Lesson 17: Equations Involving Factored Expressions

Classwork

Exercise 1

1. Solve each equation for x.

   a. $x - 10 = 0$

   b. $\frac{x}{2} + 20 = 0$

   c. Demanding Dwight insists that you give him two solutions to the following equation:

   $$x - 10 \quad \frac{x}{2} + 20 \quad = 0$$

   Can you provide him with two solutions?

   d. Demanding Dwight now wants FIVE solutions to the following equation:

   $$x - 10 \quad 2x + 6 \quad x^2 - 36 \quad x^2 + 10 \quad \frac{x}{2} + 20 \quad = 0$$

   Can you provide him with five solutions?

   Do you think there might be a sixth solution?

Consider the equation $(x-4)(x+3)=0$.

e. Rewrite the equation as a compound statement.

f. Find the two solutions to the equation.

Example 1

Solve $2x^2-10x=0$, for x.

Example 2

Solve $x\ x-3\ +5\ x-3\ =0$, for x.

Exercises 2–7

2. $(x+1)(x+2)=0$

3. $(3x-2)(x+12)=0$

4. $(x-3)(x-3)=0$

5. $(x+4)(x-6)(x-10)=0$

6. $x^2-6x=0$

7. $x(x-5)+4(x-5)=0$

Example 3

Consider the equation $(x-2)(2x-3)=(x-2)(x+5)$. Lulu chooses to multiply through by $\frac{1}{x-2}$ and gets the answer $x=8$. But Poindexter points out that $x=2$ is also an answer, which Lulu missed.

a. What's the problem with Lulu's approach?

b. Use factoring to solve the original equation for x.

Exercises 8–11

8. Use factoring to solve the equation for x: $(x-2)(2x-3)=(x-2)(x+1)$.

9. Solve each of the following for x:

a. $x+2=5$

b. $x^2+2x=5x$

c. $x\ 5x-20\ +2\ 5x-20\ =5(5x-20)$

10.

a. Verify: $a-5 \quad a+5 \quad = a^2 - 25$.

b. Verify: $x-88 \quad x+88 \quad = x^2 - 88^2$.

c. Verify: $A^2 - B^2 = (A-B)(A+B)$.

d. Solve for x: $x^2 - 9 = 5(x-3)$.

e. Solve for w: $w+2 \quad w-5 \quad = w^2 - 4$.

11. A string 60 inches long is to be laid out on a table-top to make a rectangle of perimeter 60 inches. Write the width of the rectangle as $15 + x$ inches. What is an expression for its length? What is an expression for its area? What value for x gives an area of largest possible value? Describe the shape of the rectangle for this special value of x.

Lesson Summary

The zero-product property says that if $ab = 0$, then either $a = 0$ or $b = 0$ or $a = b = 0$.

Problem Set

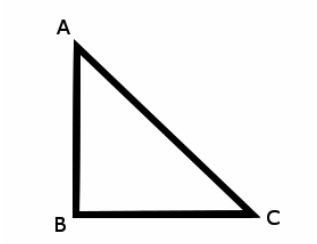
1. Find the solution set of each equation:
   a. $x-1 \quad x-2 \quad x-3 \quad = 0$
   b. $x-16.5 \quad x-109 \quad = 0$
   c. $x \; x+7 \; +5 \; x+7 \; = 0$
   d. $x^2+8x+15=0$
   e. $x-3 \quad x+3 \quad = 8x$

2. Solve $x^2-11x=0$, for x.

3. Solve $p+3 \quad p-5 \quad = 2 \; p+3$, for p. What solution do you lose if you simply divide by $p+3$ to get $p-5=2$?

4. The square of a number plus 3 times the number is equal to 4. What is the number?

5. In the right triangle shown below, the length of side AB is x, the length of side BC is $x+2$, and the length of the hypotenuse AC is $x+4$. Use this information to find the length of each side. (Use the Pythagorean Theorem to get an equation, and solve for x.)



6. Using what you learned in this lesson, create an equation that has 53 and 22 as its only solutions.