



SpeedLabs

MATHS

ICSE 8th

TEEVRA EDUTECH PVT. LTD.

ALGEBRAIC EXPRESSIONS AND IDENTITIES

1. Identify monomials, binomials and trinomials from the following:

(i) $\frac{1}{2}a^2b^2c^2$

Ans. Monomial

(ii) $7x \times y^2 \times z^2$

Ans. Monomial

(iii) $2x + 5$

Ans. Binomial

(iv) $8a \div 9b - 2a^2 \times b^2$

Ans. Binomial

(v) $xy + yz + zx$

Ans. Trinomial

(vi) $\frac{x^2 - 2y^2 + 3z^2}{3}$

Ans. Trinomial

2. If $a = 4$ and $b = 5$, find the value of $a^3 + b^3 - 3a^2b + 3ab^2$.

Ans. $a^3 + b^3 - 3a^2b + 3ab^2$

$$= 4^3 + 5^3 - 3 \times 4^2 \times 5 + 3 \times 4 \times 5^2 = 249$$

3. Add: $5x^2y, -3x^2y, \frac{1}{2}x^2y, \frac{4}{5}x^2y$

Ans. $5x^2y, -3x^2y, \frac{1}{2}x^2y, \frac{4}{5}x^2y$

$$5x^2y + (-3x^2y) + \frac{1}{2}x^2y + \frac{4}{5}x^2y$$

$$= (5 - 3 + \frac{1}{2} + \frac{4}{5})x^2y$$

$$= \frac{33}{10}x^2y$$

4. Subtract:

(i) $-5xy^2$ from $-3xy^2$

Ans. $-3xy^2 - (-5xy^2) = 2xy^2$

(ii) $\frac{(-3)}{7}x^2y$ from $\frac{1}{3}x^2y$

Ans. $\frac{1}{3}x^2y - \frac{(-3)}{7}x^2y = \frac{16}{21}x^2y$

5. Add the following expression;

(i) $3x + 8y - 5z$, $7x - 9y + 6z$, $x - 2y - 3z$, $-5x + 3y + z$

$$3x + 8y - 5z$$

$$7x - 9y + 6z$$

Ans. $x - 2y - 3z$

$$+ -5x + 3y + z$$

$$\hline 6x \quad -z$$

(ii) $7xy + yz - 3zx$, $2yz + zx - 5xy$, $2zx - 3yz + 4xy$

$$7xy + yz - 3zx$$

$$-5xy + 2yz + zx$$

Ans. $+4xy - 3yz + 2zx$

$$\hline 6xy$$

6. Subtract the following expression;

(i) $7x^3 - 6x^2y + 9xy^2 - 2y^3$ from $3x^2y - 2x^3 + y^3 - 5xy^2$

$$3x^2y - 2x^3 + y^3 - 5xy^2$$

Ans. $-6x^2y + 7x^3 - 2y^3 + 9xy^2$

$$+ \quad - \quad + \quad -$$

$$\hline 9x^2y - 9x^3 + 3y^3 - 14xy^2$$

(ii) $1 - x + 2x^2 - x^3$ from $2x^3 - x^2 + 3x + 2$

$$2x^3 - x^2 + 3x + 2$$

Ans. $-x^3 + 2x^2 - x + 1$

$$+ \quad - \quad + \quad -$$

$$\hline 3x^3 - 3x^2 + 4x + 1$$

7. Subtract the sum of $4x^2 + 7xy + 3y^2 + 1$ and $2x^2 - 5xy - 2y^2 + 8$ from $9x^2 - 8xy + 11y^2$.

Ans. First Add

$$4x^2 + 7xy + 3y^2 + 1$$

$$2x^2 - 5xy - 2y^2 + 8$$

$$\hline 6x^2 + 2xy + y^2 + 9$$

Then Subtract

$$9x^2 - 8xy + 11y^2$$

$$6x^2 + 2xy + y^2 + 9$$

$$\begin{array}{r} - \quad - \quad - \quad - \\ \hline 3x^2 - 10xy + 10y^2 - 9 \end{array}$$

8. What must be subtract from $a^2 + b^2 + c^2 - 3abc$ to get $2a^2 - b^2 - 3c^2 + abc$.

$$a^2 + b^2 + c^2 - 3abc$$

Ans. $2a^2 - b^2 - 3c^2 + abc$

$$\begin{array}{r} - \quad + \quad + \quad - \\ \hline -a^2 + 2b^2 + 4c^2 - 4abc \end{array}$$

