ODM EDUCATIONAL GROUP
Changing your Tomorrow

FUNDAMENTAL OPERATIONS

SUBJECT : MATHEMATICS
CHAPTER NUMBER:19
CHAPTER NAME :FUNDAMENTAL OPERATIONS
SUBTOPIC : More about Addition and Subtraction.

PERIOD NO: 2

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Learning outcomes

- Students will be able to solve questions based on addition and subtraction of like terms .
- Students will develop application skill.

PREVIOUS KNOWLEDGE TEST

1. Simplify:

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

(ii) $4a + 3b – 2a – b$

(iii) $2xy + 4yz + 5xy + 3yz – 6xy$

(iv) $ab + 15ab – 11ab – 2ab$

(v) $6a^2 – 3b^2 + 2a^2 + 5b^2 – 4a^2$

FUNDAMENTAL OPERATIONS

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

The simplified form of the given expression is calculated as follows

$2a^2b^2 + 5ab^2 + 8a^2b^2 – 3ab^2 = 2a^2b^2 + 8a^2b^2 + 5ab^2 – 3ab^2$

We get, $= 10a^2b^2 + 2ab^2$

Therefore, $2a^2b^2 + 5ab^2 + 8a^2b^2 – 3ab^2 = 10a^2b^2 + 2ab^2$

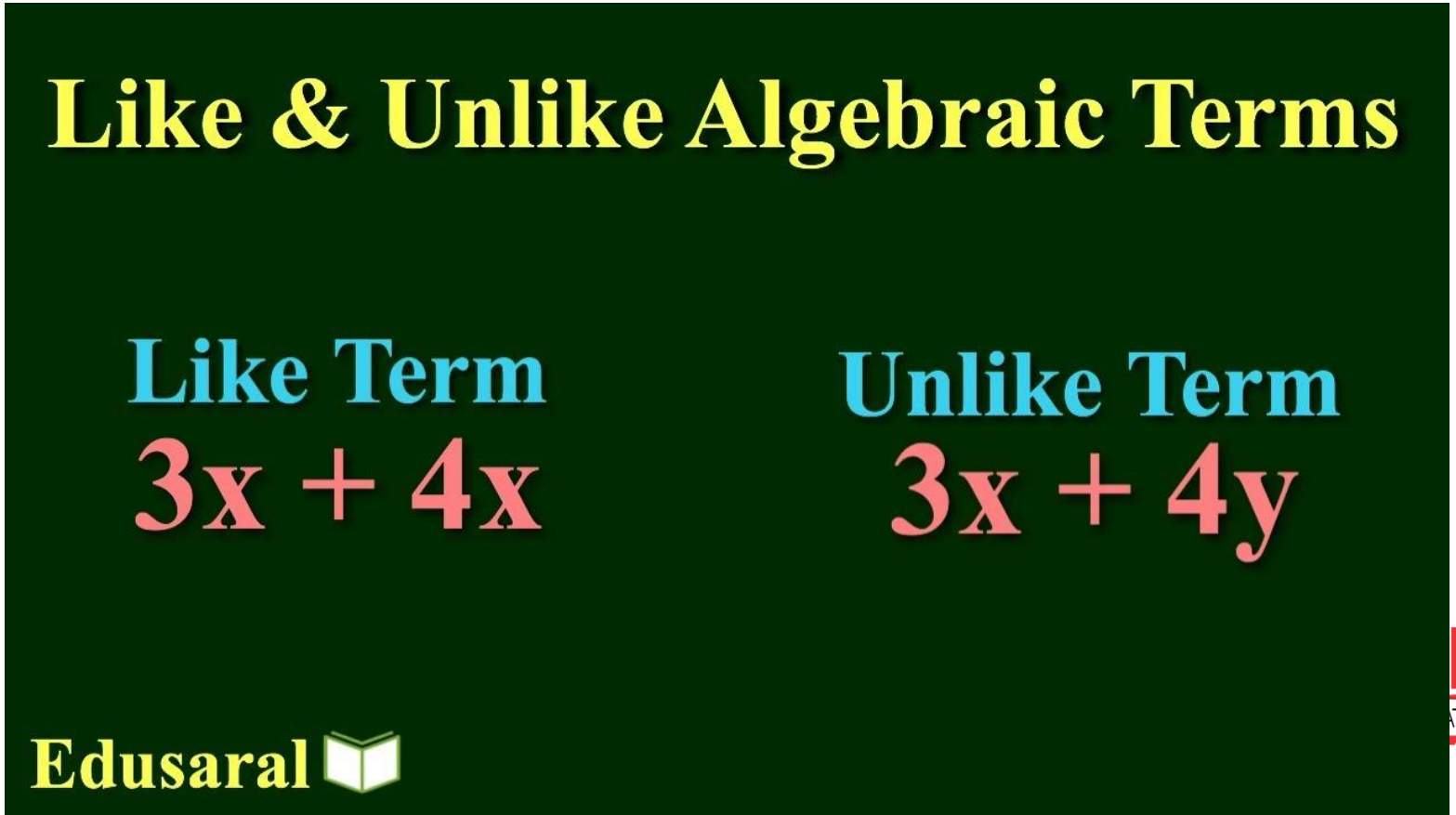
(ii) $4a + 3b – 2a – b$

The simplified form of the given expression is calculated as follows

$4a + 3b – 2a – b = 4a – 2a + 3b – b$

$= 2a + 2b$

FUNDAMENTAL OPERATIONS



Subtracting Like Terms

We can also Subtract Like Terms

Suppose that we have bought 5 apples and 6 bananas, but we eat two bananas before putting our fruit into the bowl.

The Algebra is: **5a + 6b – 2b**

= 5a + 6b – 2b (6 bananas take away 2 is 4)

= 5a + 4b

= **5a + 4b** ✓

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Evaluation Question EX-19 B

1. Find the sum of:

(i) $3a + 4b + 7c, -5a + 3b - 6c$

and $4a - 2b - 4c$

(ii) $2x^2 + xy - y^2, -x^2 + 2xy + 3y^2$

and $3x^2 - 10xy + 4y^2$

(iii) $x^2 - x + 1, -5x^2 + 2x - 2$

and $3x^2 - 3x + 1$

(iv) $a^2 - ab + bc, 2ab + bc - 2a^2$

and $-3bc + 3a^2 + ab$

