



ST. MARY'S CO-ED SCHOOL, HARDA

[2020-21]

CLASS- VI

SUBJECT- MATHS

CHAPTER- 8

ALGEBRAIC EXPRESSIONS

EXERCISE – 8A

1. Write the following using literals, numbers and signs of basic operation:

- (i)  $x$  increased by 12
- (ii)  $y$  decreased by 7
- (iii) The difference of  $a$  and  $b$ , when  $a > b$
- (iv) The product of  $x$  and  $y$  added to their sum
- (v) One third of  $x$  multiplied by the sum of  $a$  and  $b$
- (vi) 5 times  $x$  added to seven times  $y$
- (vii) Sum of  $x$  and the quotient of  $y$  by 5
- (viii)  $x$  taken away from 4
- (ix) 2 less than the quotient of  $x$  by  $y$
- (x)  $x$  multiplied by itself
- (xi) Twice  $x$  increased by  $y$
- (xii) Thrice  $x$  added to  $y$  squared
- (xiii)  $x$  minus twice  $y$
- (xiv)  $x$  cubed less than  $y$  cubed
- (xv) The quotient of  $x$  by 8 is multiplied by  $y$

Solution

- (i)  $x$  increased by 12 is written as  $x + 12$

(ii)  $y$  decreased by 7 is written as  $y - 7$

(iii) The difference of  $a$  and  $b$ , when  $a > b$  is  $(a - b)$

(iv) The product of  $x$  and  $y$  is  $xy$ , added to their sum is  $(x + y)$

Hence, the product of  $x$  and  $y$  added to their sum is  $(x + y) + xy$

(v) One third of  $x = x / 3$

Sum of  $a$  and  $b = (a + b)$

$\therefore$  One third of  $x$  multiplied by the sum of  $a$  and  $b = x / 3 \times (a + b)$   
 $= x(a + b) / 3$

(vi) 5 times  $x = 5x$ , seven times  $y = 7y$

$\therefore$  5 times  $x$  added to seven times  $y$  is written as  $7y + 5x$

(vii) Sum of  $x = x$

Quotient of  $y = y / 5$

$\therefore$  Sum of  $x$  and the quotient of  $y$  by 5  $= x + y / 5$

(viii)  $x$  taken away from 4 is written as  $(4 - x)$

(ix) Quotient of  $x$  by  $y = x / y$

$\therefore$  2 less than the quotient of  $x$  by  $y = (x / y) - 2$

(x)  $x$  multiplied by itself is  $x \times x = x^2$

$\therefore$   $x$  multiplied by itself is written as  $x^2$

(xi) Twice  $x$  increased by  $y$  is written as  $(2x + y)$

(xii) Thrice  $x = 3 \times x = 3x$  and  $y$  squared  $= (y \times y) = y^2$

$\therefore$  Thrice  $x$  added to  $y$  squared is written as  $3x + y^2$

(xiii) Twice  $y = 2 \times y = 2y$

$\therefore$   $x$  minus twice  $y$  is written as  $(x - 2y)$

(xiv)  $x$  cubed  $= (x \times x \times x) = x^3$   $y$  cubed  $= (y \times y \times y) = y^3$

$\therefore$   $x$  cubed less than  $y$  cubed is written as  $(y^3 - x^3)$

(xv) The quotient of  $x$  by 8 is  $x / 8$

$\therefore$  The quotient of  $x$  by 8 is multiplied by  $y$  is written as  $(x / 8) \times y$

2. Ranjit scores 80 marks in English and  $x$  marks in Hindi. What is his total score in the two subjects?

Solution

Marks scored by Ranjit in English = 80

Marks scored by Ranjit in Hindi =  $x$

Total score in the two subjects = (Marks in English) + (Marks in Hindi)

$$= (80 + x)$$

$\therefore$  Total score in the two subjects scored by Ranjit is  $(80 + x)$  marks

### EXERCISE – 8 B

1. If  $a = 2$  and  $b = 3$ , find the value of

(i)  $a + b$

(ii)  $a^2 + ab$

(iii)  $ab - a^2$

(iv)  $2a - 3b$

(v)  $5a^2 - 2ab$

(vi)  $a^3 - b^3$

Solutions

Given  $a = 2$  and  $b = 3$

(i)  $a + b$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$a + b = 2 + 3$$

$$= 5$$

$$\therefore a + b = 5$$

(ii)  $a^2 + ab$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$a^2 + ab = (2)^2 + (2) \times (3)$$

$$= (2 \times 2) + (2 \times 3)$$

$$= 4 + 6$$

$$= 10$$

$$\therefore a^2 + ab = 10$$

$$(iii) ab - a^2$$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$ab - a^2 = (2 \times 3) - (2)^2$$

$$= (2 \times 3) - (2 \times 2)$$

$$= 6 - 4$$

$$= 2$$

$$\therefore ab - a^2 = 2$$

$$(iv) 2a - 3b$$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$2a - 3b = (2 \times 2) - (3 \times 3)$$

$$= 4 - 9$$

$$= -5$$

$$\therefore 2a - 3b = -5$$

$$(v) 5a^2 - 2ab$$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$5a^2 - 2ab = 5 \times (2)^2 - 2(2)(3)$$

$$= (5 \times 4) - 2(2 \times 3)$$

$$= 20 - 2(6)$$

$$= 20 - 12$$

$$= 8$$

$$\therefore 5a^2 - 2ab = 8$$

$$(vi) a^3 - b^3$$

Substituting  $a = 2$  and  $b = 3$  in the given expression, we get

$$\begin{aligned} a^3 - b^3 &= (2)^3 - (3)^3 \\ &= (2 \times 2 \times 2) - (3 \times 3 \times 3) \\ &= 8 - 27 = -19 \\ \therefore a^3 - b^3 &= -19 \end{aligned}$$

