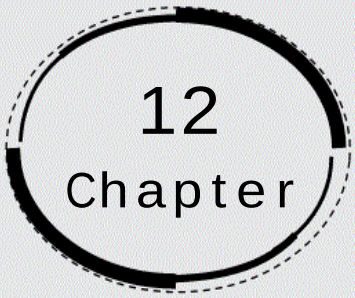
factorisation



Exercise 12.1

1. Find the common factors of the terms

i. 12x, 36

Ans:

Write the factors of each term separately:

$12x = 2 \times 2 \times 3 \times x$

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, 2, 3$.

Multiply the common factors, $2 \times 2 \times 3 = 12$

ii. 2y, 22xy

Ans:

Write the factors of each term separately:

$2y = 2 \times y$

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, y$.

Multiply the common factors, $2 \times y = 2y$.

iii. $14pq, 28p^2q^2$

Ans:

Write the factors of each term separately:

$14pq = 2 \times 7 \times p \times q$

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, 7, p, q$.

Multiply the common factors, $2 \times 7 \times p \times q = 14pq$.

iv. $2x, 3x^2, 4$

Ans:

Write the factors of each term separately:

$2x = 2 \times x$

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

$4 = 2 \times 2$

The factors that appear in both the lists are the common factors.

Hence, the common factor is 1.

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

Ans:

Write the factors of each term separately:

$6abc = 2 \times 3 \times a \times b \times c$

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

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, 3, a, b$.

Multiply the common factors, $2 \times 3 \times a \times b = 6ab$.

vi. $16x^3, -4x^2, 32x$

Ans:

Write the factors of each term separately:

$16x^3 = 2 \times 2 \times 2 \times 2 \times x \times x \times x$

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

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, 2, x$

Multiply the common factors, $2 \times 2 \times x = 4x$

vii. $10pq, 20qr, 30rp$

Ans:

Write the factors of each term separately:

$10pq = 2 \times 5 \times p \times q$

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

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

The factors that appear in both the lists are the common factors.

Hence, the common factors are $2, 5$.

Multiply the common factors, $2 \times 5 = 10$.

viii. $3x^2y^3, 10x^3y^2, 6x^2y^2z$

Ans:

Write the factors of each term separately:

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

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

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

The factors that appear in both the lists are the common factors.

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

2. Factorise the following expressions

i. $7x - 42$

Ans:

Take out the common factors from all the terms to factorize.

$7x = 7 \times x$

$42 = 2 \times 3 \times 7$

The common factor is 7

$\therefore 7x - 42 = (7 \times x) - (2 \times 3 \times 7) = 7(x - 6)$

ii. $6p - 12q$

Ans:

Take out the common factors from all the terms to factorize.

$6p = 2 \times 3 \times p$

$12q = 2 \times 2 \times 3 \times q$

The common factors are 2 and 3.

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

$= 2 \times 3[p - (2 \times q)]$

$= 6(p - 2q)$

iii. $7a^2 + 14a$

Ans:

Take out the common factors from all the terms to factorize.

$7a^2 = 7 \times a \times a$

$14a = 2 \times 7 \times a$

The common factors are 7 and a

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

$= 7 \times a[a + 2]$

$= 7a(a + 2)$

iv. $-16z + 20z^3$

Ans:

Take out the common factors from all the terms to factorize.

$16z = 2 \times 2 \times 2 \times 2 \times z$

$20z^3 = 2 \times 2 \times 5 \times z \times z \times z$

The common factors are $2, 2$, and z .

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

$= (2 \times 2 \times z)[-(2 \times 2) + (5 \times z \times z)]$

$= 4z\left(-4 + 5z^2\right)$

v. $20l^2m + 30alm$

Ans:

Take out the common factors from all the terms to factorize.

$20l^2m = 2 \times 2 \times 5 \times 1 \times 1 \times m$

$30alm = 2 \times 3 \times 5 \times a \times 1 \times m$

The common factors are $2, 5, 1,$ and m .

