

RD SHARMA

Solutions

Class 8 Maths

Chapter 7

Ex 7.4

Factorize each of the following expressions :

Q.1) $qr - pr + qs - ps$

Soln.:

$$\begin{aligned} &qr - pr + qs - ps \\ &= (qr - pr) + (qs - ps) \\ &= r(q - p) + s(q - p) \\ &= (r + s)(q - p) \quad \text{[taking } (q - p) \text{ as the common factor]} \end{aligned}$$

Q.2) $p^2q - pr^2 - pq + r^2$

Soln.:

$$\begin{aligned} &p^2q - pr^2 - pq + r^2 \\ &= (p^2q - pq) + (r^2 - pr^2) \\ &= pq(p - 1) + r^2(1 - p) \\ &= pq(p - 1) - r^2(p - 1) \quad \text{[since, } (1 - p) = -(p - 1)\text{]} \\ &= (pq - r^2)(p - 1) \quad \text{[taking } (p - 1) \text{ as the common factor]} \end{aligned}$$

Q.3) $1 + x + xy + x^2y$

Soln.:

$$\begin{aligned} &1 + x + xy + x^2y \\ &= (1 + x) + (xy + x^2y) \\ &= (1 + x) + xy(1 + x) \\ &= (1 + xy)(1 + x) \quad \text{[taking } (1 + x) \text{ as the common factor]} \end{aligned}$$

Q.4) $ax + ay - bx - by$

Soln.:

$$\begin{aligned} &ax + ay - bx - by \\ &= (ax + ay) - (bx + by) \\ &= a(x + y) - b(x + y) \\ &= (a - b)(x + y) \quad \text{[taking } (x + y) \text{ as the common factor]} \end{aligned}$$

Q.5) $xa^2 + xb^2 - ya^2 - yb^2$

Soln.:

$$\begin{aligned} &xa^2 + xb^2 - ya^2 - yb^2 \\ &= (xa^2 + xb^2) - (ya^2 + yb^2) \\ &= x(a^2 + b^2) - y(a^2 + b^2) \\ &= (x - y)(a^2 + b^2) \quad \text{[taking } (a^2 + b^2) \text{ as the common factor]} \end{aligned}$$

Q.6) $x^2 + xy + xz + yz$

Soln.:

$$\begin{aligned} &x^2 + xy + xz + yz \\ &= (x^2 + xy) + (xz + yz) \end{aligned}$$

$$\begin{aligned}
&= x(x+y) + z(x+y) \\
&= (x+z)(x+y) \quad [\text{taking } (x+y) \text{ s the common factor}] \\
&= (x+y)(x+z)
\end{aligned}$$

Q.7) $2ax + bx + 2ay + by$

Soln.:

$$\begin{aligned}
&2ax + bx + 2ay + by \\
&= (2ax + bx) + (2ay + by) \\
&= x(2a + b) + y(2a + b) \\
&= (x+y)(2a + b) \quad [\text{taking } (2a + b) \text{ as the common factor}]
\end{aligned}$$

Q.8) $ab - by - ay + y^2$

Soln.:

$$\begin{aligned}
&ab - by - ay + y^2 \\
&= (ab - ay) + (y^2 - by) \\
&= a(b - y) + y(y - b) \quad [\text{since, } (y - b) = -(b - y)] \\
&= a(b - y) - y(b - y) \quad [\text{taking } (b - y) \text{ as the common factor}] \\
&= (a - y)(b - y)
\end{aligned}$$

Q.9) $axy + bxy - az - bcz$

Soln.:

$$\begin{aligned}
&axy + bxy - az - bcz \\
&= (axy + bxy) - (az - bcz) \\
&= xy(a + bc) - z(a + bc) \\
&= (xy - z)(a + bc) \quad [\text{taking } (a + bc) \text{ as the common factor}]
\end{aligned}$$

Q.10) $Lm^2 - mn^2 - Lm + n^2$

Soln.:

$$\begin{aligned}
&Lm^2 - mn^2 - Lm + n^2 = (Lm^2 - Lm) + (n^2 - mn^2) \\
&= Lm(m - 1) + n^2(1 - m) \\
&= Lm(m - 1) - n^2(m - 1) \quad [\text{since, } (1 - m) = -(m - 1)] \\
&= (Lm - n^2)(m - 1) \quad [\text{taking } (m - 1) \text{ a sthe common factor}]
\end{aligned}$$

Q.11) $x^3 - y^2 + x - x^2y^2$

Soln.:

$$\begin{aligned}
&x^3 - y^2 + x - x^2y^2 \\
&= (x^3 + x) - (x^2y^2 + y^2) \\
&= x(x^2 + 1) - y^2(x^2 + 1) \\
&= (x - y^2)(x^2 + 1) \quad [\text{taking } (x^2 + 1) \text{ as the common factor}]
\end{aligned}$$

Q.12) $6xy + 6 - 9y - 4x$

Soln.:

$$\begin{aligned}
6xy + 6 - 9y - 4x &= (6xy - 4x) + (6 - 9y) \\
&= 2x(3y - 2) + 3(2 - 3y) \\
&= 2x(3y - 2) - 3(3y - 2) \quad [\text{since, } (2 - 3y) = -(3y - 2)] \\
&= (2x - 3)(3y - 2) \quad [\text{taking } (3y - 2) \text{ as the common factor}]
\end{aligned}$$

