

Mathematics

(Chapter - 12) (Factorisation) (Exercise 12.1) (Class - VIII)

Question 1:

Find the common factors of the given terms.

(i) $12x, 36$

(iii) $14pq, 28p^2, 2q^2$

(v) $6abc, 24ab^2, 12a^2b$

(vii) $10pq, 20qr, 30rp$

(ii) $2y, 22xy$

(iv) $2x, 3x^2, 4$

(vi) $16x^3, -4x^2, 32x$

(viii) $3x^2y^3, 10x^3y^2, 6x^2y^2z$

Answer 1:

(i) $12x = 2 \times 2 \times 3 \times x$

$36 = 2 \times 2 \times 3 \times 3$

Hence, the common factors are 2, 2 and 3 = $2 \times 2 \times 3 = 12$

(ii) $2y = 2 \times y$

$22xy = 2 \times 11 \times x \times y$

Hence, the common factors are 2 and $y = 2 \times y = 2y$

(iii) $14pq = 2 \times 7 \times p \times q$

$28p^2q^2 = 2 \times 2 \times 7 \times p \times p \times q \times q$

Hence, the common factors are $2 \times 7 \times p \times q = 14pq$

(iv) $2x = 2 \times x \times 1$

$3x^2 = 3 \times x \times x \times 1$

$4 = 2 \times 2 \times 1$

Hence, the common factor is 1.

(v) $6abc = 2 \times 3 \times a \times b \times c$

$24ab^2 = 2 \times 2 \times 2 \times 3 \times a \times b \times b$

$12a^2b = 2 \times 2 \times 3 \times a \times a \times b$

Hence, the common factors are $2 \times 3 \times a \times b = 6ab$

(vi) $16x^3 = 2 \times 2 \times 2 \times 2 \times x \times x \times x$

$-4x^2 = (-1) \times 2 \times 2 \times x \times x$

$32x = 2 \times 2 \times 2 \times 2 \times 2 \times x$

Hence, the common factors are $2 \times 2 \times x = 4x$

(vii) $10pq = 2 \times 5 \times p \times q$

$20qr = 2 \times 2 \times 5 \times q \times r$

$30rp = 2 \times 3 \times 5 \times r \times p$

Hence, the common factors are $2 \times 5 = 10$

(viii) $3x^2y^3 = 3 \times x \times x \times y \times y \times y$

$10x^3y^2 = 2 \times 5 \times x \times x \times x \times y \times y$

$6x^2y^2z = 2 \times 3 \times x \times x \times y \times y \times z$

Hence, the common factors are $x \times x \times y \times y = x^2y^2$

Question 2:

Factorize the following expressions.

(i) $7x - 42$

(iii) $7a^2 + 14a$

(v) $20l^2m + 30alm$

(vii) $10a^2 - 15b^2 + 20c^2$

(ix) $x^2yz + xy^2z + xyz^2$

(ii) $6p - 12q$

(iv) $-16z + 20z^3$

(vi) $5x^2y - 15xy^2$

(viii) $-4a^2 + 4ab - 4ca$

(x) $ax^2y + bxy^2 + cxyz$

Answer 2:

(i) $7x - 42 = 7 \times x - 2 \times 3 \times 7$

Taking common factors from each term,
 $= 7(x - 2 \times 3) = 7(x - 6)$

(ii) $6p - 12q = 2 \times 3 \times p - 2 \times 2 \times 3 \times q$

Taking common factors from each term,
 $= 2 \times 3(p - 2q) = 6(p - 2q)$

(iii) $7a^2 + 14a = 7 \times a \times a + 2 \times 7 \times a$

Taking common factors from each term,
 $= 7 \times a(a + 2)$
 $= 7a(a + 2)$

(iv) $-16z + 20z^3 = (-1) \times 2 \times 2 \times 2 \times 2 \times z + 2 \times 2 \times 5 \times z \times z \times z$

Taking common factors from each term,
 $= 2 \times 2 \times z(-2 \times 2 + 5 \times z \times z)$
 $= 4z(-4 + 5z^2)$

(v) $20l^2m + 30alm = 2 \times 2 \times 5 \times l \times l \times m + 2 \times 3 \times 5 \times a \times l \times m$

