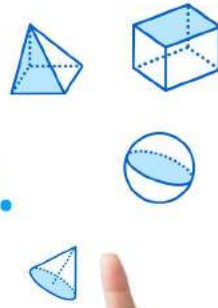


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NCERT Solutions Class 8 Maths Chapter 14 Exercise 14.1

Q1: Find the common factors of the terms

- (i) $12x, 36$
- (ii) $2y, 22xy$
- (iii) $14pq, 28p^2q^2$
- (iv) $2x, 3x^2, 4$
- (iv) $6abc, 24ab^2, 12a^2b$
- (vi) $16x^3, -4x^2, 32x$
- (vii) $10pq, 20qr, 30rp$
- (viii) $3x^2y^3, 10x^3y^2, 6x^2y^2z$

Difficulty level: Easy

What is known:

Terms.

What is unknown:

Common factors of given terms.

Reasoning:

First, we will find factors of each terms then find out which factors are common in each term.

Solution:

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

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

The common factors are 2, 2, 3.

And, $2 \times 2 \times 3 = 12$

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

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

The common factors are 2, y.

And, $2 \times y = 2y$

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

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

The common factors are 2, 7, p, q.

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

$$\begin{aligned} \text{(iv)} \quad 2x &= 2 \times x \\ 3x^2 &= 3 \times x \times x \\ 4 &= 2 \times 2 \end{aligned}$$

The common factor is 1.

$$\begin{aligned} \text{(v)} \quad 6abc &= 2 \times 3 \times a \times b \times c \\ 24ab^2 &= 2 \times 2 \times 2 \times 3 \times a \times b \times b \\ 12a^2b &= 2 \times 2 \times 3 \times a \times a \times b \end{aligned}$$

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

$$\text{And, } 2 \times 3 \times a \times b = 6ab$$

$$\begin{aligned} \text{(vi)} \quad 16x^3 &= 2 \times 2 \times 2 \times 2 \times x \times x \times x \\ -4x^2 &= -1 \times 2 \times 2 \times x \times x \\ 32x &= 2 \times 2 \times 2 \times 2 \times 2 \times x \end{aligned}$$

The common factors are 2, 2, x .

$$\text{And, } 2 \times 2 \times x = 4x$$

$$\begin{aligned} \text{(vii)} \quad 10pq &= 2 \times 5 \times p \times q \\ 20qr &= 2 \times 2 \times 5 \times q \times r \\ 30rp &= 2 \times 3 \times 5 \times r \times p \end{aligned}$$

The common factors are 2, 5.

$$\text{And, } 2 \times 5 = 10$$

$$\begin{aligned} \text{(viii)} \quad 3x^2y^3 &= 3 \times x \times x \times y \times y \times y \\ 10x^3y^2 &= 2 \times 5 \times x \times x \times x \times y \times y \\ 6x^2y^2z &= 2 \times 3 \times x \times x \times y \times y \times z \end{aligned}$$

The common factors are x , x , y , y .

$$\text{And, } x \times x \times y \times y = x^2y^2$$

Q2: Factorise the following expressions

$$\text{(i)} \quad 7x - 42$$

$$\text{(ii)} \quad 6p - 12q$$

$$\text{(iii)} \quad 7a^2 + 14a$$

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

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

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

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

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

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

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

What is known:

Algebraic expression.

What is unknown:

Factorisation of given algebraic expression.

Reasoning:

First, we will find factors of each terms then find out which factors are common in each term and take out that common factor from expression.

Solution:

(i) $7x = 7 \times x$

$$42 = 2 \times 3 \times 7$$

The common factor is 7.

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

(ii) $6p = 2 \times 3 \times p$

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

The common factors are 2 and 3.

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

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

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

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

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

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

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

The common factors are 2, 2, and z .

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

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

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

(v) $20l^2m = 2 \times 2 \times 5 \times l \times l \times m$

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

The common factors are 2, 5, l and m .