(v) $4x^2 + 7 - 3x, 4x - x^2 + 8$ and $-10 + 5x - 2x^2$

Evaluation Question EX-19 B

Solution:

(i) $3a + 4b + 7c, -5a + 3b - 6c$ and $4a - 2b - 4c$

The sum of $3a + 4b + 7c, -5a + 3b - 6c$ and $4a - 2b - 4c$ is calculated as shown below

$(3a + 4b + 7c) + (-5a + 3b - 6c) + (4a - 2b - 4c)$

$= 3a + 4a - 5a + 4b + 3b - 2b + 7c - 6c - 4c$

We get,

$= 2a + 5b - 3c$

Hence, the sum of $3a + 4b + 7c, -5a + 3b - 6c$ and $4a - 2b - 4c$ is $3c$

Evaluation Question EX-19 B

Solution:

(ii) $2x^2 + xy – y^2, – x^2 + 2xy + 3y^2$

and $3x^2 – 10xy + 4y^2$

The sum of $2x^2 + xy – y^2, – x^2 + 2xy + 3y^2$ and $3x^2 – 10xy + 4y^2$ is calculated as shown below

$(2x^2 + xy – y^2) + (- x^2 + 2xy + 3y^2) + (3x^2 – 10xy + 4y^2)$

$= 2x^2 – x^2 + 3x^2 + xy + 2xy – 10xy + 3y^2 + 4y^2 – y^2$

We get,

$= 4x^2 – 7xy + 6y^2$

Hence, the sum of $2x^2 + xy – y^2, – x^2 + 2xy + 3y^2$ and $3x^2 – 10xy + 4y^2$ is $4x^2 – 7xy + 6y^2$

Evaluation Question EX-19 B

Solution: (iii) $x^2 – x + 1$, $-5x^2 + 2x – 2$ and $3x^2 – 3x + 1$

The sum of $(x^2 – x + 1)$, $(- 5x^2 + 2x – 2)$ and $(3x^2 – 3x + 1)$ is calculated as shown below

$(x^2 – x + 1) + (- 5x^2 + 2x – 2) + (3x^2 – 3x + 1)$

$= x^2 – 5x^2 + 3x^2 + 2x – x – 3x + 1 + 1 – 2 = – x^2 – 2x$

Hence, the sum of $(x^2 – x + 1)$, $(- 5x^2 + 2x – 2)$ and $(3x^2 – 3x + 1)$ is $– x^2 – 2x$

(iv) $a^2 – ab + bc$, $2ab + bc – 2a^2$ and $– 3bc + 3a^2 + ab$

The sum of $(a^2 – ab + bc)$, $(2ab + bc – 2a^2)$ and $(- 3bc + 3a^2 + ab)$ is calculated as shown below

$(a^2 – ab + bc) + (2ab + bc – 2a^2) + (- 3bc + 3a^2 + ab)$

$= a^2 – 2a^2 + 3a^2 + 2ab + ab – ab + bc + bc – 3bc$

$= 2a^2 + 2ab – bc$

Evaluation Question EX-19 B

Solution: (v) $4x^2 + 7 – 3x$, $4x – x^2 + 8$ and $– 10 + 5x – 2x^2$

The sum of $(4x^2 + 7 – 3x)$, $(4x – x^2 + 8)$ and $(- 10 + 5x – 2x^2)$ is calculated as shown below