$\therefore 20l^2m + 30alm = (2 \times 2 \times 5 \times 1 \times 1 \times m) + (2 \times 3 \times 5 \times a \times 1 \times m)$

$= (2 \times 5 \times 1 \times m)[(2 \times l) + (3 \times a)]$

$= 10lm(2l + 3a)$

vi. $5x^2y - 15xy^2$

Ans:

Take out the common factors from all the terms to factorize.

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

$15xy^2 = 3 \times 5 \times x \times y \times y$

The common factors are $5, x$, and y .

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

$= 5 \times x \times y[x - (3 \times y)]$

$= 5xy(x - 3y)$

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

Ans:

Take out the common factors from all the terms to factorize.

$10a^2 = 2 \times 5 \times a \times a$

$15b^2 = 3 \times 5 \times b \times b$

$20c^2 = 2 \times 2 \times 5 \times c \times c$

The common factor is 5

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

$= 5[(2 \times a \times a) - (3 \times b \times b) + (2 \times 2 \times c \times c)]$

$= 5\left(2a^2 - 3b^2 + 4c^2\right)$

viii. $-4a^2 + 4ab - 4ca$

Ans:

Take out the common factors from all the terms to factorize.

$4a^2 = 2 \times 2 \times a \times a$

$4ab = 2 \times 2 \times a \times b$

$4ca = 2 \times 2 \times c \times a$

The common factors are $2, 2$, and a

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

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

$= 4a(-a + b - c)$

ix. $x^2yz + xy^2z + xyz^2$

Ans:

Take out the common factors from all the terms to factorize.

$x^2yz = x \times x \times y \times z$

$xy^2z = x \times y \times y \times z$

$xyz^2 = x \times y \times z \times z$

The common factors are x, y, and z

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

$= x \times y \times z[x + y + z]$

$= xyz(x + y + z)$

x. $ax^2y + bxy^2 + cxyz$

Ans:

Take out the common factors from all the terms to factorize.

$ax^2y = a \times x \times x \times y$

$bxy^2 = b \times x \times y \times y$

$cxyz = c \times x \times y \times z$

The common factors are x and y.

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

$= (x \times y)[(a \times x) + (b \times y) + (c \times z)]$

$= xy(ax + by + cz)$

3. Factorise

i. $x^2 + xy + 8x + 8y$

Ans:

Write each term in terms of its factors and take out the common factors.

$$x^2 + xy + 8x + 8y = x \times x + x \times y + 8 \times x + 8 \times y$$
$$= x(x + y) + 8(x + y)$$
$$= (x + y)(x + 8)$$

ii. $15xy - 6x + 5y - 2$

Ans:

Write each term in terms of its factors and take out the common factors.

$$15xy - 6x + 5y - 2 = 3 \times 5 \times x \times y - 3 \times 2 \times x + 5 \times y - 2$$
$$= 3x(5y - 2) + 1(5y - 2)$$
$$= (5y - 2)(3x + 1)$$

iii. $ax + bx - ay - by$

Ans:

Write each term in terms of its factors and take out the common factors.

$$ax + bx - ay - by = a \times x + b \times x - a \times y - b \times y$$
$$= x(a + b) - y(a + b)$$
$$= (a + b)(x - y)$$

iv. $15pq + 15 + 9q + 25p$

Ans:

Write each term in terms of its factors and take out the common factors.

$$15pq + 15 + 9q + 25p = 15pq + 9q + 25p + 15$$
$$= 3 \times 5 \times p \times q + 3 \times 3 \times q + 5 \times 5 \times p + 3 \times 5$$
$$= 3\,q(5\,p + 3) + 5(5\,p + 3)$$
$$= (5\,p + 3)(3\,q + 5)$$

v. $z - 7 + 7xy - xyz$

Ans:

Write each term in terms of its factors and take out the common factors.

$$z - 7 + 7xy - xyz = z - x \times y \times z - 7 + 7 \times x \times y$$
$$= z(1 - x\,y) - 7(1 - x\,y)$$
$$= (1 - xy)(z - 7)$$

Exercise 12.2

1. Factorise the following expressions.

i. $a^2 + 8a + 16$

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (a+4)^2$

ii. $p^2 - 10p + 25$

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (p-5)^2$

iii. $25m^2 + 30m + 9$

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (5m+3)^2$

iv. $49y^2 + 84yz + 36z^2$

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (11b - 4c)^2$

v. $4x^2 - 8x + 4$

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (2x-2)^2$

$= [(2)(x-1)]^2$

$= 4(x-1)^2$

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

Ans:

Use the formula $\left[(x+y)^2 = x^2 + 2xy + y^2\right]$ to factorize.