Taking common factors from each term,
 $= 2 \times 5 \times l \times m(2 \times l + 3 \times a)$
 $= 10lm(2l + 3a)$

(vi) $5x^2y - 15xy^2 = 5 \times x \times x \times y + 3 \times 5 \times x \times y \times y$

Taking common factors from each term,
 $= 5 \times x \times y(x - 3y)$
 $= 5xy(x - 3y)$

(vii) $10a^2 - 15b^2 + 20c^2 = 2 \times 5 \times a \times a - 3 \times 5 \times b \times b + 2 \times 2 \times 5 \times c \times c$

Taking common factors from each term,
 $= 5(2 \times a \times a - 3 \times b \times b + 2 \times 2 \times c \times c)$
 $= 5(2a^2 - 3b^2 + 4c^2)$

(viii) $-4a^2 + 4ab - 4ca = (-1) \times 2 \times 2 \times a \times a + 2 \times 2 \times a \times b - 2 \times 2 \times c \times a$

Taking common factors from each term,
 $= 2 \times 2 \times a(-a + b - c)$
 $= 4a(-a + b + c)$

(ix) $x^2yz + xy^2z + xyz^2 = x \times x \times y \times z + x \times y \times y \times z + x \times y \times z \times z$

Taking common factors from each term,
 $= x \times y \times z(x + y + z)$
 $= xyz(x + y + z)$

(x) $ax^2y + bxy^2 + cxyz = a \times x \times x \times y + b \times x \times y \times y + c \times x \times y \times z$

Taking common factors from each term,
 $= x \times y(a \times x + b \times y + c \times z)$
 $= xy(ax + by + cz)$

Question 3:

Factorize:

(i) $x^2 + xy + 8x + 8y$

(iii) $ax + bx - ay - by$

(v) $z - 7 + 7xy - xyz$

(ii) $15xy - 6x + 5y - 2$

(iv) $15pq + 15 + 9q + 25p$

Answer 1:

(i)
$$\begin{aligned} x^2 + xy + 8x + 8y &= x(x + y) + 8(x + y) \\ &= (x + y)(x + 8) \end{aligned}$$

(ii)
$$\begin{aligned} 15xy - 6x + 5y - 2 &= 3x(5y - 2) + 1(5y - 2) \\ &= (5y - 2)(3x + 1) \end{aligned}$$

(iii)
$$\begin{aligned} ax + bx - ay - by &= (ax + bx) - (ay + by) \\ &= x(a + b) - y(a + b) \\ &= (a + b)(x - y) \end{aligned}$$

(iv)
$$\begin{aligned} 15pq + 15 + 9q + 25p &= 15pq + 25p + 9q + 15 \\ &= 5p(3q + 5) + 3(3q + 5) \\ &= (3q + 5)(5p + 3) \end{aligned}$$

(v)
$$\begin{aligned} z - 7 + 7xy - xyz &= 7xy - 7 - xyz + z \\ &= 7(xy - 1) - z(xy - 1) \\ &= (xy - 1)(7 - z) = (-1)(1 - xy)(-1)(z - 7) \\ &= (1 - xy)(z - 7) \end{aligned}$$

Mathematics

(Chapter - 12) (Factorisation) (Exercise 12.2) (Class - VIII)

Question 1:

Factorize the following expressions:

(i) $a^2 + 8a + 16$

(iii) $25m^2 + 30m + 9$

(v) $4x^2 - 8x + 4$

(vii) $(l+m)^2 - 4lm$ [Hint: Expand $(l+m)^2$ first]

(viii) $a^4 + 2a^2b^2 + b^4$

(ii) $p^2 - 10p + 25$

(iv) $49y^2 + 84yz + 36z^2$

(vi) $121b^2 - 88bc + 16c^2$

Answer 1:

