

### 5.1 - Modelling Polynomials

*many parts*

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

Eg.  $x$   $y$   $n$   $a$   $b$   $\Theta$  "Theta"  $\oplus$

A **polynomial** is an algebraic expression made up of one term or the sum of terms.

**\*** To be a polynomial, any variables must have whole number 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.

~~$\frac{1}{x}$~~   ~~$\sqrt{x}$~~   ~~$x^{0.5}$~~

A **term** is a single number or variable, or numbers and variables multiplied together. Terms are separated by addition and subtraction signs.

$3x$   
 $-5y^2$

Some polynomials have special names depending on how many terms they have:

A monomial has one term  $2x^2$

A binomial has two terms  $3x + 1$

A trinomial has three terms  $2x^2 + 3x - 1$

A **coefficient** is a number in front of a variable, multiplying it.

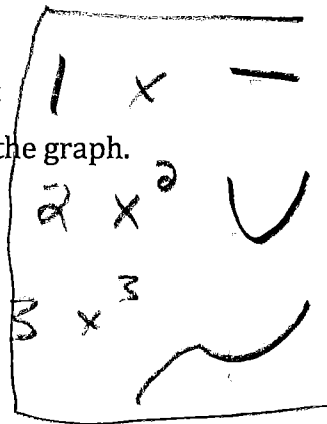
A **constant** is a term that does not contain a variable, so that the value stays constant even if the value of the variable changes.

For the polynomials we will be examining, the **degree of a polynomial** is the highest exponent. 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: 3 Coefficients: 5, -2 Degree: 3

Type of polynomial: trinomial / Constant: -6



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
$3x^2 - 5x + 1$	Y	3	tri	3, -5	1	2
$-4y$	Y	1	mono	-4	none	1
$3x^3 + \frac{4}{x^2}$	N	Since it has a variable in denominator				
$5.68p^4 + 9p^{10}$	Y	2	bi	5.68, 9	none	10
$4q^2 - 4\sqrt{q}$	N	Since it has a $\sqrt{\quad}$ square root				
$5x^0$	Y	1	mono	none	5	0

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.

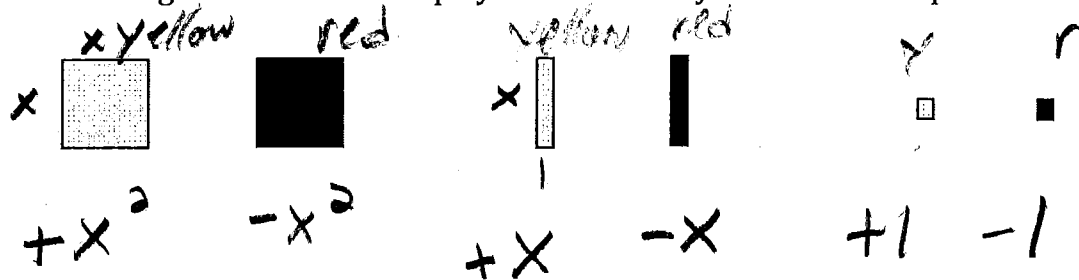
(a)  $6x - 4 + 2x^2$

(b)  $5y^4 + 3y + 2 - 8y^5 - y^2$

$= 2x^2 + 6x - 4$

$= -8y^5 + 5y^4 - y^2 + 3y + 2$

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

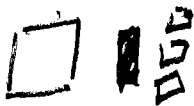


Ex. 3: Model the following with algebra tiles.

(a)  $-3x^2$



(b)  $x^2 - x + 3$



(c)  $4x - 3$