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

$= (11b - 4c)^2$

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

Ans:

Use identity $\left[(a+b)^2 = a^2 + 2ab + b^2\right]$ to factorize.

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

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

$= (l-m)^2$

viii. $a^4 + 2a^2b^2 + b^4$

Ans:

Use identity $\left[(a+b)^2 = a^2 + 2ab + b^2\right]$ to factorize.

$a^4 + 2a^2b^2 + b^4 = \left(a^2\right)^2 + 2\left(a^2\right)\left(b^2\right) + \left(b^2\right)^2$

$= \left(a^2 + b^2\right)^2$

2. Factorise

i. $4p^2 - 9q^2$

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$4p^2 - 9q^2 = (2p)^2 - (3q)^2$

$= (2p+3q)(2p-3q)$

ii. $63a^2 - 112b^2$

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$63a^2 - 112b^2 = 7\left(9a^2 - 16b^2\right)$

$= 7\left[(3a)^2 - (4b)^2\right]$

$= 7(3a+4b)(3a-4b)$

iii. $49x^2 - 36$

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$49x^2-36=(7x)^2-(6)^2$

$=(7x-6)(7x+6)$

iv. $16x^5-144x^3$

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$16x^5-144x^3=16x^3\left(x^2-9\right)$

$=16x^3\left[(x)^2-(3)^2\right]$

$=16x^3(x-3)(x+3)$

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

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$(l+m)^2-(l-m)^2=[(l+m)-(l-m)][(l+m)+(l-m)]$

$=\left(l+m-1+m\right)\left(I+m+l-m\right)$

$=2m\times 2l$

$=4ml$

$=4lm$

vi. $9x^2y^2-16$

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$9x^2y^2-16=(3xy)^2-(4)^2$

$=(3xy-4)(3xy+4)$

vii. $\left(x^2-2xy+y^2\right)-z^2$

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$\left(x^2-2xy+y^2\right)-z^2=(x-y)^2-(z)^2$

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

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

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$$25a^2-4b^2+28bc-49c^2=25a^2-\left(4b^2-28bc+49c^2\right)$$
$$=(5a)^2-\left[(2b)^2-2\times 2b\times 7c+(7c)^2\right]$$
$$=(5a)^2-\left[(2b-7c)^2\right]$$
$$=\left[5\,a+\left(2\,b-7\,c\right)\right]\left[5\,a-\left(2\,b-7\,c\right)\right]$$
$$=\left(5\,a+2\,b-7\,c\right)\left(5\,a-2\,b+7\,c\right)$$

3. Factorise the expressions

i. ax^2+bx

Ans:

Take the common factors out to factorize.

$$ax^2+bx=a\times x\times x+b\times x$$
$$=x(ax+b)$$

ii. $7p^2+21q^2$

Ans:

Take the common factors out to factorize.

$$7p^2+21q^2=7\times p\times p+3\times 7\times q\times q$$
$$=7\left(p^2+3q^2\right)$$

iii. $2x^3+2xy^2+2xz^2$

Ans:

Take the common factors out to factorize.

$$2x^3+2xy^2+2xz^2=2x\left(x^2+y^2+z^2\right)$$

iv. $am^2+bm^2+bn^2+an^2$

Ans:

Take the common factors out to factorize.

$$am^2+bm^2+bn^2+an^2=am^2+bm^2+an^2+bn^2$$
$$=m^2(a+b)+n^2(a+b)$$
$$=(a+b)\left(m^2+n^2\right)$$

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

Ans:

Take the common factors out to factorize.

