

## NCERT Solutions for Class 7 Maths

### Chapter 10 – Algebraic Expression

#### Exercise 10.1

1. Get the algebraic expressions in the following cases using variables, constants and arithmetic operations:

(i) Subtraction of  $z$  from  $y$ .

Ans:  $y - z$

(ii) One-half of the sum of numbers  $x$  and  $y$ .

Ans:  $\frac{x + y}{2}$

(iii) The number  $z$  multiplied by itself.

Ans:  $z^2$

(iv) One-fourth of the product of numbers  $p$  and  $q$ .

Ans:  $\frac{pq}{4}$

**(v) Numbers  $x$  and  $y$  both squared and added.**

**Ans:**  $x^2 + y^2$

**(vi) Number 5 added to three times the product of  $m$  and  $n$ .**

**Ans:**  $3mn + 5$

**(vii) Product of numbers  $y$  and  $z$  subtracted from 10.**

**Ans:**  $10 - yz$

**(viii) Sum of numbers  $a$  and  $b$  subtracted from their product.**

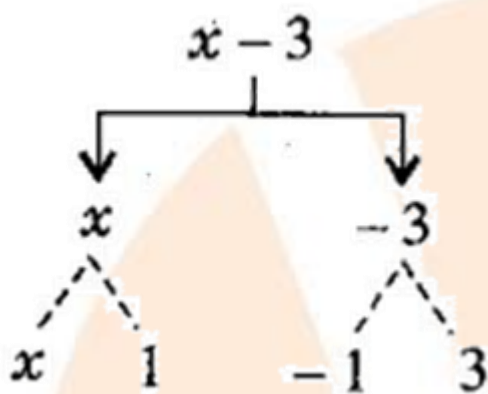
**Ans:**  $ab - (a + b)$

**2.**

**(i) Identify the terms and their factors in the following expressions, show the term and factors by tree diagram:**

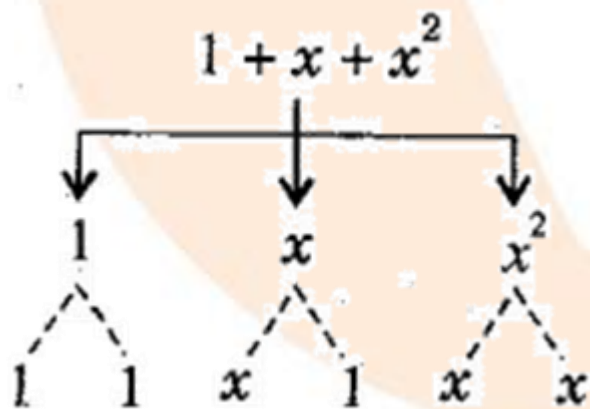
**(a)**  $x - 3$

**Ans:** Terms:  $x, -3$



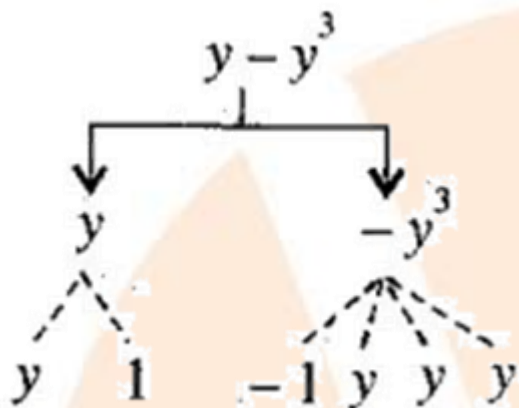
**(b)**  $1 + x + x^2$

**Ans:** Terms:  $1, x, x^2$



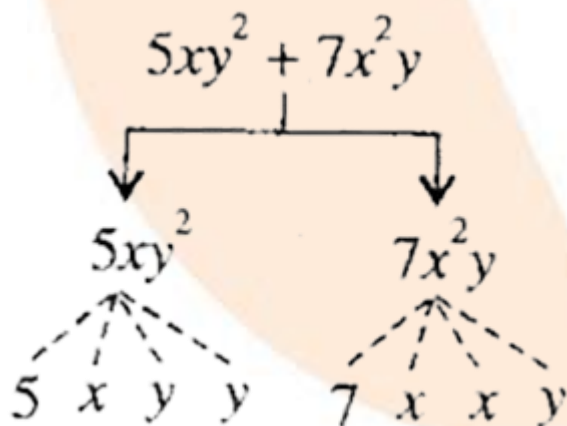
**(c)**  $y - y^3$

**Ans:** Terms:  $y, -y^3$



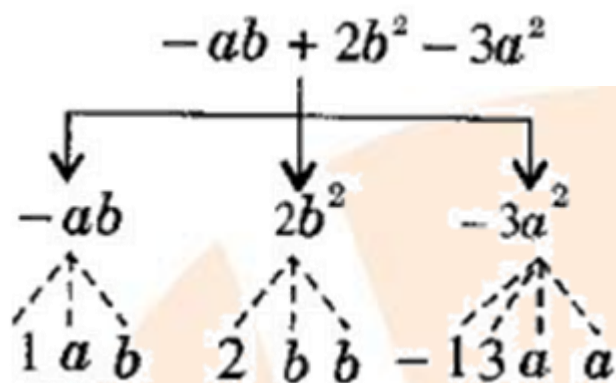
**(d)**  $5xy^2 + 7x^2y$

**Ans:** Terms:  $5xy^2, 7x^2y$



**(e)**  $-ab + 2b^2 - 3a^2$

**Ans:** Terms:  $-ab, 2b^2, -3a^2$



(ii) Identify the terms and factors in the given expressions given below:

(a)  $-4x + 5$