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

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

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

$$(vi) \quad 5x^2y = 5 \times x \times x \times y$$

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

The common factors are 5, x , and y .

$$\begin{aligned} \therefore 5x^2y - 15xy^2 &= (5 \times x \times x \times y) - (3 \times 5 \times x \times y \times y) \\ &= 5 \times x \times y [x - (3 \times y)] \\ &= 5xy(x - 3y) \end{aligned}$$

$$(vii) \quad 10a^2 = 2 \times 5 \times a \times a$$

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

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

The common factor is 5.

$$\begin{aligned} 10a^2 - 15b^2 + 20c^2 &= (2 \times 5 \times a \times a) - (3 \times 5 \times b \times b) + (2 \times 2 \times 5 \times c \times c) \\ &= 5[(2 \times a \times a) - (3 \times b \times b) + (2 \times 2 \times c \times c)] \\ &= 5(2a^2 - 3b^2 + 4c^2) \end{aligned}$$

$$(viii) \quad 4a^2 = 2 \times 2 \times a \times a$$

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

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

The common factors are 2, 2, and a .

$$\begin{aligned} \therefore -4a^2 + 4ab - 4ca &= -(2 \times 2 \times a \times a) + (2 \times 2 \times a \times b) - (2 \times 2 \times c \times a) \\ &= 2 \times 2 \times a [-a + b - c] \\ &= 4a(-a + b - c) \end{aligned}$$

$$(ix) \quad x^2yz = x \times x \times y \times z$$

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

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

The common factors are x , y , and z .

$$\begin{aligned} \therefore x^2yz + xy^2z + xyz^2 &= (x \times x \times y \times z) + (x \times y \times y \times z) + (x \times y \times z \times z) \\ &= x \times y \times z [x + y + z] \\ &= xyz(x + y + z) \end{aligned}$$

$$(x) \quad ax^2y = a \times x \times x \times y$$

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

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

The common factors are x and y .

$$\begin{aligned} ax^2y + bxy^2 + cxyz &= (a \times x \times x \times y) + (b \times x \times y \times y) + (c \times x \times y \times z) \\ &= (x \times y)[(a \times x) + (b \times y) + (c \times z)] \\ &= xy(ax + by + cz) \end{aligned}$$

Q3: Factorize:

- (i) $x^2 + xy + 8x + 8y$
- (ii) $15xy - 6x + 5y - 2$
- (iii) $ax + bx - ay - by$
- (iv) $15pq + 15 + 9q + 25p$
- (v) $z - 7 + 7xy - xyz$

Difficulty level: Medium**What is known:**

Algebraic expression.

What is unknown:

Factorisation of given algebraic expression.

Reasoning:

There are 4 terms in each expression. First, we will make pair of two terms from which we can take out common factors and convert the expression of 4 terms into 2 terms expression then take out common factors from remaining 2 terms.

Solution:

- (i)
$$\begin{aligned}x^2 + xy + 8x + 8y &= x \times x + x \times y + 8 \times x + 8 \times y \\&= x(x + y) + 8(x + y) \\&= (x + y)(x + 8)\end{aligned}$$
- (ii)
$$\begin{aligned}15xy - 6x + 5y - 2 &= 3 \times 5 \times x \times y - 3 \times 2 \times x + 5 \times y - 2 \\&= 3x(5y - 2) + 1(5y - 2) \\&= (5y - 2)(3x + 1)\end{aligned}$$
- (iii)
$$\begin{aligned}ax + bx - ay - by &= a \times x + b \times x - a \times y - b \times y \\&= x(a + b) - y(a + b) \\&= (a + b)(x - y)\end{aligned}$$
- (iv)
$$\begin{aligned}15pq + 15 + 9q + 25p &= 15pq + 9q + 25p + 15 \\&= 3 \times 5 \times p \times q + 3 \times 3 \times q + 5 \times 5 \times p + 3 \times 5 \\&= 3q(5p + 3) + 5(5p + 3) \\&= (5p + 3)(3q + 5)\end{aligned}$$
- (v)
$$\begin{aligned}z - 7 + 7xy - xyz &= z - xyz - 7 + 7xy \\&= z - x \times y \times z - 7 + 7 \times x \times y \\&= z(1 - xy) - 7(1 - xy) \\&= (1 - xy)(z - 7)\end{aligned}$$

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