9. Multiply:

(i) $(2x^2 - 5x + 6) \times (-3x)$

Ans. $= -6x^3 + 15x^2 - 18x$

(ii) $(y - 4)(y - 6) = y^2 - 4y - 6y + 24$

Ans. $= y^2 + 10y + 24$

(iii) $(5x + 4y)(2x - 3y) = 10x^2 + 8xy - 15xy - 12y^2$

Ans. $= 10x^2 - 7xy - 12y^2$

(iv) $(4x^2 + 3x - 5) \times (2x + 3)$

Ans. $(4x^2 + 3x - 5) \times (2x + 3)$

$$= 8x^3 + 6x^2 - 10x + 12x^2 + 9x - 15$$

$$= 8x^3 + 18x^2 - x - 15$$

(v) $(4x^2 - 4x + 1) \times (2x^2 + x - 2)$

Ans. $= 8x^4 - 8x^3 + 2x^2 + 4x^3 - 4x^2 + x - 8x^2 + 8x - 2$

$$= 8x^4 - 4x^3 - 10x^2 + 9x - 2$$

(vi) $(3x^5 - 7x^3 + 2x^2 - x + 4) \times (x^3 - 2x^2 + 3x - 1)$

Ans. $(3x^5 - 7x^3 + 2x^2 - x + 4) \times (x^3 - 2x^2 + 3x - 1)$

$$= 3x^8 - 7x^6 + 2x^5 - x^4 + 4x^3 + 14x^5 - 4x^4 + 2x^3 - 6x^7 - 8x^2 + 9x^6 - 21x^4 + 6x^3 - 3x^2 + 12x - 3x^5 + 7x^3 - 2x^2 + x - 4$$

$$= 3x^8 + 2x^6 + 13x^5 - 26x^4 + 19x^3 - 6x^7 + 13x^2 + 13x - 4$$

10. Divide:

(i)
$$\frac{6ax - 3cx + 15x}{-3x}$$

Ans. $-2a + c - 5$

(ii)
$$\frac{\frac{1}{2}p^2q^3 - \frac{5}{3}p^3q^2 + \frac{1}{4}p^3q^3}{-\frac{1}{4}p^2q^2}$$

Ans. $-2q + \frac{5}{2}p - pq$

(iii) $x^3 - 3x^2y + 3xy^2 - y^3$ divide by $x - y$

$$\begin{array}{r} x - y \overline{) x^3 - 3x^2y + 3xy^2 - y^3} (x^2 - 2xy + y^2 \\ \underline{(-) x^3 - x^2y} \\ -2x^2y + 3xy^2 - y^3 \\ \underline{(-) -2x^2y + 2xy^2} \\ xy^2 - y^3 \\ \underline{(-) xy^2 - y^3} \\ 0 \end{array}$$

(iv) $112x^2 + 7xy - 12y^2$ divide by $3x + 4y$

$$\begin{array}{r} 3x + 4y \overline{) 12x^2 + 7xy - 12y^2} (4x - 3y \\ \underline{(-) 12x^2 + 16xy} \\ -9xy - 12y^2 \\ \underline{(-) -9xy - 12y^2} \\ 0 \end{array}$$

(v) $x^6 - y^6$ Divide by $x - y$

$$\begin{array}{r}
 x - y \overline{)x^6 - y^6} (x^5 + x^4y + x^3y^2 + x^2y^3 + xy^4 + y^5 \\
 \underline{(-) x^6 - x^5y} \\
 x^5y - y^6 \\
 \underline{(-) x^5y - x^4y^2} \\
 x^4y^2 - y^6 \\
 \underline{(-) x^4y^2 - x^3y^3} \\
 x^3y^3 - y^6 \\
 \underline{(-) x^3y^3 - x^2y^4} \\
 x^2y^4 - y^6 \\
 \underline{(-) x^2y^4 - xy^5} \\
 xy^5 - y^6 \\
 \underline{(-) xy^5 - y^6} \\
 0
 \end{array}$$

