

# NCERT SOLUTIONS OF Factorization

## Exercise 1

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### Question 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)  $3x^2y^3, 10x^3y^2, 6x^2y^2z$

**Answer:**

- i) We need to convert each of these terms in simple factors forms and then choose the common factors

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

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

So common Factor are 2,2,3

$$\text{And } 2 \times 2 \times 3 = 12$$

ii)  $2y = 2 \times y$

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

So common factors are 2,y

$$\text{And } 2 \times y = 2y$$

iii)  $14pq = 2 \times 7 \times p \times q$   
 $28p^2q^2 = 2 \times 2 \times 7 \times p \times p \times q \times q$   
 So common factors are 2, 7, p, q  
 $= 14pq$

iv)  $2x = 2 \times x$   
 $3x^2 = 3 \times x \times x$   
 $4 = 2 \times 2$

There is no common factor other than unity, so common factor = 1

v)  $6abc = 2 \times 3 \times a \times b \times c$   
 $24ab^2 = 2 \times 2 \times 2 \times 3 \times a \times b \times b$   
 $12a^2b = 2 \times 2 \times 3 \times a \times a \times b$   
 Common factors are 2, 3, a, b  
 $= 6ab$

vi)  $16x^3 = 2 \times 2 \times 2 \times 2 \times x \times x \times x$   
 $-4x^2 = -2 \times 2 \times x \times x$   
 $32x = -2 \times 2 \times 2 \times 2 \times 2 \times x$   
 Common factors are 2, 2, x  
 $= 4x$

vii)  $10pq = -2 \times 5 \times p \times q$   
 $20qr = -2 \times 2 \times 5 \times q \times r$   
 $30rp = -2 \times 3 \times 5 \times p \times r$

Common factors are 2, 5  
 $= 10$

viii)  $3x^2y^3 = 3 \times x \times x \times y \times y \times y$   
 $10x^3y^3 = 2 \times 5 \times x \times x \times x \times y \times y \times y$   
 $6x^2y^2z = -2 \times 3 \times x \times x \times y \times y \times z$   
 Common factors are x, x, y, y  
 $= x^2y^2$

## Question 2

Factorize 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)  $ax^2y + bxy^2 + cxyz^2$

### Answer

**In these problem, we need to factorize each term and then find common factors to factorize the expression**

**i)**  $7x-42$   
 $= (7 \times x) - (7 \times 6)$   
 $= 7(x-6)$

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

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

**iv)**  $-16z+ 20z^3$   
 $= 4z(5z^2-4)$

**v)**  $20l^2m + 30alm$   
 $= (2 \times 2 \times 5 \times l \times m \times l) + (2 \times 3 \times 5 \times a \times l \times m)$   
 $= 2lm(10l+15a)$

$$\begin{aligned} \text{vi)} \quad & 5x^2y - 15xy^2 \\ & = (5 \times x \times x \times y) + (5 \times 3 \times x \times y \times y) \\ & = 5x(xy - 3y^2) \end{aligned}$$

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

$$\begin{aligned} \text{viii)} \quad & -4a^2 + 4ab - 4ca \\ & = (-4 \times a \times a) + (4 \times b \times a) - (4 \times c \times a) \\ & = -4a(a - b + c) \end{aligned}$$

$$\begin{aligned} \text{ix)} \quad & x^2yz + xy^2z + xyz^2 \\ & = (x \times x \times y \times z) + (x \times y \times y \times z) + (x \times y \times z \times z) \\ & = xyz(x + y + z) \end{aligned}$$

$$\begin{aligned} \text{x)} \quad & ax^2yz + bxy^2z + cxyz^2 \\ & = (x \times x \times y \times z \times a) + (x \times y \times y \times z \times b) + (x \times y \times z \times z \times c) \\ & = xyz(ax + by + cz) \end{aligned}$$

### Question 3

Factorize

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

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

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

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

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

**Answer**

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