Framing Algebraic Expressions

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 21
CHAPTER NAME:FRAMING ALGEBRAIC EXPRESSIONS.
SUB TOPIC: Problem Solving on Evaluation of Algebraic
Expressions.
PERIOD NO:2

Learning outcomes

- Students will be able to evaluate algebraic expressions.
- Students will be able apply evaluation of algebraic expressions.

Previous Knowledge Test

1. If a = – 10, evaluate:

(i) 5a

(ii) a^2

(iii) a^3

2. If x = – 6, evaluate:

(i) 11x

(ii) $4x^2$

(iii) $2x^3$

FRAMING ALGEBRAIC EXPRESSIONS

Definition

Algebraic Expression

An expression consisting of numbers, constants, variables, and operation symbols.

Examples of variable expressions:

$$3x$$
$$4x^2 + 1$$
$$-3x^3y + y^2z$$
$$2\pi r$$

Example #4

Evaluate $5 - x^2$ for $x = -2$

$$5 - (-2)^2 = 5 - 4 = 1$$

$$5 - -(2)^2 \qquad 5 -$$

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Evaluation Question

11. If m = − 7, evaluate:

(i) 12m   (ii) 2m^2 (iii) 2m^3

Solution:(i) 12m

The value of 12m for m = − 7 is calculated as below,

12m = 12 ✕ (- 7)

= − 84

Therefore, the value of 12m for m = − 7 is − 84

(ii) 2m^2

The value of 2m^2 for m = − 7 is calculated as below,

2m^2 = 2 ✕ (- 7)^2

= 2 ✕ 49= 98

Therefore, the value of 2m^2 for m = − 7 is 98

(iii) The value of 2m^3 for m = − 7 is calculated as below,

2m^3 = 2 ✕ (-7)^3= 2 ✕ (- 343)= − 686

Therefore, the value of 2m^3 for m = − 7 is − 686

Evaluation Question

12. Find the average (A) of four quantities p, q, r and s. If A = 6, p = 3, q = 5 and r = 7; find the value of s.

Solution : The average of four quantities p, q, r and s is calculated as,

A = (p + q + r + s) / 4

Substituting the given values in the above expression, we get

6 = (3 + 5 + 7 + s) / 4

6 ✕ 4 = 3 + 5 + 7 + s

24 = 15 + s

s = 24 − 15

s = 9

Hence, the value of s is 9

13. If a = 5 and b = 6, evaluate:

(i) 3ab   (ii) 6a²b   (iii) 2b²

Evaluation Question

Solution:

(i) 3ab   The value of 3ab for a = 5 and b = 6 is calculated as follows,

3ab = 3 × a × b= 3 × 5 × 6 = 90

Therefore, the value of 3ab if a = 5 and b = 6 is 90

(ii) $6a^2b$, The value of $6a^2b$ for a = 5 and b = 6 is calculated as follows,

$6a^2b$ = 6 × a × a × b

= 6 × 5 × 5 × 6

= 6 × 25 × 6= 900

Therefore, the value of $6a^2b$ if a = 5 and b = 6 is 900

(iii) $2b^2$, The value of $2b^2$ for a = 5 and b = 6 is calculated as follows,

$2b^2$ = 2 × b × b= 2 × 6 × 6= 2 × 36= 72

Therefore, the value of $2b^2$ if a = 5 and b = 6 is 72

14. If x = 8 and y = 2, evaluate:

(i) 9xy   (ii) $5x^2y$ (iii) $(4y)^2$

Evaluation Question

Solution:(i) 9xy

The value of 9xy for x = 8 and y = 2 is calculated as follows,

9xy = 9 × x × y

9xy = 9 × 8 × 2

9xy = 144

Hence, the value of 9xy for x = 8 and y = 2 is 144

(ii) $5x^2y$,

The value of $5x^2y$ for x = 8 and y = 2 is calculated as follows,

$5x^2y$ = 5 × x × x × y

= 5 × 8 × 8 × 2= 640

Hence, the value of $5x^2y$ for x = 8 and y = 2 is 640

(iii) $(4y)^2$,The value of $(4y)^2$ for x = 8 and y = 2 is calculated as follows,