$(4x^2 + 7 – 3x) + (4x – x^2 + 8) + (- 10 + 5x – 2x^2)$

$= 4x^2 – x^2 – 2x^2 + 7 + 8 – 10 + 4x + 5x – 3x$

$= x^2 + 5 + 6x$

Hence, the sum of $(4x^2 + 7 – 3x)$, $(4x – x^2 + 8)$ and $(- 10 + 5x – 2x^2)$ is $x^2 + 5 + 6x$

Evaluation Question EX-19 B

3. Evaluate:

(i) 3a – (a + 2b)

(ii) (5x – 3y) – (x + y)

(iii) (8a + 15b) – (3b – 7a)

(iv) (8x + 7y) – (4y – 3x)

(v) 7 – (4a – 5)

Solution: (i) 3a – (a + 2b)

The value of the given expression is calculated as below

3a – (a + 2b) = 3a – a – 2b

= 2a – 2b=2(a – b)

Evaluation Question EX-19 B

Solution:

(ii) $(5x – 3y) – (x + y)$

The value of the given expression is calculated as below

$(5x – 3y) – (x + y) = 5x – x – 3y – y$

$= 4x – 4y$

Taking 4 as common, we get $4(x – y)$

(iii) $(8a + 15b) – (3b – 7a)$

The value of the given expression is calculated as below

$(8a + 15b) – (3b – 7a) = 8a + 7a + 15b – 3b$

On calculation, we get $15a + 12b$

Evaluation Question EX-19 B

Solution: (iv) $(8x + 7y) – (4y – 3x)$

The value of the given expression is calculated as below

$(8x + 7y) – (4y – 3x)$

$= 8x + 3x + 7y – 4y$

On further calculation, we get

$= 11x + 3y$

(v) $7 – (4a – 5)$

The value of the given expression is calculated as below

$7 – (4a – 5) = 7 – 4a + 5$

We get, $12 – 4a$

Evaluation Question EX-19 B

4. Subtract:

(i) 5a – 3b + 2c from a – 4b – 2c

(ii) 4x – 6y + 3z from 12x + 7y – 21z

(iii) 5 – a – 4b + 4c from 5a – 7b + 2c

(iv) – 8x – 12y + 17z from x – y – z

(v) 2ab + cd – ac – 2bd from ab – 2cd + 2ac + bd

Solution:

(i) 5a – 3b + 2c from a – 4b – 2c

The value of the subtraction is calculated as follows

(a – 4b – 2c) – (5a – 3b + 2c) = a – 5a – 4b + 3b – 2c – 2c

= – 4a – b – 4c

Evaluation Question EX-19 B

Solution:

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

The value of the subtraction is calculated as follows

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

$= 12x - 4x + 7y + 6y - 21z - 3z$

On further calculation, we get

$= 8x + 13y - 24z$

(iii) $5 - a - 4b + 4c$ from $5a - 7b + 2c$

The value of the subtraction is calculated as follows

$(5a - 7b + 2c) - (5 - a - 4b + 4c) = 5a + a - 7b + 4b + 2c - 4c - 5$

$=6a - 3b - 2c - 5$

Evaluation Question EX-19 B

Solution:

(iv) – 8x – 12y + 17z from x – y – z

The value of the subtraction is calculated as follows

(x – y – z) – (- 8x – 12y + 17z)

= x + 8x + 12y – y – z – 17z = 9x + 11y – 18z

(v) 2ab + cd – ac – 2bd from ab – 2cd + 2ac + bd

The value of the subtraction is calculated as follows

(ab – 2cd + 2ac + bd) – (2ab + cd – ac – 2bd)

= ab – 2ab – 2cd – cd + 2ac + ac + bd + 2bd

On calculating further, we get

= – ab – 3cd + 3ac + 3bd

Evaluation Question EX-19 B

5.(i) Take – ab + bc – ca from bc – ca + ab.

(ii) Take 5x + 6y – 3z from 3x + 5y – 4z.

(iii) Take (-3 / 2) p + q – r from (1 / 2)p – (1 / 3)q – (3 / 2) r

(iv) Take $1 - a + a^2$ from $a^2 + a + 1$

Solution: (i) The value of the subtraction is calculated as,

$(bc - ca + ab) - (-ab + bc - ca) = bc - bc - ca + ca + ab + ab = 2ab$

Hence, $(bc - ca + ab) - (-ab + bc - ca) = 2ab$

(ii) The value of the subtraction is calculated as,

$(3x + 5y - 4z) - (5x + 6y - 3z) = 3x - 5x + 5y - 6y - 4z + 3z$

On simplification, we get $-2x - y - z$

Hence, $(3x + 5y - 4z) - (5x + 6y - 3z) = -2x - y - z$

Evaluation Question EX-19 B

Solution: (iii) The value of the subtraction is calculated as,

$[(1 / 2)p – (1 / 3)q – (3 / 2) r] – [(-3 / 2) p + q – r]$

$= (1 / 2)p + (3 / 2)p – (1 / 3)q – q – (3 / 2)r + r$

On further calculation, we get

$= 2p – (4 / 3)q – (1 / 2)r$

Hence, $[(1 / 2)p – (1 / 3)q – (3 / 2) r] – [(-3 / 2) p + q – r] = 2p – (4 / 3)q – (1 / 2)r$