(i) $a^2 + 8a + 16 = a^2 + (4+4)a + 4 \times 4$

Using identity $x^2 + (a+b)x + ab = (x+a)(x+b)$,

Here $x = a, a = 4$ and $b = 4$

$$a^2 + 8a + 16 = (a+4)(a+4) = (a+4)^2$$

(ii) $p^2 - 10p + 25 = p^2 + (-5-5)p + (-5)(-5)$

Using identity $x^2 + (a+b)x + ab = (x+a)(x+b)$,

Here $x = p, a = -5$ and $b = -5$

$$p^2 - 10p + 25 = (p-5)(p-5) = (p-5)^2$$

(iii) $25m^2 + 30m + 9 = (5m)^2 + 2 \times 5m \times 3 + (3)^2$

Using identity $a^2 + 2ab + b^2 = (a+b)^2$, here $a = 5m, b = 3$

$$25m^2 + 30m + 9 = (5m+3)^2$$

(iv) $49y^2 + 84yz + 36z^2 = (7y)^2 + 2 \times 7y \times 6z + (6z)^2$

Using identity $a^2 + 2ab + b^2 = (a+b)^2$, here $a = 7y, b = 6z$

$$49y^2 + 84yz + 36z^2 = (7y+6z)^2$$

(v) $4x^2 - 8x + 4 = (2x)^2 - 2 \times 2x \times 2 + (2)^2$

Using identity $a^2 - 2ab + b^2 = (a-b)^2$, here $a = 2x, b = 2$

$$4x^2 - 8x + 4 = (2x-2)^2 = (2)^2(x-1)^2 = 4(x-1)^2$$

(vi) $121b^2 - 88bc + 16c^2 = (11b)^2 - 2 \times 11b \times 4c + (4c)^2$

Using identity $a^2 - 2ab + b^2 = (a-b)^2$, here $a = 11b, b = 4c$

$$121b^2 - 88bc + 16c^2 = (11b-4c)^2$$

(vii) $(l+m)^2 - 4lm = l^2 + 2 \times l \times m + m^2 - 4lm$

$$= l^2 + 2lm + m^2 - 4lm$$

$$= l^2 - 2lm + m^2$$

$$= (l-m)^2$$

$$\left[\because (a+b)^2 = a^2 + 2ab + b^2 \right]$$

$$\left[\because (a-b)^2 = a^2 - 2ab + b^2 \right]$$

(viii) $a^4 + 2a^2b^2 + b^4 = (a^2)^2 + 2 \times a^2 \times b^2 + (b^2)^2$

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

$$\left[\because (a+b)^2 = a^2 + 2ab + b^2 \right]$$

Question 2:

Factorize:

(i) $4p^2 - 9q^2$

(iii) $49x^2 - 36$

(v) $(l+m)^2 - (l-m)^2$

(vii) $(x^2 - 2xy + y^2) - z^2$

(ii) $63a^2 - 112b^2$

(iv) $16x^5 - 144x^3$

(vi) $9x^2y^2 - 16$

(viii) $25a^2 - 4b^2 + 28bc - 49c^2$

Answer 2:

$$\begin{aligned} \text{(i)} \quad 4p^2 - 9q^2 &= (2p)^2 - (3q)^2 \\ &= (2p-3q)(2p+3q) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\begin{aligned} \text{(ii)} \quad 63a^2 - 112b^2 &= 7(9a^2 - 16b^2) = 7[(3a)^2 - (4b)^2] \\ &= 7(3a-4b)(3a+4b) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\text{(iii)} \quad 49x^2 - 36 = (7x)^2 - (6)^2 = (7x-6)(7x+6)$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\begin{aligned} \text{(iv)} \quad 16x^5 - 144x^3 &= 16x^3(x^2 - 9) \\ &= 16x^3[(x)^2 - (3)^2] \\ &= 16x^3(x-3)(x+3) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\text{(v)} \quad (l+m)^2 - (l-m)^2 = [(l+m) + (l-m)][(l+m) - (l-m)]$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$= (l+m+l-m)(l+m-l+m) = (2m)(2l) = 4lm$$

$$\begin{aligned} \text{(vi)} \quad 9x^2y^2 - 16 &= (3xy)^2 - (4)^2 \\ &= (3xy-4)(3xy+4) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\begin{aligned} \text{(vii)} \quad (x^2 - 2xy + y^2) - z^2 &= (x-y)^2 - z^2 \\ &= (x-y-z)(x-y+z) \end{aligned}$$

$$[\because (a-b)^2 = a^2 - 2ab + b^2]$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\text{(viii)} \quad 25a^2 - 4b^2 + 28bc - 49c^2 = 25a^2 - (4b^2 - 28bc + 49c^2)$$

$$= 25a^2 - [(2b)^2 - 2 \times 2b \times 7c + (7c)^2]$$

$$= 25a^2 - (2b-7c)^2$$

$$[\because (a-b)^2 = a^2 - 2ab + b^2]$$

$$= (5a)^2 - (2b-7c)^2$$

$$= [5a - (2b-7c)][5a + (2b-7c)]$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$= (5a-2b+7c)(5a+2b-7c)$$

