CHAPTER ONE

BASIC ALGEBRA

Addition in algebra:

1. $a + a = 2a$.
2. $x + x = 2x$.
3. $a + 2a = 3a$.
4. $4y + 2y + 3y = 9y$.
5. $6a + a = 6a + 1a = 7a$.
6. $3y + y + 2y = 3y + 1y + 2y = 6y$.
7. $2ab + 3ab = 5ab$.
8. $4ab + 2ab + 3ab = 9ab$.
9. $4xy + xy = 4xy + 1xy = 5xy$.
10. $xy + 2xy + 3xy = 1xy + 2xy + 3xy = 6xy$.

N/B: - In algebra we can only add if the letters or the terms are the same.

- $ab = ba$, $xy = yx$. and $y^2x = xy^2$
- If the letters or the terms are not the same, then we cannot add.

Examples:

1. $a + b = a + b$

2. $2a + 3b = 2a + 3b$.

3. $x + y = x + y$.

4. $6x + 2y = 6x + 2y$.

Q1. Simplify each of the following:

a) $3a + a + 5x$

Soln.

3a + a + 5x = 4a + 5x.

b) 3x + 4x + 2y + y

Soln.

3x + 4x +2y + y = 7x + 3y.

c)) 4x + 2b + 3x + 6b

Soln.

4x + 2b + 3x + 6b = 4x + 3x + 2b + 6b = 7x + 8b.

d) 2ab + 5ab + 4x + 5x

Soln.

2ab + 5ab + 4x + 5x = 7ab + 9x.

e) 4ab + 6x + 6ab + 5x

Soln.

4ab + 6x + 6ab + 5x = 4ab + 6ab + 6x + 5x

= 10ab + 11x.

f) 3ab + 4ba

Soln.

3ab + 4ab = 3ab + 4ab = 7ab.

g) 5xy + 4ab + 2yx + 2ba

Soln.

5xy + 4ab + 2yx + 2ba = 5xy + 2yx + 4ab + 2ba

= 5xy + 2xy + 4ab + 2ab = 7xy + 6ab.

h) 4xy + 2y

<div align="center">Soln.</div>

$4xy + 2y = 4xy + 2y$

i) $2ab + 5a$.

<div align="center">Soln.</div>

$2ab + 5a = 2ab + 5a$.

j) $3xy + 2x + 6xy + 4x$

<div align="center">Soln.</div>

$3xy + 2x + 6xy + 4x = 3xy + 6xy + 2x + 4x = 9xy + 6x$.

k) $x^2y + xy$

<div align="center">Soln.</div>

$x^2y + xy = x^2y + xy$.

l) $3a^2b + 4ab$

<div align="center">Soln.</div>

$3a^2b + 4ab = 3a^2b + 4ab$.

m) $3a^2b + 4a^2b$

<div align="center">Soln.</div>

$3a^2b + 4a^2b = 7a^2b$.

n) $3a^2b + 4ab^2$

<div align="center">Soln.</div>

$3a^2b + 4ab^2 = 3a^2b + 4ab^2$

o) $2x^2y^2 + 5x^2y^2$

<div align="center">Soln.</div>

$2x^2y^2 + 5x^2y^2 = 7x^2y^2$

p) $2x^2y^2 + 5x^2y$

<div align="center">Soln.</div>

$2x^2y^2 + 5x^2y = 2x^2y^2 + 5x^2y.$

q) $3x^2y^2 + 5xy + 2x^2y^2 + 6xy$

<div align="center">Soln.</div>

$3x^2y^2 + 5xy + 2x^2y^2 + 6xy = 3x^2y^2 + 2x^2y^2 + 5xy + 6xy$

$= 5x^2y^2 + 11xy.$

r) $3a^2b + 4ba^2 + ab + 6ab$

<div align="center">Soln.</div>

$3a^2b + 4ba^2 + ab + 6ab = 3a^2b + 4a^2b + 1ab + 6ab$

$= 7a^2b + 7ab.$

s) $3ac + 5ab + 5ca + 4a^2b$

<div align="center">Soln.</div>

$3ac + 5ab + 5ca + 4a^2b = 3ac + 5ca + 5ab + 4a^2b$

$= 3ac + 5ac + 5ab + 4a^2b = 8ac + 5ab + 4a^2b.$

t) $4ab + 3a^2b + 6ba + 4ba^2$

<div align="center">Soln.</div>

$4ab + 3a^2b + 6ba + 4ba^2 = 4ab + 6ba + 3a^2b + 4ba^2$

$= 4ab + 6ab + 3a^2b + 4a^2b = 10ab + 7a^2\,b.$

Subtraction in algebra:

N/B: - In algebra, we can only subtract when the letters or terms are the same.

Examples:

1. $2a - a = a$.

2. $4a - 2a = 2a$.

3. $7b - 3b = 4b$.

4. $2ab - a = 2ab - a$.

5. $3ab - b = 3ab - b$.

6   $5ab - 2ba = 5ab - 2ab = 3ab$.

7. $5a^2b - 4ab = 5a^2b - 4ab$.

8. $5a^2b - 4a^2b = 1a^2b = a^2b$.

9. $3x^2y^2 - y^2x^2 = 3x^2y^2 - x^2y^2 = 3x^2y^2 - 1x^2y^2 = 2x^2y^2$

10. $2x^3y - x^2y = 2x^3y - x^2y$.

11. $2x^3y - 1x^3y = 1x^3y = x^3y$.

Q1. Simplify the following:

a) $5x + 2x - 4x$

   Soln.

$5x + 2x - 4x = 7x - 4x = 3x$.

b) $5x + 4x - 2x + 5y - 3y$

   Soln.

$5x + 4x - 2x + 5y - 3y = 9x - 2x + 5y - 3y = 7x + 2y$.