## LIFFEPAC Math



# MATHEMATICS 904 <br> POLYNOMIALS 

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## POLYNOMIALS

In this LIFEPAC ${ }^{\circledR}$ you will continue your study in the mathematical system known as algebra by learning about a special classification of algebraic expressionspolynomials. In arithmetic, after becoming familiar with the whole numbers, you learned to perform the four basic operations (addition, subtraction,
multiplication, and division) with them; later, you did the same with fractions, with decimals, and with integers. Now, in algebra, you will follow the same procedure again with polynomials: become familiar with what they are and then find their sums, differences, products, and quotients.

## OBJECTIVES

Read these objectives. The objectives tell you what you will be able to do when you have successfully completed this LIFEPAC.

When you have finished this LIFEPAC, you should be able to:

1. Identify and combine like terms.
2. Identify a polynomial by its number of terms.
3. Arrange the terms of a polynomial in ascending or descending powers of a variable.
4. Add polynomials.
5. Subtract polynomials.
6. Multiply polynomials.
7. Divide polynomials.
8. Simplify polynomial expressions having mixed operations.
9. Simplify polynomial expressions requiring the removal of grouping symbols.

Survey the LIFEPAC. Ask yourself some questions about this study. Write your questions here.

## OBJECTIVES

When you have completed this section, you should be able to:

1. Identify and combine like terms.
2. Identify a polynomial by its number of terms.
3. Arrange the terms of a polynomial in ascending or descending powers of a variable.
4. Add polynomials.

The first operation to be considered is addition, and in this section you will learn to add like terms and to add polynomials. Before that, however, you should become familiar with some basic definitions.

## SUMS OF TERMS

## DEFINITION

A term ( or monomial ) is a number or a variable, or an indicated product of a number and variable(s).

Models: $\quad x y, 0.3,-7 a, \frac{4}{9} p q^{2}$, and $t$ are terms.
$\frac{x}{y}$ is not a term under the definition since it is an indicated quotient of variables.

## DEFINITIONS

Like terms have the same variable(s), including the same exponent with each variable.

Constant terms are terms that have no variables.

Models: $\quad 5 x,-2 x$, and $-\frac{5}{3} x$ are like terms.
$8 m, 8 n$, and $8 p$ are not like terms.
$3 a^{2} b^{3}$ and $-4.7 a^{2} b^{3}$ are like terms.
$6 x^{2} y$ and $6 x y^{2}$ are not like terms.

70, $\frac{2}{3}$, and -1.25 are like terms; they are called constant terms since they contain no variables.

## - Write true or false.

$1.1 \quad 6 a$ and $-60 a$ are like terms.
1.2 2wxy and $2 w x z$ are like terms.
$1.3 \quad a^{3} b^{2} c, a^{3} b c^{2}$, and $a^{2} b^{3} c$ are like terms.
$1.4 —-5 x^{4}$ and $-5 x^{4}$ are like terms.
1.5 2xays. $2 x^{2}$, and $2 x$ are like terms.
1.6 - $\frac{1}{3} m n, 0.58 m n$, and $-4 m n$ are like terms.
$1.7 \quad-46$ and 5.2 are like terms.
$1.8 \quad-46$ and 5.2 are constant terms.
$1.9-7 k,-2 k$, and $-\frac{1}{5} k$ are like terms.
$1.10 \quad 7 k,-2 k$, and $-\frac{1}{5} k$ are constant terms.

The distributive property is used to add like terms.

## PROPERTY

The distributive property states that $B A+C A=(B+C) A$.

$$
\begin{array}{ll}
\text { Models: } & 4 x+2 x=(4+2) x=6 x \\
& -4 y^{3}+5 y^{3}=(-4+5) y^{3}=1 y^{3}=y^{3} \\
& 7 a b c^{2}+\left(-1.5 a b c^{2}\right)+a b c^{2}=[7+(-1.5)+1] a b c^{2}=6.5 a b c^{2}
\end{array}
$$

Notice in the models that the answer is obtained by adding the numerical parts (or coefficients) of the like terms, and then by multiplying that sum by the common variable(s). This same procedure is used for addition problems written in a vertical format.


## DEFINITION

A coefficient is the numerical part of a term.

| Models: | $8 a$ | $-\frac{3}{5} x^{2}$ | $0.2 m^{3} n$ |
| :--- | :--- | :--- | :--- |
|  | $-5 a$ | $0.3 m^{3} n$ |  |
|  | $\frac{-7 a}{-4 a}$ | $\frac{\frac{3}{5} x^{2}}{0 x^{2}}=0$ | $-0.1 m^{3} n$ |
|  |  |  | $\frac{m^{3} n\left(=1.0 \mathrm{~m}^{3} n\right)}{1.4 m 3 n}$ |

>- Find each sum of like terms.
$1.117 y+2 y$
$1.12-3 x^{4}+8 x^{4}$
$1.135 .2 a b+(-3.4 a b)$
$1.14-4 m+3 m+(-2 m)$
$1.15 \frac{2}{9} h+\left(-\frac{1}{3} h\right)+\frac{1}{9} h$
$1.164 c^{3} d^{2}+3 c^{3} d^{2}+c^{3} d^{2}$
$1.17-\frac{1}{6} x y+\left(-\frac{2}{3} x y\right)$
$1.18-11 k+8 k+4 k$
$1.19-7 a b c$
$3 a b c$
$\underline{2 a b c}$
$1.20 \quad 4.3 p q^{2}$
$-2.5 p q^{2}$ $-3.8 p q^{2}$
$\quad p q^{2}$

## SUMS OF POLYNOMIALS

A polynomial is a term or a sum of terms. Polynomials can be one-term, two-term, three-term, and so on.

DEFINITIONS
A polynomial is a term or a sum of terms.
A monomial is a one-term polynomial.
A binomial is a two-term polynomial.
A trinomial is a three-term polynomial.