**Ans:** Terms:  $-4x, 5$  and factors:  $-4, x; 5$

(b)  $-4x + 5y$

**Ans:** Terms:  $-4x, 5y$  and factors:  $-4, x; 5, y$

(c)  $5y + 3y^2$

**Ans:** Terms:  $5y, 3y^2$  and factors:  $5, y; 3, y, y$

(d)  $xy + 2x^2y^2$

**Ans:** Terms:  $xy, 2x^2y^2$  and factors:  $x, y; 2, x, x, y, y$

**(e)**  $pq + q$

**Ans:** Terms:  $pq, q$  and factors:  $p, q; q$

**(f)**  $1.2ab - 2.4b + 3.6a$

**Ans:** Terms:  $1.2ab, -2.4b, 3.6a$  and factors:  $1.2, a, b; -2.4, b; 3.6, a$

**(g)**  $\frac{3}{4}x + \frac{1}{4}$

**Ans:** Terms:  $\frac{3}{4}x, \frac{1}{4}$  and factors:  $\frac{3}{4}, x; \frac{1}{4}$ .

**(h)**  $0.1p^2 + 0.2q^2$

**Ans:** Terms:  $0.1p^2, 0.2q^2$  and factors:  $0.1, p, p; 0.2, q, q^2$ .

**3. Identify the numerical coefficients of terms (other than constants) in the following expressions:**

**(i)**  $5 - 3t^2$

**Ans:** Terms:  $-3t^2$ , Numerical coefficients:  $-3$

(ii)  $1+t+t^2+t^3$

**Ans:** Terms:  $t, t^2, t^3$  , Numerical coefficients: 1,1,1

(iii)  $x+2xy+3y$

**Ans:** Terms:  $x, 2xy, 3y$  , Numerical coefficients: 1,2,3

(iv)  $100m+1000n$

**Ans:** Terms:  $100m, 1000n$  , Numerical coefficients: 100,100

(v)  $p^2q^2+7pq$

**Ans:** Terms:  $-p^2q^2, 7pq$  , Numerical coefficients: -1,7

(vi)  $1.2a+0.8b$

**Ans:** Terms:  $1.2a, 0.8b$  , Numerical coefficients: 1.2,0.8

(vii)  $3.14r^2$

**Ans:** Terms:  $3.14r^2$  , Numerical coefficients: 3.14

(viii)  $2^{(l+b)}$

**Ans:** Terms:  $2l, 2b$ , Numerical coefficients: 2, 2

(ix)  $0.1y + 0.01y^2$

**Ans:** Terms:  $0.1y, 0.01y^2$ , Numerical coefficients: 0.1, 0.01

4.

