

Algebraic Expressions and Identities: Exercise 9.1

Q.1 Identify the terms, their coefficients for each of the following expressions.

(i) $5xyz^2 - 3zy$

(ii) $1 + x + x^2$

(iii) $4x^2y^2 - 4x^2y^2z^2 + z^2$

(iv) $3 - pq + qr - rp$

(v) $\frac{x}{2} + \frac{y}{2} - xy$

(vi) $0.3a - 0.6ab + 0.5b$

Sol. (i) Given: $5xyz^2 - 3zy$

Terms: $5xyz^2$ and $-3zy$ (2-terms)

Coefficients: 5 in term $5xyz^2$ and -3 in term $-3zy$

(ii) Given: $1 + x + x^2$

Terms: 1, x and x^2 (3-terms)

Coefficients: 1 in term 1, 1 in term x and 1 in term x^2 .

(iii) Given: $4x^2y^2 - 4x^2y^2z^2 + z^2$

Terms: $4x^2y^2$, $-4x^2y^2z^2$ and z^2 (3-terms)

Coefficients: 4 in term $4x^2y^2$, -4 in term $-4x^2y^2z^2$ and 1 in term z^2

(iv) Given: $3 - pq + qr - rp$

Terms: 3, $-pq$, qr and $-rp$ (4-terms)

Coefficients: 3 in term 3, -1 in term $-pq$, 1 in term qr and -1 in term $-rp$.

(v) Given: $\frac{x}{2} + \frac{y}{2} - xy$

Terms: $\frac{x}{2}$, $\frac{y}{2}$ and $-xy$ (3-terms)

Coefficients: $\frac{1}{2}$ in terms $\frac{x}{2}$, $\frac{1}{2}$ in terms $\frac{y}{2}$ and -1 in term $-xy$

(vi) Given: $0.3a - 0.6ab + 0.5b$

Terms: $0.3a$, $-0.6ab$ and $0.5b$ (4-terms)

Coefficients: 0.3 in term $0.3a$, -0.6 in term $-0.6ab$ and 0.5 in term $0.5b$.

Q.2 Classify the following polynomials as monomials, binomials, trinomials. Which polynomials do not fit in any of these three categories?

$x + y$, 1000, $x + x^2 + x^3 + x^4$, $7 + y + 5x$, $2y - 3y^2$, $2y - 3y^2 + 4y^3$, $5x - 4y + 3xy$, $4z - 15z^2$, $ab + bc + cd + da$, pqr , $p^2q + pq^2$, $2p + 2q$.

Sol. The classification of polynomials as monomials, binomials, trinomials and Not fit in any of these categories:

Monomials	1000, pqr
Binomials	$x + y$, $2y - 3y^2$, $4z - 15z^2$, $p^2q + pq^2$, $2p + 2q$
Trinomials	$7 + y + 5x$, $2y - 3y^2 + 4y^3$, $5x - 4y + 3xy$
Not fit in any of these categories	$x + x^2 + x^3 + x^4$, $ab + bc + cd + da$

Q.3 Add the following.

(i) $ab - bc$, $bc - ca$, $ca - ab$

(ii) $a - b + ab$, $b - c + bc$, $c - a + ac$

(iii) $2p^2q^2 - 3pq + 4$, $5 + 7pq - 3p^2q^2$

(iv) $l^2 + m^2$, $m^2 + n^2$, $n^2 + l^2$, $2lm + 2mn + 2nl$

Sol. (i) Given: $ab - bc, bc - ca, ca - ab$

By adding all the terms,

$$\begin{aligned}(ab - bc) + (bc - ca) + (ca - ab) &= ab - bc + bc - ca + ca - ab \\&= ab - ab - bc + bc - ca + ca \\&= 0\end{aligned}$$

Thus, addition of the terms, $ab - bc, bc - ca, ca - ab = 0$

(ii) Given: $a - b + ab, b - c + bc, c - a + ac$

By adding all the terms,

$$\begin{aligned}(a - b + ab) + (b - c + bc) + (c - a + ac) &= a - b + ab + b - c + bc + c - a + ac \\&= a - a - b + b + ab - c + c + bc + ac \\&= ab + bc + ac\end{aligned}$$

Thus, addition of $a - b + ab, b - c + bc, c - a + ac = ab + bc + ac$

(iii) Given: $2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2$

By adding all the terms,

$$\begin{aligned}(2p^2q^2 - 3pq + 4) + (5 + 7pq - 3p^2q^2) &= 2p^2q^2 - 3pq + 4 + 5 + 7pq - 3p^2q^2 \\&= 2p^2q^2 - 3p^2q^2 - 3pq + 7pq + 4 + 5 \\&= -p^2q^2 + 4pq + 9\end{aligned}$$

Thus, addition of $2p^2q^2 - 3pq + 4, 5 + 7pq - 3p^2q^2 = -p^2q^2 + 4pq + 9$

(iv) Given: $l^2 + m^2, m^2 + n^2, n^2 + l^2, 2lm + 2mn + 2nl$

By adding all the terms,

$$\begin{aligned}(l^2 + m^2) + (m^2 + n^2) + (n^2 + l^2) + (2lm + 2mn + 2nl) &= l^2 + m^2 + m^2 + n^2 + n^2 + l^2 + 2lm + 2mn + 2nl \\&= l^2 + l^2 + m^2 + m^2 + n^2 + n^2 + 2lm + 2mn + 2nl \\&= 2l^2 + 2m^2 + 2n^2 + 2lm + 2mn + 2nl\end{aligned}$$

Thus, addition of $l^2 + m^2, m^2 + n^2, n^2 + l^2, 2lm + 2mn + 2nl$

$$= 2l^2 + 2m^2 + 2n^2 + 2lm + 2mn + 2nl$$

Q.4 . (a) Subtract $4a - 7ab + 3b + 12$ from $12a - 9ab + 5b - 3$.

(b) Subtract $3xy + 5yz - 7zx$ from $5xy - 2yz - 2zx + 10xyz$.

(c) Subtract $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from $18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$.

Sol.

(a) $(12a - 9ab + 5b - 3) - (4a - 7ab + 3b + 12)$

$$\begin{aligned}&= 12a - 9ab + 5b - 3 - 4a + 7ab - 3b - 12 \\&= 12a - 4a - 9ab + 7ab + 5b - 3b - 3 - 12 \\&= 8a - 2ab + 2b - 15\end{aligned}$$

(b) $(5xy - 2yz - 2zx + 10xyz) - (3xy + 5yz - 7zx)$

$$\begin{aligned}&= 5xy - 2yz - 2zx + 10xyz - 3xy - 5yz + 7zx \\&= 5xy - 3xy - 2yz - 5yz + 10xyz + 7zx - 2zx \\&= 2xy - 7yz + 5zx + 10xyz\end{aligned}$$

(c) $(18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q) - (4p^2q - 3pq + 5pq^2 - 8p + 7q - 10)$

$$\begin{aligned}&= 18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q - 4p^2q + 3pq - 5pq^2 + 8p - 7q + 10 \\&= 18 + 10 - 3p + 8p - 11q - 7q + 5pq + 3pq - 2pq^2 - 5pq^2 + 5p^2q - 4p^2q \\&= 28 + 5p - 18q + 8pq - 7pq^2 + p^2q\end{aligned}$$