2. If  $x = 1$ ,  $y = 2$  and  $z = 5$ , find the value of

- (i)  $3x - 2y + 4z$
- (ii)  $x^2 + y^2 + z^2$
- (iii)  $2x^2 - 3y^2 + z^2$
- (iv)  $xy + yz - zx$
- (v)  $2x^2y - 5yz + xy^2$
- (vi)  $x^3 - y^3 - z^3$

Solutions

Given  $x = 1$ ,  $y = 2$  and  $z = 5$

(i)  $3x - 2y + 4z$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$\begin{aligned} 3x - 2y + 4z &= 3(1) - 2(2) + 4(5) \\ &= (3 \times 1) - (2 \times 2) + (4 \times 5) \\ &= 3 - 4 + 20 \\ &= 23 - 4 \\ &= 19 \end{aligned}$$

$\therefore 3x - 2y + 4z = 19$

(ii)  $x^2 + y^2 + z^2$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$\begin{aligned} x^2 + y^2 + z^2 &= (1)^2 + (2)^2 + (5)^2 \\ &= (1 \times 1) + (2 \times 2) + (5 \times 5) \\ &= 1 + 4 + 25 \end{aligned}$$

$$= 30$$

$$\therefore x^2 + y^2 + z^2 = 30$$

$$(iii) 2x^2 - 3y^2 + z^2$$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$2x^2 - 3y^2 + z^2 = 2(1)^2 - 3(2)^2 + (5)^2$$

$$= (2 \times 1) - 3(2 \times 2) + (5 \times 5)$$

$$= (2) - 3(4) + (25)$$

$$= 2 - 12 + 25$$

$$= 27 - 12$$

$$= 15$$

$$\therefore 2x^2 - 3y^2 + z^2 = 15$$

$$(iv) xy + yz - zx$$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$xy + yz - zx = (1)(2) + (2)(5) - (5)(1)$$

$$= (1 \times 2) + (2 \times 5) - (5 \times 1)$$

$$= 2 + 10 - 5$$

$$= 12 - 5$$

$$= 7$$

$$\therefore xy + yz - zx = 7$$

$$(v) 2x^2y - 5yz + xy^2$$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$2x^2y - 5yz + xy^2 = 2(1)^2(2) - 5(2)(5) + (1)(2)^2$$

$$= 2(1 \times 1)(2) - 5(2 \times 5) + (1 \times 2 \times 2)$$

$$= 4 - 5(10) + (4)$$

$$= 4 - 50 + 4$$

$$= 8 - 50$$

$$= -42$$

$$\therefore 2x^2y - 5yz + xy^2 = -42$$

$$(vi) x^3 - y^3 - z^3$$

Substituting  $x = 1$ ,  $y = 2$  and  $z = 5$  in the given expression, we get

$$x^3 - y^3 - z^3 = (1)^3 - (2)^3 - (5)^3$$

$$= (1 \times 1 \times 1) - (2 \times 2 \times 2) - (5 \times 5 \times 5)$$

$$= (1) - (8) - (125)$$

$$= 1 - 8 - 125$$

$$= 1 - 133$$

$$= -132$$

$$\therefore x^3 - y^3 - z^3 = -132$$

3. If  $p = -2$ ,  $q = -1$  and  $r = 3$ , find the value of

$$(i) p^2 + q^2 - r^2$$

$$(ii) 2p^2 - q^2 + 3r^2$$

$$(iii) p - q - r$$

$$(iv) p^3 + q^3 + r^3 + 3pqr$$

$$(v) 3p^2q + 5pq^2 + 2pqr$$

$$(vi) p^4 + q^4 - r^4$$

Solutions

Given  $p = -2$ ,  $q = -1$  and  $r = 3$

$$(i) p^2 + q^2 - r^2$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$p^2 + q^2 - r^2 = (-2)^2 + (-1)^2 - (3)^2$$

$$= (-2 \times -2) + (-1 \times -1) - (3 \times 3)$$

$$= 4 + 1 - 9$$

$$= 5 - 9$$

$$= -4$$

$$\therefore p^2 + q^2 - r^2 = -4$$

$$(ii) 2p^2 - q^2 + 3r^2$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$2p^2 - q^2 + 3r^2 = 2(-2)^2 - (-1)^2 + 3(3)^2$$

