**5.1 – Modelling Polynomials**

A **variable** is a letter or symbol that is used in algebra to represent an unknown quantity.

Eg.

A **polynomial** is an algebraic expression made up of one \_\_\_\_\_\_\_\_\_\_\_\_ or the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

To be a polynomial, any variables must have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ exponents (i.e. no negatives, decimals, or fractions). Therefore, an expression that contains a term with a variable in the denominator or that contains the root (square root, cube root, etc.) of a variable, is **NOT** a polynomial.

A **term** is a single \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, or numbers and variables \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ together. Terms are separated by addition and subtraction signs. Some polynomials have special names depending on how many terms they have:

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has one term

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has two terms

 A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has three terms

A **coefficient** is a number \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a variable, multiplying it.

A **constant** is a term that does not contain a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so that the value stays constant even if the value of the variable changes.

For the polynomials we will be examining, the **degree of a polynomial** is the highest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Later on, you will learn that the degree affects the shape of the graph.

Eg. For the polynomial $5x^{3}-2x-6$

Number of terms: Coefficients: Degree:

Type of polynomial: Constant:

Ex. 1: Decide whether each is a polynomial expression. If so, state its characteristics. If not, state why.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Poly? | # of Terms | Type | Coefficient(s) | Constant | Degree |
| $$3x^{2}-5x+1$$ |  |  |  |  |  |  |
| $$-4y$$ |  |  |  |  |  |  |
| $$3x^{3}+\frac{4}{x^{2}}$$ |  |  |  |  |  |  |
| $$5.68p+9p^{10}$$ |  |  |  |  |  |  |
| $$4q^{2}-4\sqrt{q}$$ |  |  |  |  |  |  |
| $$5$$ |  |  |  |  |  |  |

Generally, polynomials are written in **descending order**, where the term with the largest exponent is written first.

Ex. 2: Write the following in descending order.

1. $6x-4+2x^{2}$ (b) $5y^{4}+3y+2-8y^{5}-y^{2}$

 We can use algebra tiles to model polynomials visually. This will be helpful to us later on.

 Ex. 3: Model the following with algebra tiles.

1. $-3x^{2}$ (b) $x^{2}-x+3$ (c) $4x-3$