Question 3:

Factorize the expressions:

(i) $ax^2 + bx$

(iii) $2x^3 + 2xy^2 + 2xz^2$

(v) $(lm+l)+m+1$

(vii) $5y^2 - 20y - 8z + 2yz$

(ix) $6xy - 4y + 6 - 9x$

(ii) $7p^2 + 21q^2$

(iv) $am^2 + bm^2 + bn^2 + an^2$

(vi) $y(y+z)+9(y+z)$

(viii) $10ab + 4a + 5b + 2$

Answer 3:

(i) $ax^2 + bx = x(ax+b)$

(ii) $7p^2 + 21q^2 = 7(p^2 + 3q^2)$

(iii) $2x^3 + 2xy^2 + 2xz^2 = 2x(x^2 + y^2 + z^2)$

(iv) $am^2 + bm^2 + bn^2 + an^2 = m^2(a+b) + n^2(a+b) = (a+b)(m^2 + n^2)$

(v) $(lm+l)+m+1 = l(m+1)+1(m+1) = (m+1)(l+1)$

(vi) $y(y+z)+9(y+z) = (y+z)(y+9)$

$$\begin{aligned} \textbf{(vii)} \quad 5y^2 - 20y - 8z + 2yz &= 5y^2 - 20y + 2yz - 8z \\ &= 5y(y-4) + 2z(y-4) \\ &= (y-4)(5y+2z) \end{aligned}$$

(viii) $10ab + 4a + 5b + 2 = 2a(5b+2) + 1(5b+2) = (5b+2)(2a+1)$

$$\begin{aligned} \textbf{(ix)} \quad 6xy - 4y + 6 - 9x &= 6xy - 9x - 4y + 6 \\ &= 3x(2y-3) - 2(2y-3) \\ &= (2y-3)(3x-2) \end{aligned}$$

Question 4:

Factorize:

(i) $a^4 - b^4$

(ii) $p^4 - 81$

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

(iv) $x^4 - (x-z)^4$

(v) $a^4 - 2a^2b^2 + b^4$

Answer 4:

$$\begin{aligned} \textbf{(i)} \quad a^4 - b^4 &= (a^2)^2 - (b^2)^2 \\ &= (a^2 - b^2)(a^2 + b^2) \\ &= (a-b)(a+b)(a^2 + b^2) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\begin{aligned} \textbf{(ii)} \quad p^4 - 81 &= (p^2)^2 - (9)^2 \\ &= (p^2 - 9)(p^2 + 9) \\ &= (p^2 - 3^2)(p^2 + 9) \\ &= (p-3)(p+3)(p^2 + 9) \end{aligned}$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$[\because a^2 - b^2 = (a-b)(a+b)]$$

$$\begin{aligned}
\text{(iii)} \quad x^4 - (y+z)^4 &= (x^2)^2 - [(y+z)^2]^2 \\
&= [x^2 - (y+z)^2][x^2 + (y+z)^2] & [\because a^2 - b^2 = (a-b)(a+b)] \\
&= [x - (y+z)][x + (y+z)][x^2 + (y+z)^2] & [\because a^2 - b^2 = (a-b)(a+b)] \\
&= (x - y - z)(x + y + z)[x^2 + (y+z)^2] \\
\text{(iv)} \quad x^4 - (x-z)^4 &= (x^2)^2 - [(x-z)^2]^2 \\
&= [x^2 - (x-z)^2][x^2 + (x-z)^2] & [\because a^2 - b^2 = (a-b)(a+b)] \\
&= [x - (x-z)][x + (x-z)][x^2 + (x-z)^2] & [\because a^2 - b^2 = (a-b)(a+b)] \\
&= (x - x + z)(x + x - z)(x^2 + x^2 - 2xz + z^2) & [\because (a-b)^2 = a^2 - 2ab + b^2] \\
&= x(2x - z)(2x^2 - 2xz + z^2) \\
\text{(v)} \quad a^4 - 2a^2b^2 + b^4 &= (a^2)^2 - 2a^2b^2 + (b^2)^2 \\
&= (a^2 - b^2)^2 & [\because (a-b)^2 = a^2 - 2ab + b^2] \\
&= [(a-b)(a+b)]^2 & [\because a^2 - b^2 = (a-b)(a+b)] \\
&= (a-b)^2(a+b)^2 & [\because (xy)^m = x^m \cdot y^m]
\end{aligned}$$

