Girls' High School & College, Prayagraj

Session 2020 – 21

Class 6 (A, B, C, D, E,& F)

Subject – Mathematics

Worksheet-7

Instruction: Parents kindly ensure that the student takes a reference from any ICSE mathematics book of class 6 or the internet. Following links can be helpful in understanding the concepts:

Link: http://youtu.be/4sTiwiqJwzY

http://www.aplustopper.com (*Selina Concise mathematics Class 6 ICSE Solutions Chapter 19*)

Chapter: Fundamental Operations

1. Basic Concept

In Mathematics, the operations **addition** (+), **subtraction** (-), **multiplication** (x) and **division** (÷) are the four fundamental operations.

A. ADDITION OF LIKE TERMS:

The addition of like terms is a single term (like to the given terms) whose coefficient is equal to the sum of the coefficients of the given (like) terms.

For example:

(i) Addition of $3x$ and $8x = 3x + 8x = (3 + 8) x = $ **$11x$**
(ii) Addition of $8x^2y$ and $- 5x^2y = 8x^2y + (-5x^2y)$
$$= 8x^2y - 5x^2y = (8 - 5) x^2y = \textbf{3x}^2\textbf{y}$$
(iii) Addition of $7y^2 - 4y^2 + 3y^2 = (7 - 4 + 3) y^2$
$$= (10 - 4) y^2 = \textbf{6y}^2$$

For addition, the terms are taken with their given signs. e.g.

(i) Addition of $7xy$ and $- 3xy = 7xy - 3xy = (7 - 3) xy = $ **$4xy$**
(ii) Addition of $- 7xy$ and $3xy = - 7xy + 3xy = (- 7 + 3) xy = $ **$- 4xy$** and
(iii) Addition of $- 7x - 3x = (-7 - 3) x = $ **$- 10x$**

In the same way:

(1) Addition of $- 3xy^2$, $-5xy^2$ and $-xy^2$
$= (-3xy^2) + (- 5xy^2) + (-xy^2)$
$= -3xy^2 - 5xy^2 - xy^2$
$= (-3 -5 - 1) xy^2$
$= $ **$- 9xy^2$**

(2) Addition of 7ab, - 2ab, - 5ab,6ab and -ab

=7ab -2ab -5ab +6ab -ab

= (7 -2 -5 +6 -1) ab

= (13 -8) ab

= **5ab**

B. ADDITION OF UNLIKE TERMS:

The sum of two or more like terms is a single like term, but two unlike terms cannot be added together to get a single term.

For example: the unlike terms 2ab and 4bc cannot be added together to form a single term.

All that can be done is to connect them by the sign of addition and leave the result in the form 2ab+ 4bc.

In the same way,

(1) Addition of $5x^2$ and 8xy

= $5x^2$ + 8xy

(2) Addition of $2y^3$, -5xy and $3x^3$

= $2y^3$ - 5xy + $3x^3$ and so on.

C. SUBTRACTION OF LIKE TERMS:

For subtraction of like terms, the rules are the same as those for subtraction of integers.

For example:

Subtract: (1) 4x from -8x   (2) -3x from -7x

Solution:

In each subtraction, change the sign of the term to be subtracted.

(1)   -8x –(4x) = -8x -4x   = **-12x**   **Ans**.

(2)   -7x – (-3x) = -7x + 3x = **- 4x**   **Ans.**

The result of subtraction of the two like terms is also a like term.

D. SUBTRACTION OF UNLIKE TERMS:

Just as it is with addition of unlike terms, we cannot get a single term by the subtraction of unlike terms. For example, 2ab and 4bc are two unlike terms, the subtraction of 2ab from 4bc is 4bc – 2ab, which cannot be simplified further to get a single term.

Similarly, the subtraction of 4bc from 2ab is 2ab – 4bc, which cannot be simplified further to get a single term.

For example:

Evaluate: (1) 6ab + 3ab – 4ab   (2) 8a +3a -5a -2a

Solution:

1. Add the positive terms together and separately add the negative terms together as well.

2. Find the result of the two terms obtained.

 (1) 6ab +3ab – 4ab = 9ab – 4ab =**5ab** **Ans**.

