CHAPTER TWO

Factorization, Standard Form and Simplification

(With Supplementary Notes)

(Q1) Factorize completely $3a^2$ + 2ab -12ac - 8bc

. Soln

$3a^2$ + 2ab -12ac - 8bc = ($3a^2$ + 2ab) – (12ac + 8bc)

= a(3a + 2b) – (4 x 3ac + 4 x 2bc)

= a(3a + 2b) - 4c(3a + 2b) = (3a + 2b) (a - 4c),

(Q2) Factorize completely 2ap + aq – bq – 2bq

Soln

2ap + aq – bq – 2bq = (2ap + aq) – (bq + 2bp)

= a(2p + q) – b(q + 2p) = (2p + q) (a – b).

(Q3)Factorize completely mp + np – mt – nt

Soln

mp + np – mt – nt = (mp + np) – (mt + nt)

= p(m + n) – t(m + n) = (m + n) (p - t).

(Q4)(i) Factorize completely the expression 2xy – 8x + 3y - 12.

(ii) If x = 5 and y = 2, evaluate the expression in (i) .

. Soln

(i)2xy – 8x + 3y -12 = (2xy – 8x) + (3y -12),

= (2 x 1 x xy – 2 x 4 x x) + (3y – 3 x 4)

= 2x(y – 4) + 3(y – 4) = (2x + 3) (y - 4)

(ii) If x = 5 and y = 7. then (2x + 3) (y- 4)

= {2(5) + 3} {7- 4} = (10 + 3)(3) = (13)(3) = 39.

(Q5) Factorize xy + 3x + 6y + 18

Soln

xy + 3x + 6y + 18 = (xy + 3x) + (6y + 18)

= (xy + 3x) + (6y + 3 x 6)

= x(y + 3) + 6(y + 3) = (y + 3) (x + 6)

(Q6) Factorize xy – xz + 5y - 5z

Soln

xy – xz + 5y - 5z = (xy – xz) + (5y - 5z)

= x(y – z) + 5 (y - z) = (x + 5)(y – z)

(Q7) Factorize (m + n)(2x – y) – x(m + n)

N/B: Factorize or bring the (m + n) outside the bracket.

Soln

(m + n)(2x – y) – x(m + n) = (m + n) {(2x – y) – x}

= (m + n) {2x – y – x} = (m + n) {2x – x - y }

= (m + n) {x - y }.

(Q8) Factorize $3a^2$ - 8bc – 12ac + 2ba.

N/B: First group like terms.

Soln

$3a^2$ - 8bc – 12ac + 2ba = $3a^2$– 12ac - 8bc + 2ba.

= $3a^2$– 12ac + 2ba. - 8bc = ($3a^2$– 12ac) + (2ba. - 8bc)

= (3 x a x a – 3 x 4 x a x c) + (2 x a x b – 2 x 4 x b x c)

= 3a(a – 4ac) + 2b(a – 4c) = (3a + 2b)(a – 4ac)

(Q9) Factorize completely 6xy - 3y + 4x -2

Soln

6xy - 3y + 4x – 2 = (6xy - 3y) + (4x -2)

= (2 x 3 x x x y – 3 x 1 x y) + (2 x 2 x x – 2 x 1)

=3y(2x – 1) + 2(2x – 1) = (3y + 2)(2x – 1)

(Q10) Simplify $\frac{mn + mp\ nq + pq}{n+p}$

Soln

$\frac{mn + mp + nq + pq}{n+p} = \frac{(mn + mp) + (nq + pq)}{n+p}$

$= \frac{m(n+p) + q(n+p)}{n+p} = \frac{(n+p) + (m+q)}{n+p}$

= (m + q) = m + q.

Q11) Simplify $(\frac{2a+4b}{3}) - (\frac{3a-b}{2})$

Soln:

$(\frac{2a+4b}{3}) - (\frac{3a-b}{2}) = \frac{1}{3}(2a+4b) - \frac{1}{2}(3a-b)$.

Multiply through using 6

=> 6 x $\frac{1}{3}(2a+4b) - 6$ x $\frac{1}{2}(3a-b)$

2(2a + 4b) – 3(3a – b)

= 4a + 8b – 9a + 3b

= 4a – 9a + 8b + 3b

= -5a + 11b

(Q12) Simplify $3x^2 + 6x – 3y^2 + 4x^2 – 8x + 2y^2$.

Soln:

$3x^2 + 6x – 3y^2 + 4x^2 – 8x + 2y^2$

$= 3x^2 + 4x^2 – 3y^2 + 2y^2 + 6x – 8x$

$= 7x^2 – y^2 – 8x + 6x$

$= 7x^2 – y^2 – 2x.$

(Q13) Multiply (a – b) by (2b – a).

Soln:

$(a – b)(2b – a) = a \times 2b – a \times a – b \times 2b + b \times a$

$= 2ab – a^2 – 2b^2 + ba$

$= 2ab + ba – a^2 – 2b^2$

$= 2ab + ab – a^2 – 2b^2$

$= 3ab – a^2 – 2b^2.$

(Q14) Multiply (3 + x) by (5 – 2x)

Soln:

$(3 + x)(5 – 2x) = 3 \times 5 – 3 \times 2x + x \times 5 – x \times 2x$

$= 15 – 6x + 5x – 2x^2$

$= 15 – x – 2x^2$