Math 3 **4.3 Solving Polynomials** Unit 4

*SWBAT solve polynomials for their real and imaginary solutions.*

**Example 1:** You are given an expression for the volume of the rectangular prism. Find the expression for the missing value.



**Example 2:** Consider the polynomial $P\left(x\right)= x^{3}+kx^{2}+x+6$. Find the value of k so that x + 1 is a factor of P. Then, find the other two factors of P for the value of k.

Finding Solutions based on a Polynomial’s Degree

|  |  |  |
| --- | --- | --- |
| **Degree** | **# of Roots** | **Possible Combinations** |
| 1 | 1 |  |
| 2 | 2 |  |
| 3 | 3 |  |
| 4 | 4 |  |

Multiplicity:How often a certain root is part of the factoring.

**Example 3:** Expand each of the following, and find the roots. Then, state each factor’s multiplicity.

1. f(x) = (x – 5)3(x + 7)(x – 1)2
2. f(x) = (x – 2)2(x – 4)3

**Example 4:** What are all the roots of the equation x4 + 2x3 = 13x2 – 10x?

**Example 5:** What are all the roots of the equation y = x3 – 5x2 + 16x – 80?

**Example 6:** What are the zeros of f(x) = x4 + x3 – 7x2 – 9x – 18?

**Example 7:** What are the roots of x5 – x4 – 3x3 + 3x2 – 4x + 4 = 0?

**Practice!** Complete the following practice problems on your own.

1. Consider the polynomial P(x) = x3 + x2 – 10x – 10. Is x + 1 one of the factors of P? Explain.
2. The graph shown has x-intercepts at $\sqrt{10}$, -1, and $-\sqrt{10}$. Could this be the graph of

P(x) = x3 + x2 – 10x – 10? Explain how you know.

1. Given that x + 1 and x – 1 are factors of P(x) = x4 + 2x3 – 49x2 – 2x + 48, write P in factored form.