(a) Identify terms which contain  $x$  and give the coefficient of  $x$ .

(1)  $y^2x + y$

**Ans:** Terms:  $y^2x$ , coefficients:  $y^2$

(2)  $13y^2 - 8yx$

**Ans:** Terms:  $-8yx$ , coefficients:  $-8y$

(3)  $x + y + 2$

**Ans:** Terms:  $x$ , coefficients: 1

(4)  $5 + z + zx$

**Ans:** Terms:  $zx$ , coefficients:  $z$

(5)  $1 + x + xy$

**Ans:** Terms:  $x, xy$ , coefficients:  $1, y$

(6)  $12xy^2 + 25$

**Ans:** Terms:  $12xy^2$ , coefficients:  $12y^2$

(7)  $7x + xy^2$

**Ans:** Terms:  $7x, xy^2$ , coefficients:  $7, y^2$

**(b) Identify terms which contain  $y^2$  and give the coefficient of  $y^2$ .**

(1)  $8 - xy^2$

**Ans:** Terms:  $-xy^2$ , coefficients:  $-x$

(2)  $5y^2 + 7x$

**Ans:** Terms:  $5y^2$ , coefficients:  $5$

(3)  $2x^2y - 15xy^2 + 7y^2$

**Ans:** Terms:  $-15xy^2, 7y^2$ , coefficients:  $-15x, 7$

**5. Classify into the monomial, binomial and trinomials:**

1.  $4y - 7x$

**Ans:** Binomial

2.  $y^2$

**Ans:** Monomial

3.  $x + y - yx$

**Ans:** Trinomial

4.  $100$

**Ans:** Monomial

5.  $ab - a - b$

**Ans:** Trinomial

6.  $5 - 3t$

**Ans:** Binomial

7.  $4p^2q - 4pq^2$

**Ans:** Binomial

8.  $7mn$

**Ans:** Monomial

9.  $z^2 - 3z + 8$

**Ans:** Trinomial

10.  $a^2 + b^2$

**Ans:** Binomial

11.  $z^2 + z$

**Ans:** Binomial

12.  $1 + x + x^2$

**Ans:** Trinomial

**6. State whether a given pair of terms is of like or unlike terms:**

1. 1, 100

**Ans:** Like terms

2.  $-7x, \frac{5}{2}x$

**Ans:** Like terms

3.  $-29x, -29y$

**Ans:** Unlike terms

4.  $14xy, 42yx$

**Ans:** Like terms

5.  $4m^2p, 4mp^2$

**Ans:** Unlike terms

6.  $12xz, 12x^2z^2$

**Ans:** Unlike terms

**7. Identify like terms in the following:**

(1)  $-xy^2, -4yx^2, 8x^2, 2xy^2, 7y, -11x^2, -100x, -11yx, 20x^2y, -6x^2, y, 2xy, 3x$

**Ans:** Like terms are:

$(-xy^2, 2xy^2), (-4yx^2, 20x^2y), (8x^2, -11x^2, -6x^2), (7y, y), (-100x, 3x), (-11yx, 2xy)$

(2)  $10pq, 7p, 8q, -p^2q^2, -7qp, -100q, -23, 12q^2p^2, -5p^2, 41, 2405p, 78qp, 13p^2q, qp^2, 701p^2$

**Ans:** Like terms are:

$(10pq, -7qp, 78pq), (7p, 2405p), (8q, -100q), (-p^2q^2, 12p^2q^2), (-23, 41), (-5p^2, 701p^2), (13p^2q, qp^2)$

