



SpeedLabs

MATHS

CBSE 8th

TEEVRA EDUTECH PVT. LTD.

Factorisation

Exercise 14.1

Q.1: Find the common factors of the given terms.

(i) $12x, 36$

(ii) $2y, 22xy$

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

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

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

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

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

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

Sol:

(i) $12x, 36$

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

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

Here, common factors are 2, 2 and 3.

The highest common factors = $2 \times 2 \times 3 = 12$.

(ii) $2y, 22xy$

$$2y = 2 \times y$$

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

Here, common factors are 2 and y.

The highest common factors = $2 \times y = 2y$.

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

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

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

Here, common factors are 2, 7, p and q.

The highest common factors = $2 \times 7 \times p \times q = 14pq$.

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

$$2x = 2 \times x \times 1$$

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

$$4 = 2 \times 2 \times 1$$

Here, common factor is 1.

The highest common factor is 1.

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

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

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

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

Here, common factors are 2, 3, a, b.

The highest common factor is $6ab$.

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

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

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

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

Here, common factors are 2, 2 and x.

The highest common factor $2 \times 2 \times x = 4x$.

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

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

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

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

Here, common factors are 2 and 5

The highest common factor = $2 \times 5 = 10$.

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

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

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

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

Here, common factors are x, x, y and y

The highest common factor = $x \times x \times y \times y = x^2y^2$

Q.2 Factorise the following expressions.

(i) $7x - 42$

(ii) $6p - 12q$

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

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

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

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

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

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

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

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

Sol:

(i) $7x - 42$

$$= 7 \times x - 7 \times 3 \times 2 \quad (\text{We write each term in the prime factors' form.})$$

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

(ii) $6p - 12q$

$$= 2 \times 3 \times p - 2 \times 2 \times 3 \times q \quad (\text{We write each term in the prime factors' form.})$$

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

$$= 6(p - 2q).$$

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

$$= 7 \times a \times a + 7 \times 2 \times a \text{ (We write each term in the prime factors' form.)}$$

$$= 7 \times a \times (a + 2)$$

$$= 7a(a + 2).$$

$$\text{(iv) } -16z + 20z^3$$

$$= -1 \times 2 \times 2 \times 2 \times 2 \times z + 2 \times 2 \times 5 \times z \times z \times z \text{ (We write each term in the prime factors' form.)}$$

$$= 2 \times 2 \times z(-1 \times 2 \times 2 + 5 \times z \times z)$$

$$= 4z(-4 + 5z^2).$$

$$\text{(v) } 20l^2m + 30alm$$

$$= 2 \times 2 \times 5 \times l \times l \times m + 2 \times 3 \times 5 \times a \times l \times m$$

$$= 2 \times 5 \times l \times m \times (2 \times l + 3 \times a) \text{ (We write each term in the prime factors' form.)}$$

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

$$\text{(vi) } 5x^2y - 15xy^2$$

$$= 5 \times x \times x \times y - 3 \times 5 \times x \times y \times y \text{ (We write each term in the prime factors' form.)}$$

$$= 5 \times x \times y(x - 3y) = 5xy(x - 3y).$$

$$\text{(vii) } 10a^2 - 15b^2 + 20c^2$$

$$= 2 \times 5 \times a \times a - 3 \times 5 \times b \times b + 2 \times 2 \times 5 \times c \times c \text{ (We write each term in the prime factors' form.)}$$

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

$$= 5(2a^2 - 3b^2 + 4c^2).$$

$$\text{(viii) } -4a^2 + 4ab - 4ca$$

$$= -1 \times 2 \times 2 \times a \times a + 2 \times 2 \times a \times b - 2 \times 2 \times c \times a \text{ (We write each term in prime factors' form.)}$$

$$= 2 \times 2 \times a(-1 \times a + b - c) = 4a(-a + b - c).$$

$$\text{(ix) } x^2yz + xy^2z + xyz^2$$

$$= x \times x \times y \times z + x \times y \times y \times z + x \times y \times z \times z. \text{ (We write each term in prime factors' form.)}$$

$$= x \times y \times z \times (x + y + z) = xyz(x + y + z).$$

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

$$= a \times x \times x \times y + b \times x \times y \times y + c \times x \times y \times z \quad (\text{We write each term into prime factors' form.})$$

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

$$= xy(ax + by + cz).$$

Q.3 Factorise.

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

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

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

$$(iv) \quad 15pq + 15 + 9p + 25p$$

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

Sol:

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

$$= x(x + y) + 8(x + y) \quad (\text{Taking in groups})$$

$$= (x + y)(x + 8).$$

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

$$= 3 \times (5y - 2) + 1(5y - 2) \quad (\text{Taking in groups})$$

$$= (5y - 2)(3x + 1).$$

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

$$= (ax + bx) - (ay + by) \quad (\text{Taking in groups})$$

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

$$= (a + b)(x - y).$$

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

$$= 15pq + 25p + 9q + 15 \quad (\text{Taking in groups})$$

$$= 5p(3q + 5) + 3(3q + 5)$$

$$= (3q + 5)(5p + 3).$$

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

$$= 7xy - 7 - xyz + z \quad (\text{Taking in groups})$$

$$= 7(xy - 1) - z(xy - 1)$$

$$= (xy - 1)(7 - z)$$

$$= (-1)(1 - xy)(-1)(z - 7) = + (1 - xy)(z - 7).$$