11. Find Remainder and Quotient for the following:

(i)

$$\begin{array}{r}
 t^2 + 3t + 2 \overline{)3t^5 + 7t^4 - 11t^3 + 8t^2 - 32t + 5} (3t^3 - 2t^2 - 11t + 45 \\
 \underline{(-) 3t^5 + 9t^4 + 6t^3} \\
 -2t^4 - 17t^3 + 8t^2 - 32t + 5 \\
 \underline{(-) -2t^4 - 6t^3 - 4t^2} \\
 -11t^3 + 12t^2 - 32t + 5 \\
 \underline{(-) -11t^3 - 33t^2 - 22t} \\
 45t^2 - 10t + 5 \\
 \underline{(-) 45t^2 - 135t + 90} \\
 25t - 85
 \end{array}$$

Quotient : $3t^3 - 2t^2 - 11t + 45$

Remainder : $25t - 85$

12. There are $(3x + 5y)$ she has in a library and in each shelf are $(5x + 3y)$ books. How many books are there in the library?

Ans. Total No. of Book

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

$$= 15x^2 + 25xy + 9xy + 15y^2$$

$$= 15x^2 + 34xy + 15y^2$$

13. If a sum of Rs. $(16x^3 - 46x^2 + 39x - 9)$ is to be divided equally among $(8x - 3)$ persons, find the amount received by each person.

Ans.

$$\begin{array}{r}
 8x - 3 \overline{) 16x^3 - 46x^2 + 39x - 9} \quad (2x^2 - 5x + 3) \\
 \underline{(-) 16x^3 - 6x^2} \\
 -40x^2 + 39x - 9 \\
 \underline{(-) -40x^2 + 15x} \\
 24x - 9 \\
 \underline{(-) 24x - 3} \\
 0
 \end{array}$$

Quotient : $2x^2 - 5x + 3$

Remainder : 0

Each one will get $2x^2 - 5x + 3$ Rs.

14. The length and breadth of a rectangle are $(a + 5b)$ units and $(7a - b)$ units respectively. The perimeter of the rectangle is equal to the perimeter of the square. Find the how much in the area of the rectangle can there of the square.

Ans. Perimeter of Rectangle = $2(a + 5b) + 2(7a - b)$

$$= 16a + 8b$$

$$\text{Area of Rectangle} = (a + 5b)(7a - b)$$

$$= 7a^2 + 35ab - ab - 5b^2$$

$$= 7a^2 + 34ab - 5b^2$$

$$\text{Side of the square} = \frac{16a + 8b}{4} = (4a + 2b)$$

$$\text{Area of square} = (4a + 2b)(4a + 2b)$$

$$= 16a^2 + 8ab + 8ab + 4b^2$$

$$= 16a^2 + 16ab + 4b^2$$

$$\text{Area of square} - \text{Area of rectangle}$$

$$= 16a^2 + 16ab + 4b^2 - 7a^2 - 34ab + 5b^2$$

$$= 9a^2 - 18ab + 9b^2$$

15. Simplify each of the following algebraic expression:

(i) $42c \div 14 \times 3 - 10c \div 5 + c$

Ans. $42c \div 14 \times 3 - 10c \div 5 + c$

$$= 3c \times 3 - 2c + c$$

$$= 9c - 2c + c = 8c$$

(ii) $9.6a \div 0.32 \times 2 + 4.5a \div 0.5 \text{ of } 3 - 2a$

Ans. $9.6a \div 0.32 \times 2 + 4.5a \div 0.5 \text{ of } 3 - 2a$

$$= 9.6a \div 0.32 \times 2 + 4.5a \div 1.5 - 2a$$

$$= 60a + 3a - 2a = 61a$$

(iii) $5a - [2b - \{2a - 4(a - 2b) - 3(b - 2a - b)\}]$

Ans. $5a - [2b - \{2a - 4(a - 2b) - 3(b - 2a - b)\}]$

$$= 5a - [2b - \{2a - 4(a - 2b) - 3(b - 2a + b)\}]$$

$$= 5a - [2b - \{2a - 4a + 8b - 6b + 6a\}]$$

$$= 5a - [2b - \{4a + 2b\}] = 9a$$

(iv) $11a - [-7m - \{6x - (4m - 2a - 6x)\}]$

Ans. $= 11a - [-7m - \{6x - (4m - 2a + 6x)\}]$

$$= 11a - [-7m - \{6x - 4m + 2a - 6x\}]$$

$$= 11a - [-7m - \{6x - 4m + 2a - 6x\}]$$

$$= 11a - [-7m + 4m - 2a]$$

$$= 11a + 7m - 4m + 2a = 13a + 3m$$