**Exercise 10.2**

**1. If  $m = 2$ , find the value of:**

(a)  $m - 2$

**Ans:**  $\Rightarrow m - 2$

$\Rightarrow 2 - 2$

$\Rightarrow 0$

(b)  $3m - 5$

**Ans:**  $\Rightarrow 3m - 5$

$\Rightarrow 6 - 5$

$\Rightarrow 1$

(c)  $9 - 5m$

**Ans:**  $\Rightarrow 9 - 5m$

$\Rightarrow 9 - 10$

$\Rightarrow -1$

(d)  $3m^2 - 2m - 7$

**Ans:**  $\Rightarrow 3m^2 - 2m - 7$

$\Rightarrow 12 - 4 - 7$

$\Rightarrow 1$

(e)  $\frac{5}{2}m - 4$

**Ans:**  $\Rightarrow \frac{5}{2}m - 4$

$$\Rightarrow 5 - 4$$

$$\Rightarrow 1$$

**2. If  $p = -2$ , find the value of:**

**(a)**  $4p + 7$

**Ans:**  $\Rightarrow 4p + 7$

$$\Rightarrow -8 + 7$$

$$\Rightarrow -1$$

**(b)**  $-3p^2 + 4p + 7$

**Ans:**  $\Rightarrow -3p^2 + 4p + 7$

$$\Rightarrow -3 \times 4 + 4(-2) + 7$$

$$\Rightarrow -12 - 8 + 7$$

$$\Rightarrow -13$$

**(c)**  $-2p^3 - 3p^2 + 4p + 7$

**Ans:**  $\Rightarrow -2p^3 - 3p^2 + 4p + 7$

$$\Rightarrow -2(-8) - 3 \times 4 - 8 + 7$$

$$\Rightarrow 16 - 12 - 8 + 7$$

$$\Rightarrow 3$$

**3. Find the value of the following expressions, when  $x = -1$ :**

**(a)**  $2x - 7$

**Ans:**  $\Rightarrow 2x - 7$

$$\Rightarrow 2(-1) - 7$$

$$\Rightarrow -9$$

**(b)**  $-x + 2$

**Ans:**  $\Rightarrow -x + 2$

$$\Rightarrow -(-1) + 2$$

$$\Rightarrow 3$$

**(c)**  $x^2 + 2x + 1$

**Ans:**  $\Rightarrow x^2 + 2x + 1$

$$\Rightarrow (-1)^2 + 2(-1) + 1$$

$$\Rightarrow 0$$

**(d)**  $2x^2 - x - 2$

**Ans:**  $\Rightarrow 2x^2 - x - 2$

$$\Rightarrow 2(-1)^2 - (-1) - 2$$

$$\Rightarrow 1$$

**4. If  $a = 2, b = -2$ , find the value of:**

**(a)**  $a^2 + b^2$

**Ans:**  $\Rightarrow (-2)^2 + (-2)^2$

$$\Rightarrow 4 + 4$$

$$\Rightarrow 8$$

**(b)**  $a^2 + ab + b^2$

**Ans:**

$$\Rightarrow (-2)^2 + (-2)(-2) + (-2)^2$$

$$\Rightarrow 4 - 4 + 4$$

$$\Rightarrow 4$$

**(c)**  $a^2 - b^2$

**Ans:**  $\Rightarrow (-2)^2 - (-2)^2$

$$\Rightarrow 4 - 4$$

$$\Rightarrow 0$$

**5. If  $a = 0, b = -1$ , find the value of given expression:**

**(a)**  $2a + 2b$

**Ans:**  $\Rightarrow 2(0) + 2(-1)$

$$\Rightarrow 0 - 2$$

$$\Rightarrow -2$$

**(b)**  $2a^2 + b^2 + 1$

**Ans:**  $\Rightarrow 2(0)^2 + (-1)^2 + 1$

$$\Rightarrow 0+1+1$$

$$\Rightarrow 2$$

**(c)**  $2a^2b + 2ab^2 + ab$

**Ans:**  $\Rightarrow 2(0)^2(-1) + 2(0)(-1)^2 + (0)(-1)$

$$\Rightarrow 0$$

**(d)**  $a^2 + ab + 2$

**Ans:**  $\Rightarrow (0)^2 + (0)(-1) + 2$

$$\Rightarrow 0+0+2$$

$$\Rightarrow 2$$

**6. Simplify the expressions and find the value if  $x$  is equal to 2 :**

**(a)**  $x + 7 + 4(x - 5)$

**Ans:**

$$\Rightarrow x + 7 + 4x - 20$$