 (2) 8a +3a – 5a – 2a = 11a – 7a = **4a**   **Ans.**

EXERCISE: 1

SOLVE THE FOLLOWING SUMS:

 1 Fill in the blanks:

(i) 5 + 4 =…………………..and 5x + 4x =…………………………….

(ii) 12 +18 =………………………and $12x^2y + 18x^2y$ =……………………………

(iii) 7 + 16 =………………………and 7a + 16b =……………………………

(iv) 7 – 4 =………………………..and 7ab – 4ab =……………………………

 (v) 28 – 13 =……………………… and $28x^2$ - $13a^2x$ =……………………………

2. Fill in the blanks:

   (i) The sum of - 2 and -5 =………….and the sum of -2x and -5x =………….

   (ii) The sum of 8 and – 3 =………….and the sum of 8ab and -3ab =………..

   (iii) The sum of -15 and -4 =…………and the sum of -15x and -4y =…………

   (iv) 12 – 9 +15 =………… and 12ab – 9ab + 15ba =…………….

   (v) – 4 – 6 - 5 =………….and – 4ax – 6ax – 5ay =………………

3. Add:

   (i) 8xy and 3xy

   (ii) 2xyz, xyz and 6xyz

   (iii) -2y, -y and -3y

   (iv) 5b, -4b and -10b

   (v) -2c, -c and -5c

4. Evaluate:

   (i) - 7x +9x + 2x – 2x

   (ii) 6a – a – 5a – 2a

   (iii) 19abc – 11abc – 12abc + 14abc

   (iv) – 8a – 3a + 12a + 13a – 6a

   (v) 5ab – 2ab – 8ab + 6ab

5. Simplify:

   (i) $2a^2b^2 + 5ab^2 + 8a^2b^2$ -$3ab^2$

   (ii) 2xy + 4yz + 5xy +3yz – 6xy

   (iii) 8abc + 2ab – 4abc + ab

   (iv) 4ab + 0 - 2ba

   (v) 4a + 3b – 2a - b

2. More about addition and subtraction

A. ADDITION OF POLYNOMIALS:

For example:

Add: 4a + 2b, 3a − 3b + c and − 2a + 4b + 2c.

Solution:

First method (Row method):

Steps:

1. Write all the given polynomials in a row.

2. Group the like terms.

3. Add the like terms.

The required addition

= (4a + 2b) + (3a − 3b + c) + (-2a + 4b + 2c)   [Step 1]

= 4a + 2b +3a - 3b + c - 2a + 4b + 2c   [Step 2]

= 4a + 3a − 2a + 2b − 3b + 4b + c + 2c   [Step 3]

= **5a + 3b + 3c**   Ans.

Second method (Column method):

Arrange the given polynomials so that the	$4a + 2b$
like terms of the polynomials are one below	$3a\ -3b\ +\ c$
the other in a vertical column, then add.	$-2a + 4b + 2c$

In general, the column method is preferred	**5a + 3b + 3c** Ans.

For example:

Add: $3x^3 - 5x^2 + 8x +10$, $15x^3 − 6x − 23$ and $9x^2 − 4x + 15$.

Solution: (using the row method)

$(3x^3 - 5x^2 + 8x + 10) +(15x^3 - 6x − 23) + (9x^2 - 4x + 15)$

= $3x^3 - 5x^2 + 8x + 10 + 15x^3 - 6x − 23 + 9x^2 − 4x + 15$

= $18x^3 + 4x^2 +8x -10x +25-23$

= **$18x^3 + 4x^2 − 2x + 2$**   Ans.

For example:

Add: $3ab^2 - 2b^2 + a^2$, $5a^2b − 2ab^2 - 3a^2$ and $8a^2 − 5b^2$

Solution: (using column method)

$$3ab^2 - 2b^2 + \quad a^2$$
$$5a^2b - 2ab^2 \qquad - 3a^2$$
$$\qquad\qquad -5b^2 + 8a^2$$

$5a^2b + ab^2 - 7b^2 + 6a^2$ **(Ans)**

B. SUBTRACTION IN POLYNOMIALS:

Steps (for the row method):

1. Enclose the expression to be subtracted in brackets with a minus sign prefixed.
2. Remove the bracket by changing the sign of each term kept in the bracket.
   Example:
   $(2x-y) - (x + 5y) = 2x - y - x - 5y$
3. Combine the like terms and add.