(iv) The value of the subtraction is calculated as,

$(a^2 + a + 1) – (1 – a + a^2)$

$= a^2 – a^2 + a + a + 1 – 1$

We get,$= a + a = 2a$

Evaluation Question EX-19 B

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

Solution:

The value of terms as per the question is calculated as follows

$(x + y – 2z) + (2x – y + z) – (x + y + z)$

$= x + 2x – x + y – y – y – 2z – z + z$

We get,

$= 2x – y – 2z$

Therefore, $(x + y – 2z) + (2x – y + z) – (x + y + z) = 2x – y – 2z$

Evaluation Question EX-19 B

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

Solution:

The value of terms as per the question is calculated as shown below

$(3a – 2b + 4c) + (3b – 2c) – (a – b – c)$

$= 3a – 2b + 4c + 3b – 2c – a + b + c$

On further calculation, we get

$= 3a – a + 3b + b – 2b + 4c + c – 2c$

$= 2a + 2b + 3c$

Hence, $(3a – 2b + 4c) + (3b – 2c) – (a – b – c) = 2a + 2b + 3c$

Evaluation Question EX-19 B

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

Solution:

The value of terms as per the question is calculated as follows

$(3x – y + z) + (x + y – 3z) – (x – 2y – z)$

$= 3x + x – x – y + y + 2y + z – 3z + z$

We get,

$= 3x + 2y – z$

Therefore, $(3x – y + z) + (x + y – 3z) – (x – 2y – z) = 3x + 2y – z$

Evaluation Question EX-19 B

9. Subtract the sum of x + y and x – z from the sum of x – 2z and x + y + z

Solution:

The value of terms as per the question is calculated as follows

$(x – 2z) + (x + y + z) – \{(x + y) + (x – z)\}$

On further calculation, we get

$= x + x – x – x + y – y + z + z – 2z$

We get,

$= 0$

Therefore, $(x – 2z) + (x + y + z) – \{(x + y) + (x – z)\} = 0$

Evaluation Question EX-19 B

10. By how much should x + 2y – 3z be increased to get 3x?

Solution:

The terms calculated as per the question is as follows

$3x – (x + 2y – 3z) = 3x – x – 2y + 3z$

We get,

$= 2x – 2y + 3z$

11. The sum of two expressions is $5x^2 – 3y^2$. If one of them is $3x^2 + 4xy – y^2$, find the other.

Solution: The other expression is calculated as follows

$(5x^2 – 3y^2) – (3x^2 + 4xy – y^2) = 5x^2 – 3x^2 – 4xy – 3y^2 + y^2$

$= 2x^2 – 4xy – 2y^2$

Evaluation Question EX-19 B

12. The sum of two expressions is $3a^2 + 2ab – b^2$. If one of them is $2a^2 + 3b^2$, find the other.

Solution:

The other expression is calculated as follows

$(3a^2 + 2ab – b^2) – (2a^2 + 3b^2)$

On simplification, we get

$=3a^2 – 2a^2 – b^2 – 3b^2 + 2ab$

$= a^2– 4b^2 + 2ab$

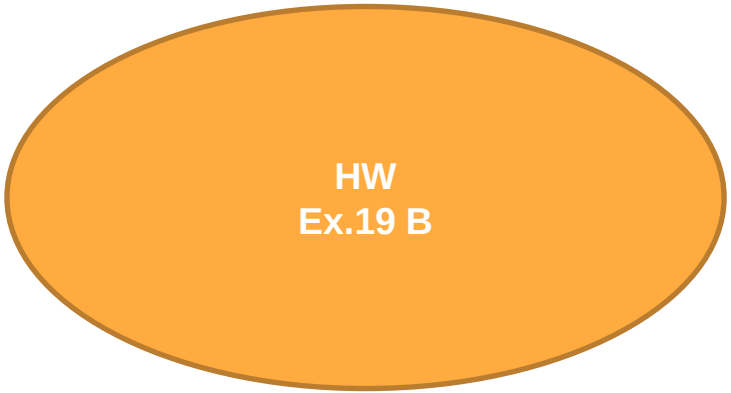
Additional Homework

1. Write the degree of each of the following polynomials:

(i) $x + x^2$

(ii) $5x^2 - 7x + 2$

(iii) $x^3 - x^8 + x^{10}$



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