$(4y)^2 = (4 × 2)^2= (8)^2= 64$

Hence, the value of $(4y)^2$ for x = 8 and y = 2 is 64

Evaluation Question

15. If x = 5 and y = 4, evaluate:

(i) 8xy   (ii) 3x²y   (iii) 3y²

Solution:(i) 8xy,The value of 8xy for x = 5 and y = 4 is calculated as follows,

8xy = 8 × x × y

= 8 × 5 × 4= 160

Therefore, the value of 8xy for x = 5 and y = 4 is 160

(ii) $3x^2y$,The value of $3x^2y$ for x = 5 and y = 4 is calculated as follows,

$3x^2y$ = 3 × x × x × y= 3 × 5 × 5 × 4

= 15 × 20= 300

Therefore, the value of $3x^2y$ for x = 5 and y = 4 is 300

(iii) The value of $3y^2$ for x = 5 and y = 4 is calculated as follows,

$3y^2$ = 3 × y × y= 3 × 4 × 4= 48

Therefore, the value of $3y^2$ for x = 5 and y = 4 is 48

Evaluation Question

16. If y = 5 and z = 2, evaluate:

(i) 100yz (ii) $9y^2z$

(iii) $5y^2$ (iv) $(5z)^3$

Solution: (i) 100yz,

The value of 100yz for y = 5 and z = 2 is calculated as below,

$100yz = 100 \times y \times z = 100 \times 5 \times 2$

$= 100 \times 10 = 1000$

Hence, the value of 100yz for y = 5 and z = 2 is 1000

(ii) $9y^2z$, The value of $9y^2z$ for y = 5 and z = 2 is calculated as below,

$9y^2z = 9 \times y \times y \times z$

$= 9 \times 5 \times 5 \times 2 = 45 \times 10 = 450$

Hence, the value of $9y^2z$ for y = 5 and z = 2 is 450

Evaluation Question

18. If m = 3 and n = 7, evaluate:

(i) 12mn   **(ii) $5mn^2$**

(iii) $(10m)^2$ **(iv) $4n^2$**

Solution:(i) 12mn

The value of 12mn for m = 3 and n = 7 is calculated as follows,

$12mn = 12 \times m \times n = 12 \times 3 \times 7 = 252$

Hence, the value of 12mn for m = 3 and n = 7 is 252

(ii) $5mn^2$, The value of $5mn^2$ for m = 3 and n = 7 is calculated as follows,

$5mn^2 = 5 \times m \times n^2$

$= 5 \times 3 \times 7^2 = 5 \times 3 \times 7 \times 7 = 735$

Hence, the value of $5mn^2$ for m = 3 and n = 7 is 735.

Evaluation Question

(iii) $(10m)^2$, The value of $(10m)^2$ for m = 3 and n = 7 is calculated as follows,

$(10m)^2 = (10 \times m)^2$

$= (10 \times 3)^2 = (30)^2 = 900$

Hence, the value of $(10m)^2$ for m = 3 and n = 7 is 900

(iv) $4n^2$, The value of $4n^2$ for m = 3 and n = 7 is calculated as follows,

$4n^2 = 4 \times n^2 = 4 \times 7^2 = 4 \times 7 \times 7$

$= 196$

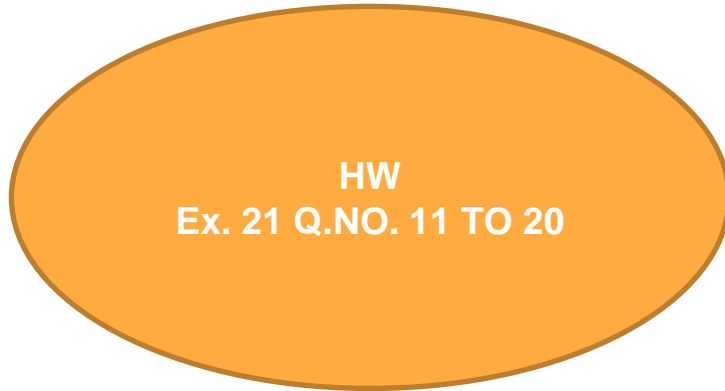Hence, the value of $4n^2$ for m = 3 and n = 7 is 196

Additional Homework

1. Add:

(i) a + b and 2a + 3b

(ii) 2x + y and 3x – 4y

(iii) -3a + 2b and 3a + b

(iv) 4 + x, 5 – 2x and 6x

HW
Ex. 21 Q.NO. 11 TO 20

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