$$\Rightarrow 5x - 13$$

$$\Rightarrow 5 \times 2 - 13$$

$$\Rightarrow 10 - 13$$

$$\Rightarrow -3$$

**(b)**  $3(x+2)+5x-7$

**Ans:**

$$\Rightarrow 3x+6+5x-7$$

$$\Rightarrow 8x-1$$

$$\Rightarrow 8 \times 2 - 1$$

$$\Rightarrow 16 - 1$$

$$\Rightarrow 15$$

**(c)**  $6x+5(x-2)$

**Ans:**

$$\Rightarrow 6x+5x-10$$

$$\Rightarrow 11x-10$$

$$\Rightarrow 11 \times 2 - 10$$

$$\Rightarrow 22 - 10$$

$$\Rightarrow 12$$

(d)  $4(2x - 1) + 3x + 11$

**Ans:**

$$\Rightarrow 8x - 4 + 3x + 11$$

$$\Rightarrow 11x + 7$$

$$\Rightarrow 11 \times 2 + 7$$

$$\Rightarrow 22 + 7$$

$$\Rightarrow 29$$

**7. Simplify these expressions and find their values if  $x = 3, a = -1, b = -2$  :**

(a)  $3x - 5 - x + 9$

**Ans:**

$$\Rightarrow 2x + 4$$

$$\Rightarrow 2 \times 3 + 4$$

$$\Rightarrow 6 + 4$$

$$\Rightarrow 10$$

**(b)**  $2 - 8x + 4x + 4$

**Ans:**

$$\Rightarrow 6 - 4x$$

$$\Rightarrow 6 - 4 \times 3$$

$$\Rightarrow 6 - 12$$

$$\Rightarrow -6$$

**(c)**  $3a + 5 - 8a + 1$

**Ans:**

$$\Rightarrow 6 - 5a$$

$$\Rightarrow 6 - 5(-1)$$

$$\Rightarrow 6 + 5$$

$$\Rightarrow 11$$

**(d)**  $10 - 3b - 4 - 5b$

**Ans:**

$$\Rightarrow 6 - 8b$$

$$\Rightarrow 6 - 8(-2)$$

$$\Rightarrow 6 + 16$$

$$\Rightarrow 22$$

**(e)**  $2a - 2b - 4 - 5 + a$

**Ans:**

$$\Rightarrow 3a - 2b - 9$$

$$\Rightarrow 3(-1) - 2(-2) - 9$$

$$\Rightarrow -3 + 4 - 9$$

$$\Rightarrow -8$$

**8.**

**(a)** If  $z = 10$ , find the value of  $z^3 - 3(z - 10)$

**Ans:**

$$\Rightarrow (10)^3 - 3(10 - 10)$$

$$\Rightarrow 1000 - 0$$

$$\Rightarrow 1000$$

**(b) If  $p = -10$ , find the value of  $p^2 - 2p - 100$**

**Ans:**

$$\Rightarrow (-10)^2 - 2(-10) - 100$$

$$\Rightarrow 100 + 20 - 100$$

$$\Rightarrow 20$$

**9. What should be the value of  $a$  if the value of  $2x^2 + x - a$  equal to 5, when  $x = 0$  ?**

**Ans:**

Putting  $x = 0$  in  $2x^2 + x - a = 5$ , we get

$$2(0)^2 + 0 - a = 5$$

$$0 + 0 - a = 5$$

$$a = -5$$

Hence, the value of  $a$  is  $-5$ .

**10. Simplify the expression and find its value when  $a = 5$  and  $b = -3$ :  $2(a^2 + ab) + 3 - ab$**

**Ans:**

Simplifying the equation,

$$\Rightarrow 2(a^2 + ab) + 3 - ab$$

$$\Rightarrow 2a^2 + 2ab + 3 - ab$$

$$\Rightarrow 2a^2 + ab + 3$$

Putting  $a = 5$  and  $b = -3$  in the above equation

$$\Rightarrow 2(5)^2 + 5(-3) + 3$$

$$\Rightarrow 2 \times 25 - 15 + 3$$

$$\Rightarrow 50 - 15 + 3$$

$$\Rightarrow 38$$

Value of the expression after simplifying and putting  $a = 5$  and  $b = -3$  is 38.