For example:

Subtract: $3a - 4b + 5c$ from $4a - b + 6c$.

Solution:

$4a - b + 6c - (3a - 4b + 5c)$	[Step 1]
$= 4a - b + 6c - 3a + 4b - 5c$	[Step 2]
$= 4a - 3a - b + 4b + 6c - 5c$	[Step 3]
$= a + 3b + c$	**Ans.**

Whenever there is a negative sign before a bracket, open (remove) the bracket and at the same time, change the sign of each term inside the bracket.

e.g. $(x + y) - (x - y + z) = x + y - x + y - z = 2y - z$.

Alternative method: (column method)

Steps (for the column method)

1. Rewrite the given expressions in two lines (rows) such that the lower line is the expression to be subtracted and like terms of both the expressions are one below the other.
2. Change the sign of each term in the lower line, i.e. change the sign of each term of the expression to be subtracted.
3. Add column - wise.

Thus, for example given above, we have:

Step 1:   4a - b + 6c
            3a - 4b + 5c
Step 2:   -   +   -

Step 3 :   a + 3b + c   **Ans.**

For example:

From the sum of $5x^2 - 7x + 4$ and $-3x^2 + 5x + 2$ subtract $x^2 + x + 1$

Solution:

Row method:

$(5x^2 - 7x + 4) + (-3x^2 + 5x + 2) - (x^2 + x + 1)$
$= 5x^2 - 7x + 4 - 3x^2 + 5x + 2 - x^2 - x - 1$
$= 5x^2 - 3x^2 - x^2 - 7x + 5x - x + 4 + 2 - 1$
$= 5x^2 - 4x^2 - 8x + 5x + 6 - 1$
$= x^2 - 3x + 5$ **Ans.**

Column method:

  $5x^2 - 7x + 4$
  $-3x^2 + 5x + 2$ add

  $2x^2 - 2x + 6$
   $x^2 + x + 1$
-    -   -   subtract

  $x^2 - 3x + 5$ **Ans.**

EXERCISE: 2

SOLVE THE FOLLOWING SUMS:

1. **Find the sum of:**

    (i) $3a + 4b + 7c$, $-5a + 3b - 6$ and $4a - 2b - 4c$.
    (ii) $2x^2 + xy - y^2$, $-x + 2xy + 3y^2$ and $3x^2 - 10xy + 4y^2$.
    (iii) $a^2 - ab + bc$, $2ab + bc - 2a^2$ and $-3bc + 3a^2 + ab$.

2. **Add the following expressions:**

    (i) $-17x^2 - 2xy + 23y^2$, $-9y^2 + 15x^2 + 7xy$ and $13x^2 + 3y^2 - 4xy$.
    (ii) $-x^2 - 3xy + 3y^2 + 8$, $3x^2 - 5y^2 - 3 + 4xy$ and $-6xy + 2x^2 - 2 + y^2$.
    (iii) $a^3 - 2b^3 + a$, $b^3 - 2a^3 + b$ and $-2b + 2b^3 - 5a + 4a^3$.

3. **Evaluate:**

    (i) $3a - (a + 2b)$
    (ii) $(5x - 3y) - (x + y)$
    (iii) $(8x + 7y) - (4y - 3x)$
    (iv) $7 - (4a - 5)$
    (v) $(6y - 13) - (4 - 7y)$

4. Subtract

    (i) $5a - 3b + 2c$ from $a - 4b - 2c$.

    (ii) $4x - 6y + 3z$ from $12x + 7y - 21z$.

    (iii) $- 8x - 12y + 17z$ from $x - y - z$.

5. (i) Take $- ab + bc - ca$ from $bc - ca + ab$.

    (ii) Take $1 - a + a^2$ from $a^2 + a + 1$.

6. From the sum of $x + y - 2z$ and $2x - y + z$ subtract $x + y + z$.

7. From the sum of $3a - 2b + 4c$ and $3b - 2c$ subtract $a - b - c$.

8. Subtract $x - 2y - z$ from the sum of $3x - y + z$ and $x + y - 3z$.

[The End]

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