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

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

Ans:

Take the common factors out to factorize.

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

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

Ans:

Take the common factors out to factorize.

$$5y^2-20y-8z+2yz=5y^2-20y+2yz-8z$$
$$=5y(y-4)+2z(y-4)$$
$$=(y-4)(5y+2z)$$

viii. $10ab+4a+5b+2$

Ans:

Take the common factors out to factorize.

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

ix. $6xy-4y+6-9x$

Ans:

Take the common factors out to factorize.

$$6xy-4\,y+6-9x=6xy-9x-4y+6$$
$$=3x(2y-3)-2(2y-3)$$
$$=(2y-3)(3x-2)$$

4. Factorise

i. a^4-b^4

Ans:

Use the identity $\left[a^2-b^2=(a-b)(a+b)\right]$ for factorizing.

$$a^4-b^4=\left(a^2\right)^2-\left(b^2\right)^2$$
$$=\left(a^2-b^2\right)\left(a^2+b^2\right)$$

$= (a-b)(a+b)\left(a^2+b^2\right)$

ii. $p^4 - 81$

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$$p^4 - 81 = \left(p^2\right)^2 - (9)^2$$
$$= \left(p^2-9\right)\left(p^2+9\right)$$
$$= \left[(p)^2 - (3)^2\right]\left(p^2+9\right)$$
$$= (p-3)(p+3)\left(p^2+9\right)$$

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

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$$x^4 - (y+z)^4 = \left(x^2\right)^2 - \left[(y+z)^2\right]^2$$
$$= \left[x^2 - (y+z)^2\right]\left[x^2 + (y+z)^2\right]$$
$$= [x-(y+z)][x+(y+z)]\left[x^2 + (y+z)^2\right]$$
$$= (x-y-z)(x+y+z)\left[x^2 + (y+z)^2\right]$$

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

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$$x^4 - (x-z)^4 = \left(x^2\right)^2 - \left[(x-z)^2\right]^2$$
$$= \left[x^2 - (x-z)^2\right]\left[x^2 + (x-z)^2\right]$$
$$= [x-(x-z)][x+(x-z)]\left[x^2 + (x-z)^2\right]$$
$$= z(2x-z)\left[x^2 + x^2 - 2xz + z^2\right]$$
$$= z(2x-z)\left(2x^2 - 2xz + z^2\right)$$

v. $a^4 - 2a^2b^2 + b^4$

Ans:

Use the identity $\left[a^2 - b^2 = (a-b)(a+b)\right]$ for factorizing.

$$a^4 - 2a^2b^2 + b^4 = \left(a^2\right)^2 - 2\left(a^2\right)\left(b^2\right) + \left(b^2\right)^2$$
$$= \left(a^2 - b^2\right)^2$$
$$= [(a-b)(a+b)]^2$$
$$= (a-b)^2(a+b)^2$$

5. Factorise the following expressions

i. $p^2 + 6p + 8$

Ans:

We can see that, $8 = 4 \times 2$ and $4 + 2 = 6$

$\therefore p^2 + 6p + 8 = p^2 + 2p + 4p + 8$

$= p(p+2) + 4(p+2)$

$= (p+2)(p+4)$

ii. $q^2 - 10q + 21$

Ans:

We can see that, $21 = (-7) \times (-3)$ and $(-7) + (-3) = -10$

$\therefore q^2 - 10q + 21 = q^2 - 7q - 3q + 21$

$= q(q-7) - 3(q-7)$

$= (q-7)(q-3)$

iii. $p^2 + 6p - 16$

Ans:

We can see that, $16 = (-2) \times 8$ and $8 + (-2) = 6$

$p^2 + 6p - 16 = p^2 + 8p - 2p - 16$

$= p(p+8) - 2(p+8)$

$= (p+8)(p-2)$

Exercise 12.3

1. Carry out the following divisions.

i. $28x^4 \div 56x$

Ans:

Write the numerator and denominator in its factors and divide.

