Objectives:

- Solve polynomial equations using the Zero-Product Property.
- Solve equations involving polynomial functions.
- Model and solve problems involving polynomials.

SOLVING POLYNOMIAL EQUATIONS USING THE ZERO-PRODUCT PROPERTY

Zero-Product Property:

If the product of two (or more) numbers is zero, then at least one of the numbers is 0.

$$If \;\; ab = 0, \;\; then \;\; a = 0$$

$$or \; b = 0, or \; both \; a \; and \; b \; equal \; 0.$$

This property helps us solve polynomial equations, because when we factor, we make a *product* of factors, and if the product of factors equals 0, then one or more factors must equal 0.

Example 1: Solve by using the Zero Property

$$(x-4)(3x+2)=0$$

STEPS TO SOLVING POLYNOMIAL EQUATIONS BY FACTORING:

Step 1: Write the equation in standard form -- all terms are on one side of the equation, and the equation is equal to zero. $ax^2 + bx + c = 0$

Step 2: Completely factor the polynomial expression on the left side of the equation.

Step 3: Set each factor found in Step 2 equal to zero (apply the zero-product property and split them up.)

Step 4: Solve each new equation for the variable.

Step 5: CHECK your answers by substituting each solution into the *original* equation.

Example 2: Solve by using the Zero Property

$$2x^2 + x = 6$$

Example 3: Solve by using the Zero Property

BE CAUTIOUS! Don't set each factor = 6x!

$$(2x + 5)(x - 3) = 6x$$

Example 4: Solve by using the Zero Property

$$n^3 + 4n^2 - 9n = 36$$

SOLVING EQUATIONS CONTAINING POLYNOMIAL FUNCTIONS:

Example 5: Suppose $f(x) = x^2 - 4x + 6$

A) find the values of such that $f(x) = 11$

Example 5: Suppose $f(x) = x^2 - 4x + 6$

B) What points are on the graph of ***f*** ?

Lesson 5.8: Polynomial Equations

Definition:	A **zero** of a function $f(x)$ is any value of x such that $f(x) = 0$. In addition, if x is a zero of a function, it is **also an x-intercept** of that function (the point on the x-axis where the graph crosses it).

Example 6: Find the zeros of $f(x) = 3x^2 - 8x - 35$

What are the x-intercepts of the graph?

MODELING & SOLVING PROBLEMS INVOLVING POLYNOMIALS:

Example 7: The width of a rectangle is 7 feet less than its length. If the area of the rectangle is 78 square feet, what are the dimensions of the rectangle?

If the width (w) is 7 feet less than the length, we can say that $w = \ell - 7$.

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Homework:

Pg. 432: # 9, 11, 13, 17, 19, 21, 33, 37, 43, 47, 49, 51, 55, 59, 61, 73, 77, 83, 85

AND

Pg. 444: # 117-129 odds