3\}$
2. $\{-3, 6\}$
3. $\{3, 6\}$
4. $\{3, -6\}$

4 steps for solving a quadratic equation

1. Set the equation equal to 0.
2. Factor the equation.
3. Set each part equal to 0 and solve.
4. Check your answer on the calculator.

Set = 0
Factor
Split/Solve
Check

4. Solve $x^2 - 11x = 0$

$GCF = x$

$x(x - 11) = 0$

$x = 0$ or **$x - 11 = 0$**

$x = 0$ or $x = 11$

{0, 11}

Set = 0
Factor
Split/Solve
Check

5. Solve. $-24a + 144 = -a^2$

Put it in descending order.

$a^2 - 24a + 144 = 0$

$(a - 12)^2 = 0$

$a - 12 = 0$

$a = 12$

{12}

Set = 0
Factor
Split/Solve
Check

6. Solve $4m^2 + 25 = 20m$

$$4m^2 - 20m + 25 = 0$$

$$(2m - 5)^2 = 0$$

$$2m - 5 = 0$$

$$2m = 5$$

$$m = \frac{5}{2}$$

$$\left\{\frac{5}{2}\right\} \text{ or } \{2.5\}$$

Set = 0
Factor
Split/Solve
Check

7. Solve $x^3 + 2x^2 = 15x$

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

$$x(x^2 + 2x - 15) = 0$$

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

Set = 0
Factor
Split/Solve
Check

$x = 0$ or $x + 5 = 0$ or $x - 3 = 0$

{0, -5, 3}

Solve $a^2 - 3a = 40$

1. {-8, 5}
2. {-5, 8}
3. {-8, -5}
4. {5, 8}

Solve $4r^3 - 16r = 0$

1. {-16, 4}
2. {-4, 16}
3. {0, 2}
4. {0, 4}
5. ✓ {-2, 0, 2}

The degree will tell you how many answers you have!

Maria told this puzzle to her friends. "The product of four times my age and 45 less than three times my age is zero. How old am I?"

Find Maria's age.

Let m = Maria's age.

$$4m(3m - 45) = 0$$

$$\mathbf{4m = 0} \text{ or } \mathbf{3m - 45 = 0}$$

$$m = 0 \text{ or } 3m = 45$$

$$m = 0 \text{ or } m = 15$$

0 is not reasonable so Maria is **15 years old**!!

Find two consecutive integers whose product is 240.

Let n = 1st integer.

Let $n + 1$ = 2nd integer.

$$n(n + 1) = 240$$

$$n^2 + n = 240$$

Set = 0
Factor
Split/Solve
Check

$$n^2 + n - 240 = 0$$

$$(n - 15)(n + 16) = 0$$

$$(n - 15)(n + 16) = 0$$

$$n - 15 = 0 \text{ or } n + 16 = 0$$

$$n = 15 \text{ or } n = -16$$

The consecutive integers are

15, 16 or **-16, -15.**