$28x^4 = 2 \times 2 \times 7 \times x \times x \times x \times x$

$$56x = 2\times 2\times 2\times 7\times x$$

$$28x^4 \div 56x = \frac{2\times 2\times 7\times x\times x\times x\times x}{2\times 2\times 2\times 7\times x}$$

$$= \frac{x^3}{2}$$

$$= \frac{1}{2}x^3$$

ii. $-36y^3 \div 9y^2$

Ans:

Write the numerator and denominator in its factors and divide.

$$36y^3 = 2\times 2\times 3\times 3\times y\times y\times y$$

$$9y^2 = 3\times 3\times y\times y$$

$$-36y^3 \div 9y^2 = \frac{-2\times 2\times 3\times 3\times y\times y\times y}{3\times 3\times y\times y}$$

$$= -4y$$

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

Ans:

Write the numerator and denominator in its factors and divide.

$$66pq^2r^3 = 2\times 3\times 11\times p\times q\times q\times r\times r\times r$$

$$11qr^2 = 11\times q\times r\times r$$

$$66pq^2r^3 \div 11qr^2 = \frac{2\times 3\times 11\times p\times q\times q\times r\times r\times r}{11\times q\times r\times r} = 6pqr$$

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

Ans:

Write the numerator and denominator in its factors and divide.

$$34x^3y^3z^3 = 2\times 17\times x\times x\times x\times y\times y\times y\times z\times z\times z$$

$$51xy^2z^3 = 3\times 17\times x\times y\times y\times z\times z\times z$$

$$34x^3y^3z^3 \div 51xy^2z^3 = \frac{2\times 17\times x\times x\times x\times y\times y\times y\times z\times z\times z}{3\times 17\times x\times y\times y\times z\times z\times z}$$

$$= \frac{2}{3}x^2y$$

v. $12a^3b^8 \div \left(-6a^6b^4\right)$

Ans:
Write the numerator and denominator in its factors and divide.

$12a^8b^8 = 2\times 2\times 3\times a^8\times b^8$

$6a^6b^4 = 2\times 3\times a^6\times b^4$

$$12a^8b^8 \div \left(-6a^6b^4\right) = \frac{2\times 2\times 3\times a^8\times b^8}{-2\times 3\times a^6\times b^4}$$

$$= -2a^2b^4$$

2. Divide the given polynomial by the given monomial.

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

Ans:
Write the numerator its factors and divide.

$5x^2 - 6x = x(5x - 6)$

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

$$= \frac{1}{3}(5x - 6)$$

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

Ans:
Write the numerator its factors and divide.

$3y^8 - 4y^6 + 5y^4 = y^4\left(3y^4 - 4y^2 + 5\right)$

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

$$= 3y^4 - 4y^2 + 5$$

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

Ans:
Write the numerator its factors and divide.

$8\left(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3\right) = 8x^2y^2z^2(x + y + z)$

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

$$= 2(x + y + z)$$

iv. $\left(x^3 + 2x^2 + 3x\right) \div 2x$

Ans:
Write the numerator its factors and divide.

$$x^3+2x^2+3x=x\left(x^2+2x+3\right)$$

$$\left(x^3+2x^2+3x\right)\div 2x=\frac{x\left(x^2+2x+3\right)}{2x}$$

$$=\frac{1}{2}\left(x^2+2x+3\right)$$

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

Ans:
Write the numerator its factors and divide.

) $p^3q^6-p^6q^3=p^3q^3\left(q^3-p^3\right)$

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

$$=q^3-p^3$$

3. Work out the following divisions.

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

Ans:
Write the numerator and denominator in its factors and divide.

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

$$=\frac{5(2x-5)}{5}$$

$$=2x-5$$

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

Ans:
Write the numerator and denominator in its factors and divide.