$$= 2(-2 \times -2) - (-1 \times -1) + 3(3 \times 3)$$

$$= 2(4) - (1) + 3(9)$$

$$= 8 - 1 + 27$$

$$= 7 + 27$$

$$= 34$$

$$\therefore 2p^2 - q^2 + 3r^2 = 34$$

$$(iii) p - q - r$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$p - q - r = (-2) - (-1) - (3)$$

$$= -2 + 1 - 3$$

$$= -1 - 3$$

$$= -4$$

$$\therefore p - q - r = -4$$

$$(iv) p^3 + q^3 + r^3 + 3pqr$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$p^3 + q^3 + r^3 + 3pqr = (-2)^3 + (-1)^3 + (3)^3 + 3(-2)(-1)(3)$$

$$= (-2 \times -2 \times -2) + (-1 \times -1 \times -1) + (3 \times 3 \times 3) + 3(-2 \times -1 \times 3)$$

$$= -8 - 1 + 27 + 18$$

$$= -9 + 45$$

$$= 36$$

$$\therefore p^3 + q^3 + r^3 + 3pqr = 36$$

$$(v) 3p^2q + 5pq^2 + 2pqr$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$\begin{aligned}
 3p^2q + 5pq^2 + 2pqr &= 3(-2)^2(-1) + 5(-2)(-1)^2 + 2(-2)(-1)(3) \\
 &= 3(-2 \times -2 \times -1) + 5(-2 \times -1 \times -1) + 2(-2 \times -1 \times 3) \\
 &= 3(-4) + 5(-2) + 2(6) \\
 &= -12 - 10 + 12 \\
 &= -10
 \end{aligned}$$

$$\therefore 3p^2q + 5pq^2 + 2pqr = -10$$

$$(vi) p^4 + q^4 - r^4$$

Substituting  $p = -2$ ,  $q = -1$  and  $r = 3$  in the given expression, we get

$$\begin{aligned}
 p^4 + q^4 - r^4 &= (-2)^4 + (-1)^4 - (3)^4 \\
 &= (-2 \times -2 \times -2 \times -2) + (-1 \times -1 \times -1 \times -1) - (3 \times 3 \times 3 \times 3) \\
 &= (16) + (1) - (81) \\
 &= 17 - 81 \\
 &= -64
 \end{aligned}$$

$$\therefore p^4 + q^4 - r^4 = -64$$

4. Write the coefficient of

(i)  $x$  in  $13x$

(ii)  $y$  in  $-5y$

(iii)  $a$  in  $6ab$

(iv)  $z$  in  $-7xz$

(v)  $p$  in  $-2pqr$

(vi)  $y^2$  in  $8xy^2z$

(vii)  $x^3$  in  $x^3$

(viii)  $x^2$  in  $-x^2$

Solution

(i) The coefficient of  $x$  in  $13x$  is 13

(ii) The coefficient of  $y$  in  $-5y$  is -5

(iii) The coefficient of  $a$  in  $6ab$  is 6b

- (iv) The coefficient of  $z$  in  $-7xz$  is  $-7x$   
(v) The coefficient of  $p$  in  $-2pqr$  is  $-2qr$   
(vi) The coefficient of  $y^2$  in  $8xy^2z$  is  $8xz$   
(vii) The coefficient of  $x^3$  in  $x^3$  is  $1$   
(viii) The coefficient of  $x^2$  in  $-x^2$  is  $-1$

5. Write the numerical coefficient of

- (i)  $ab$   
(ii)  $-6bc$   
(iii)  $7xyz$   
(iv)  $-2x^3y^2z$

Solutions

- (i) The numerical coefficient of  $ab$  is  $1$   
(ii) The numerical coefficient of  $-6bc$  is  $-6$   
(iii) The numerical coefficient of  $7xyz$  is  $7$   
(iv) The numerical coefficient of  $-2x^3y^2z$  is  $-2$

6.

SOLUTION

- (i) The constant term of  $3x^2 + 5x + 8$  is  $8$   
(ii) The constant term of  $2x^2 - 9$  is  $-9$   
(iii) The constant term of  $4y^2 - 5y + \frac{3}{5}$  is  $\frac{3}{5}$   
(iv) The constant term of  $z^3 - 2x^2 + z - \frac{8}{3}$  is  $-\frac{8}{3}$

7.

SOLUTION

- (i) monomial  
(ii) binomial  
(iii) monomial  
(iv) trinomial

- (v) trinomial
- (vi) monomial
- (vii) none
- (viii) monomial
- (ix) binomial

8.

(i) All the terms of the algebraic expression

$$4x^5 - 6y^4 + 7x^2y - 9 \text{ are } 4x^5, -6y^4, +7x^2y, -9$$

(ii) All the terms of the algebraic expression

$$9x^3 - 5z^4 + 7x^3y - xyz \text{ are } 9x^3, -5z^4, +7x^3y, -xyz$$

9.

SOLUTION

(i)  $a^2, -2a^2$

ii)  $-yz, \frac{1}{2}zy$

iii)  $-2xy^2, 5y^2x$

iv)  $ab^2c, acb^2, b^2ac, cab^2$