Question 5:

Factorize the following expressions:

$$\text{(i)} \quad p^2 + 6p + 8 \qquad \text{(ii)} \quad q^2 - 10q + 21 \qquad \text{(iii)} \quad p^2 + 6p - 16$$

Answer 5:

$$\begin{aligned}
\text{(i)} \quad p^2 + 6p + 8 &= p^2 + (4+2)p + 4 \times 2 \\
&= p^2 + 4p + 2p + 4 \times 2 \\
&= p(p+4) + 2(p+4) \\
&= (p+4)(p+2) \\
\text{(ii)} \quad q^2 - 10q + 21 &= q^2 - (7+3)q + 7 \times 3 \\
&= q^2 - 7q - 3q + 7 \times 3 \\
&= q(q-7) - 3(q-7) \\
&= (q-7)(q-3) \\
\text{(iii)} \quad p^2 + 6p - 16 &= p^2 + (8-2)p - 8 \times 2 \\
&= p^2 + 8p - 2p - 8 \times 2 \\
&= p(p+8) - 2(p+8) \\
&= (p+8)(p-2)
\end{aligned}$$

Mathematics

(Chapter - 12) (Factorisation) (Exercise 12.3) (Class - VIII)

Question 1:

Carry out the following divisions:

(i) $28x^4 \div 56x$

(ii) $-36y^3 \div 9y^2$

(iii) $66pq^2r^3 \div 11qr^2$

(iv) $34x^3y^3z^3 \div 51xy^2z^3$

(v) $12a^8b^8 \div (-6a^6b^4)$

Answer 1:

(i) $28x^4 \div 56x = \frac{28x^4}{56x} = \frac{28}{56} \times \frac{x^4}{x} = \frac{1}{2}x^3$ $[\because x^m \div x^n = x^{m-n}]$

(ii) $-36y^3 \div 9y^2 = \frac{-36y^3}{9y^2} = \frac{-36}{9} \times \frac{y^3}{y^2} = -4y$ $[\because x^m \div x^n = x^{m-n}]$

(iii) $66pq^2r^3 \div 11qr^2 = \frac{66pq^2r^3}{11qr^2} = \frac{66}{11} \times \frac{pq^2r^3}{qr^2} = 6pqr$ $[\because x^m \div x^n = x^{m-n}]$

(iv) $34x^3y^3z^3 \div 51xy^2z^3 = \frac{34x^3y^3z^3}{51xy^2z^3} = \frac{34}{51} \times \frac{x^3y^3z^3}{xy^2z^3} = \frac{2}{3}x^2y$ $[\because x^m \div x^n = x^{m-n}]$

(v) $12a^8b^8 \div (-6a^6b^4) = \frac{12a^8b^8}{-6a^6b^4} = \frac{12}{-6} \times \frac{a^8b^8}{a^6b^4} = -2a^2b^4$ $[\because x^m \div x^n = x^{m-n}]$

Question 2:

Divide the given polynomial by the given monomial:

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

(ii) $(3y^8 - 4y^6 + 5y^4) \div y^4$

(iii) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2$

(iv) $(x^3 + 2x^2 + 3x) \div 2x$

(v) $(p^3q^6 - p^6q^3) \div p^3q^3$

Answer 2:

(i) $(5x^2 - 6x) \div 3x = \frac{5x^2 - 6x}{3x} = \frac{5x^2}{3x} - \frac{6x}{3x} = \frac{5}{3}x - 2 = \frac{1}{3}(5x - 6)$

(ii) $(3y^8 - 4y^6 + 5y^4) \div y^4 = \frac{3y^8 - 4y^6 + 5y^4}{y^4} = \frac{3y^8}{y^4} - \frac{4y^6}{y^4} + \frac{5y^4}{y^4} = 3y^4 - 4y^2 + 5$