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

$$=\frac{5(2x-5)}{2x-5}$$

$$=5$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= \frac{2 \times 5 \times y \times 3(2y+7)}{5(2y+7)}$$

$$= 6y$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= \frac{xy \times 3(z-8)}{3(z-8)}$$

$$= xy$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

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

$$= \frac{2abc \times 3(a-4) \times 5(b-6)}{3(a-4)(b-6)}$$

$$= 10abc$$

4. Divide as directed.

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= 5(3x+1)$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= 2$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= \frac{2 \times 2 \times 13 \times p \times q \times r \times (p+q) \times (q+r) \times (r+p)}{2 \times 2 \times 2 \times 13 \times p \times q \times (q+r) \times (r+p)}$$

$$= \frac{1}{2} r(p+q)$$

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

Ans:

Write the numerator and denominator in its factors and divide.

$$20(y+4)\left(y^2+5y+3\right) = 2 \times 2 \times 5 \times (y+4)\left(y^2+5y+3\right)$$

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

$$= 4\left(y^2+5y+3\right)$$

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

Ans:

Write the numerator and denominator in its factors and divide.

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

$$= (x+2)(x+3)$$

5. Factorise the expressions and divide them as directed.

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

Ans:

Factorise the given terms separately.

$$\left(y^2+7y+10\right)=y^2+2y+5y+10$$
$$=y(y+2)+5(y+2)$$
$$=(y+2)(y+5)$$
Divide the two terms.
$$\left(y^2+7y+10\right)\div(y+5)=\frac{(y+5)(y+2)}{(y+5)}$$
$$=y+2$$

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

Ans:

Factorise the given terms separately.
$$m^2-14m-32=m^2+2m-16m-32$$
$$=m(m+2)-16(m+2)$$
$$=(m+2)(m-16)$$
Divide the two terms.
$$\left(m^2-14m-32\right)\div(m+2)=\frac{(m+2)(m-16)}{(m+2)}$$
$$=m-16$$

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

Ans:

Factorise the given terms separately.
$$5p^2-25p+20=5\left(p^2-5p+4\right)$$
=5[p(p-1)-4(p-1)]
$$=5(p-1)(p-4)$$
Divide the two terms.
$$\left(5p^2-25p+20\right)\div(p-1)=\frac{5(p-1)(p-4)}{(p-1)}$$
$$=5(p-4)$$

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

Ans:

Factorise the given terms separately.
$$4yz\left(z^2+6z-16\right)=4yz\left[z^2-2z+8z-16\right]$$
$$=4\ y\ z\left[z(z-2)+8(z-2)\right]$$
$$=4\ y\ z(z-2)(z+8)$$

Divide the two terms.

$$4yz\left(z^2+6z-16\right)\div 2y(z+8)=\frac{4yz(z-2)(z+8)}{2y(z+8)}$$

$$=2z(z-2)$$

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

Ans:

Factorise the given terms separately.

$$5pq\left(p^2-q^2\right)=5pq(p-q)(p+q)$$

Divide the two terms.

$$5pq\left(p^2-q^2\right)\div 2p(p+q)=\frac{5pq(p-q)(p+q)}{2p(p+q)}$$

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

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

Ans:

Factorise the given terms separately.

$$12xy\left(9x^2-16y^2\right)=12xy\left[(3x)^2-(4y)^2\right]$$

$$=12xy(3x-4y)(3x+4y)$$

Divide the two terms.

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

$$=\frac{2\times 2\times 3\times x\times y\times(3x-4y)\times(3x+4y)}{2\times 2\times x\times y\times(3x+4y)}$$

$$=3\left(3x-4y\right)$$

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

Ans:

Factorise the given terms separately.

$$39y^3\left(50y^2-98\right)=3\times 13\times y\times y\times y\times 2\left[\left(25y^2-49\right)\right]$$

$$=3\times 13\times 2\times y\times y\times y\times\left[(5y)^2-(7)^2\right]$$

$$=3\times 13\times 2\times y\times y\times y(5y-7)(5y+7)$$

$$26y^2(5y+7)=2\times 13\times y\times y\times(5y+7)$$

Divide the two terms.

$$39y^3\left(50y^2-98\right)\div 26y^2(5y+7)=\frac{3\times 13\times 2\times y\times y\times y(5y-7)(5y+7)}{2\times 13\times y\times y\times (5y+7)}$$

$$=3y(5y-7)$$

$$=15y^2-21y$$