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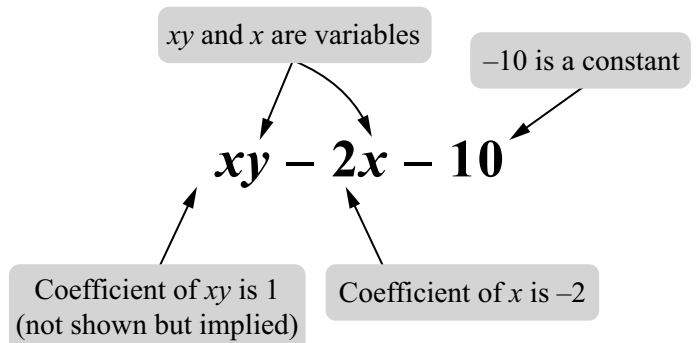
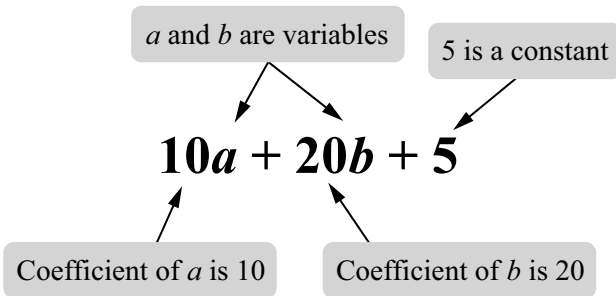
# 1

# Introduction to Algebra

## 1.1 Basics of Algebra

- Algebra is the use of symbols to represent an unknown variable.
- A constant will have a fixed value. A variable is a value that is not fixed.
- Lower case alphabets are often used to represent the unknown, for example  $x, m, n, t, r$ .
- $x$  is just an algebraic symbol, it is not '×' as in the multiplication sign. To avoid confusion, we use bracket ( ) or '·'.
- An algebraic expression is made up of more than 1 algebraic terms and/or constant.

Algebraic terms	Algebraic Expressions
$10a$	$10a + 20b + 5$
$-25y$	$12x - 25y$
$\frac{1}{2}s$	$\frac{1}{2}s + 10r - 3$
$xy$	$xy + 3y$



## 2.3 Simple Addition Involving Quadratic Terms

- Most schools introduce quadratic expressions in Secondary 2. However, some schools may do that in Secondary 1. Thus we shall cover this briefly in this book.
- Quadratic terms are terms that carry a power of 2. Example of quadratic terms are  $x^2$ ,  $b^2$ ,  $n^2$ ,  $x^2y$ ,  $a^2b$ .
- $a \cdot a = a^2$ ,  $y \cdot y = y^2$



### Examples

Algebraic Expressions	Like terms	Add and Simplify
$b^2 + b^2$	$b^2, b^2$	$2b^2$
$x^2 + 3x^2$	$x^2, 3x^2$	$4x^2$
$12y^2 - 9y^2$	$12y^2, -9y^2$	$3y^2$
$x^2y + 3xy^2$	No like terms	$x^2y + 3xy^2$



### Note!

$x^2y$  and  $xy^2$  are unlike terms. Just like  $x$  and  $xy$  are unlike terms.

## Practice 2.3

Simplify the following algebraic expressions.

1  $y^2 + 10y^2$

2  $m^2 + 7m^2 + n^2$

3  $y^2 + 5xy^2 + 5y^2$

4  $ab^2 + 5ab^2 + 15ab^2$

5  $8x^2 + 5y^2 + 37x^2 + 15y^2$

6  $10a + 19a^2 + 9a^2 + 3a$

7  $5mn^2 + 5m^2 + 17mn^2 + 10m^2$

8  $45s^2t + 5st^2 + 17st^2 + 10s^2t$

## 3.2 Simple Subtraction Involving 2 or More Variables

- Similarly, we can subtract only **like terms**.
- If there is an addition and subtraction within one expression, you can add or subtract in any order.
- For example,  $2m - m + 3m$  will give same result as  $3m + 2m - m$  and  $-m + 2m + 3m$

### Examples

Algebraic Expressions	Like terms	Add and Simplify
$a - 2a + b$	$a, -2a$	$-a + b$
$s - 10s - 3t - 7t$	$s, -10s$ $-3t, -7t$	$-9s - 10t$
$12x - 4xy - 4y$	No like terms	$12x - 4xy - 4y$
$10n - 8mn - 12mn$	$-8mn, -12mn$	$10n - 20mn$



### Note!

$mn$  and  $n$  are unlike terms. Just like  $x$  and  $xy$  are unlike terms.

## Practice 3.2

Simplify the following algebraic expressions.

1  $9x + 2 - x - 8y$

2  $9ab - 8a - 2a - 6ab$

3  $5y + 5xy - 5y$

4  $-10ab + 12 - b - 17b + ab$

5  $10ab - 2 + b - 17b - ab$

6  $-8d + 23 - cd - 13cd + 4d$

7  $xyz - 2xy + xy - 7xyz - 7xy$

8  $-8m - 2mn - 7n - 22m + 8mn$