1. The Degree of a Polynomial

2. You should be familiar with exponents and variables in algebraic expressions. In this lesson, we will define a polynomial and the degree of a polynomial.

3. We begin with the real numbers and a variable, usually x. We then create as much as we can, using addition, subtraction and multiplication. What kind of things can we get?

4. We can get real numbers like 4,

   *the variable x.

   *We can multiply real numbers times x to get terms like $4x$.

   *We can add terms together to get expressions like $4x - 3$.

   *We can multiply x by itself, to get powers of x, like x^2.

   *Multiply these by real numbers.

   *Add terms together

   *Other expressions, like the multiplication of binomials will still produce terms that are real numbers multiplied by powers of x.

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5. In general, this is what polynomials look like, the addition and subtraction of terms, each term being a real number times a power of x.

6. Specifically, a term is either the product of a real number and a positive integer power of x, or a real number by itself, called a constant.

   * A polynomial is the sum of terms. In other words, it is a bunch of terms added together. Note that subtraction is also allowed, because the real number part of a term can be a negative number.

   *The leading term is the term of a polynomial with the largest power of x.

7. The degree of a polynomial is the exponent of the leading term. That is, the degree is the larger power on x in the polynomial.

   * For example, this polynomial has degree 5, since the largest exponent is 5.

   *This expression has degree 2. It may be difficult to tell the degree of a polynomial when it is written as a the product of factors. It is best to expand the expression.

8. Here are some further examples. You may wish to pause the video to work out the answers.

   The first expression is a polynomial. When expanded, we find that the outside term involves x^3, so the degree is 3. The second expression involves division, which is not allowed. This is not a polynomial. Negative exponents mean reciprocals. $x^{-2} = \frac{1}{x^2}$. Again, this division means that the expression is not a polynomial. $4/3$ is a polynomial, it is a real number, therefore a constant. Since there are no terms with x, the degree is 0. $x + 3$ is a polynomial. Since $x = x^1$, the degree is 1. The final expression is a polynomial of degree 4.