Q.13) $x^2 - 2ax - 2ab + bx$

Soln.:

$$\begin{aligned}
x^2 - 2ax - 2ab + bx \\
&= (x^2 - 2ax) + (bx - 2ab) \\
&= x(x - 2a) + b(x - 2a) \\
&= (x + b)(x - 2a) \quad [\text{taking } (x - 2a) \text{ as the common factor}] \\
&= (x - 2a)(x + b)
\end{aligned}$$

Q.14) $x^3 - 2x^2y + 3xy^2 - 6y^3$

Soln.:

$$\begin{aligned}
x^3 - 2x^2y + 3xy^2 - 6y^3 \\
&= (x^3 - 2x^2y) + (3xy^2 - 6y^3) \\
&= x^2(x - 2y) + 3y^2(x - 2y) \\
&= (x^2 + 3y^2)(x - 2y) \quad [\text{taking } (x - 2y) \text{ as the common factor}]
\end{aligned}$$

Q.15) $abx^2 + (ay - b)x - y$

Soln.:

$$\begin{aligned}
abx^2 + (ay - b)x - y &= abx^2 + axy - bx - y \\
&= (abx^2 - bx) + (axy - y) \\
&= bx(ax - 1) + y(ax - 1) \\
&= (bx + y)(ax - 1) \quad [\text{taking } (ax - 1) \text{ as the common factor}]
\end{aligned}$$

Q.16) $(ax + by)^2 + (bx - ay)^2$

Soln.:

$$\begin{aligned}
(ax + by)^2 + (bx - ay)^2 &= a^2x^2 + 2abxy + b^2y^2 + b^2x^2 - 2abxy + a^2y^2 \\
&= a^2x^2 + b^2y^2 + b^2x^2 + a^2y^2 \\
&= (a^2x^2 + a^2y^2) + (b^2x^2 + b^2y^2) \\
&= a^2(x^2 + y^2) + b^2(x^2 + y^2) \\
&= (a^2 + b^2)(x^2 + y^2) \quad [\text{taking } (x^2 + y^2) \text{ as the common factor}]
\end{aligned}$$

Q.17) $16(a - b)^3 - 24(a - b)^2$

Soln.:

$$\begin{aligned}
16(a - b)^3 - 24(a - b)^2 \\
&= 8(a - b)^2 [2(a - b) - 3] \quad [\text{taking } 8(a - b)^2 \text{ as the common factor}] \\
&= 8(a - b)^2(2a - 2b - 3)
\end{aligned}$$

Q.18) $ab(x^2 + 1) + x(a^2 + b^2)$

Soln.:

$$\begin{aligned}ab(x^2 + 1) + x(a^2 + b^2) &= abx^2 + ab + a^2x + b^2x \\&= (abx^2 + a^2x) + (b^2x + ab) \\&= ax(bx + a) + b(bx + a) \\&= (ax + b)(bx + a) \quad \text{[taking (bx + a) as the common factor]}\end{aligned}$$

Q.19) $a^2x^2 + (ax^2 + 1)x + 1 + a$

Soln.:

$$\begin{aligned}a^2x^2 + (ax^2 + 1)x + 1 + a &= a^2x^2 + ax^3 + x + a \\&= (ax^3 + a^2x^2) + (x + a) \\&= ax^2(x + a) + (x + a) \\&= (ax^2 + 1)(x + a) \quad \text{[taking (x + a) as the common factor]}\end{aligned}$$

Q.20) $a(a - 2b - c) + 2bc$

Soln.:

$$\begin{aligned}a(a - 2b - c) + 2bc &= a^2 - 2ab - ac + 2bc \\&= (a^2 - ac) + (2bc - 2ab) \\&= a(a - c) + 2b(c - a) \quad \text{[since, (c - a) = -(a - c)]} \\&= a(a - c) - 2b(a - c) \\&= (a - 2b)(a - c) \quad \text{[taking (a - c) as the common factor]}\end{aligned}$$

Q.21) $a(a + b - c) - bc$

Soln.:

$$\begin{aligned}a(a + b - c) - bc &= a^2 + ab - ac - bc \\&= (a^2 - ac) + (ab - bc) \\&= a(a - c) + b(a - c) \\&= (a + b)(a - c) \quad \text{[taking (a - c) as the common factor]}\end{aligned}$$

Q.22) $x^2 - 11xy - x + 11y$

Soln.:

$$\begin{aligned}x^2 - 11xy - x + 11y &= (x^2 - x) + (11y - 11xy) \\&= x(x - 1) + 11y(1 - x) \\&= x(x - 1) - 11y(x - 1) \quad \text{[since, (1 - x) = -(x - 1)]} \\&= (x - 11y)(x - 1) \quad \text{[taking out the common factor]}\end{aligned}$$

Q.23) $ab - a - b + 1$

Soln.:

$$\begin{aligned}ab - a - b + 1 &= (ab - b) + (1 - a) \\&= b(a - 1) + (1 - a) \\&= b(a - 1) - (a - 1) \quad \text{[since, (1 - a) = -(a - 1)]} \\&= (a - 1)(b - 1) \quad \text{[taking out the common factor (a - 1)]}\end{aligned}$$

Q.24) $x^2 + y - xy - x$

Soln.:

$$x^2 + y - xy - x = (x^2 - xy) + (y - x)$$

$$= x(x - y) + (y - x)$$

$$= x(x - y) - (x - y) \quad [(y - x) = -(x - y)]$$

$$= (x - 1)(x - y) \quad [\text{taking } (x - y) \text{ as the common factor}]$$