(iii) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2 = \frac{8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3)}{4x^2y^2z^2}$
 $= \frac{8x^3y^2z^2}{4x^2y^2z^2} + \frac{8x^2y^3z^2}{4x^2y^2z^2} + \frac{8x^2y^2z^3}{4x^2y^2z^2}$
 $= 2x + 2y + 2z = 2(x + y + z)$

(iv) $(x^3 + 2x^2 + 3x) \div 2x = \frac{x^3 + 2x^2 + 3x}{2x} = \frac{x^3}{2x} + \frac{2x^2}{2x} + \frac{3x}{2x} = \frac{x^2}{2} + \frac{2x}{2} + \frac{3}{2} = \frac{1}{2}(x^2 + 2x + 3)$

(v) $(p^3q^6 - p^6q^3) \div p^3q^3 = \frac{p^3q^6 - p^6q^3}{p^3q^3} = \frac{p^3q^6}{p^3q^3} - \frac{p^6q^3}{p^3q^3} = q^3 - p^3$

Question 3:

Work out the following divisions:

(i) $(10x-25) \div 5$

(ii) $(10x-25) \div (2x-5)$

(iii) $10y(6y+21) \div 5(2y+7)$

(iv) $9x^2y^2(3z-24) \div 27xy(z-8)$

(v) $96abc(3a-12)(5b-30) \div 144(a-4)(b-6)$

Answer 3:

(i) $(10x-25) \div 5 = \frac{10x-25}{5} = \frac{5(2x-5)}{5} = 2x-5$

(ii) $(10x-25) \div (2x-5) = \frac{10x-25}{(2x-5)} = \frac{5(2x-5)}{(2x-5)} = 5$

(iii) $10y(6y+21) \div 5(2y+7) = \frac{10y(6y+21)}{5(2y+7)} = \frac{2 \times 5 \times y \times 3(2y+7)}{5(2y+7)} = 2 \times y \times 3 = 6y$

(iv) $9x^2y^2(3z-24) \div 27xy(z-8) = \frac{9x^2y^2(3z-24)}{27xy(z-8)} = \frac{9}{27} \times \frac{xy \times xy \times 3(z-8)}{xy(z-8)} = xy$

(v) $96abc(3a-12)(5b-30) \div 144(a-4)(b-6) = \frac{96abc(3a-12)(5b-30)}{144(a-4)(b-6)}$
 $= \frac{12 \times 4 \times 2 \times abc \times 3(a-4) \times 5(b-6)}{12 \times 4 \times 3(a-4)(b-6)} = 10abc$

Question 4:

Divide as directed:

(i) $5(2x+1)(3x+5) \div (2x+1)$

(ii) $26xy(x+5)(y-4) \div 13x(y-4)$

(iii) $52pqr(p+q)(q+r)(r+p) \div 104pq(q+r)(r+p)$

(iv) $20(y+4)(y^2+5y+3) \div 5(y+4)$

(v) $x(x+1)(x+2)(x+3) \div x(x+1)$

Answer 4:

(i) $5(2x+1)(3x+5) \div (2x+1) = \frac{5(2x+1)(3x+5)}{(2x+1)} = 5(3x+5)$

(ii) $26xy(x+5)(y-4) \div 13x(y-4) = \frac{26xy(x+5)(y-4)}{13x(y-4)} = \frac{13 \times 2 \times xy(x+5)(y-4)}{13x(y-4)} = 2y(x+5)$

(iii) $52pqr(p+q)(q+r)(r+p) \div 104pq(q+r)(r+p) = \frac{52pqr(p+q)(q+r)(r+p)}{104pq(q+r)(r+p)}$
 $= \frac{52pqr(p+q)(q+r)(r+p)}{52 \times 2 \times pq(q+r)(r+p)} = \frac{1}{2}r(p+q)$

(iv) $20(y+4)(y^2+5y+3) \div 5(y+4) = \frac{20(y+4)(y^2+5y+3)}{5(y+4)} = 4(y^2+5y+3)$

(v) $x(x+1)(x+2)(x+3) \div x(x+1) = \frac{x(x+1)(x+2)(x+3)}{x(x+1)} = (x+2)(x+3)$

Question 5:

Factorize the expressions and divide them as directed:

(i) $(y^2 + 7y + 10) \div (y + 5)$

(ii) $(m^2 - 14m - 32) \div (m + 2)$

(iii) $(5p^2 - 25p + 20) \div (p - 1)$

(iv) $4yz(z^2 + 6z - 16) \div 2y(z + 8)$

(v) $5pq(p^2 - q^2) \div 2p(p + q)$

(vi) $12xy(9x^2 - 16y^2) \div 4xy(3x + 4y)$

(vii) $39y^3(50y^2 - 98) \div 26y^2(5y + 7)$

Answer 5:

$$\begin{aligned}
 \text{(i)} \quad (y^2 + 7y + 10) \div (y + 5) &= \frac{y^2 + 7y + 10}{(y + 5)} \\
 &= \frac{y^2 + (2 + 5)y + 2 \times 5}{(y + 5)} = \frac{y^2 + 2y + 5y + 2 \times 5}{(y + 5)} \\
 &= \frac{(y + 2)(y + 5)}{(y + 5)} = y + 2
 \end{aligned}$$

$$[\because x^2 + (a + b)x + ab = (x + a)(x + b)]$$

$$\begin{aligned}
 \text{(ii)} \quad (m^2 - 14m + 32) \div (m + 2) &= \frac{m^2 - 14m + 32}{(m + 2)} = \frac{m^2 + (-16 + 2)m + (-16) \times 2}{(m + 2)} \\
 &= \frac{(m - 16)(m + 2)}{(m + 2)} = (m - 16)
 \end{aligned}$$

$$[\because x^2 + (a + b)x + ab = (x + a)(x + b)]$$

$$\begin{aligned}
 \text{(iii)} \quad (5p^2 - 25p + 20) \div (p - 1) &= \frac{5p^2 - 25p + 20}{(p - 1)} \\
 &= \frac{5p^2 - 20p - 5p + 20}{(p - 1)} = \frac{5p(p - 4) - 5(p - 4)}{(p - 1)} \\
 &= \frac{(5p - 5)(p - 4)}{(p - 1)} = \frac{5(p - 1)(p - 4)}{(p - 1)} = 5(p - 4)
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad 4yz(z^2 + 6z - 16) \div 2y(z + 8) &= \frac{4yz(z^2 + 6z - 16)}{2y(z + 8)} \\
 &= \frac{4yz[z^2 + (8 - 2)z + 8 \times (-2)]}{2y(z + 8)}
 \end{aligned}$$

$$= \frac{4yz(z - 2)(z + 8)}{2y(z + 8)} = 2z(z - 2)$$

$$[\because x^2 + (a + b)x + ab = (x + a)(x + b)]$$

$$\text{(v)} \quad 5pq(p^2 - q^2) \div 2p(p + q) = \frac{5pq(p^2 - q^2)}{2p(p + q)}$$

$$= \frac{5pq(p - q)(p + q)}{2p(p + q)}$$

$$[\because a^2 - b^2 = (a - b)(a + b)]$$

$$= \frac{5}{2}q(p - q)$$

$$\begin{aligned}
 \text{(vi)} \quad 12xy(9x^2 - 16y^2) \div 4xy(3x + 4y) &= \frac{12xy(9x^2 - 16y^2)}{4xy(3x + 4y)} = \frac{12xy[(3x)^2 - (4y)^2]}{4xy(3x + 4y)} \\
 &= \frac{12xy(3x - 4y)(3x + 4y)}{4xy(3x + 4y)} = 3(3x - 4y) \quad [\because a^2 - b^2 = (a - b)(a + b)]
 \end{aligned}$$

$$\begin{aligned}
 \text{(vii)} \quad 39y^3(50y^2 - 98) \div 26y^2(5y + 7) &= \frac{39y^3(50y^2 - 98)}{26y^2(5y + 7)} \\
 &= \frac{39y^3 \times 2(25y^2 - 49)}{26y^2(5y + 7)} = \frac{39y^2 \times 2[(5y)^2 - (7)^2]}{26y^2(5y + 7)} \\
 &= \frac{39y^2 \times 2(5y - 7)(5y + 7)}{26y^2(5y + 7)} = 3y(5y - 7) \quad [\because a^2 - b^2 = (a - b)(a + b)]
 \end{aligned}$$