

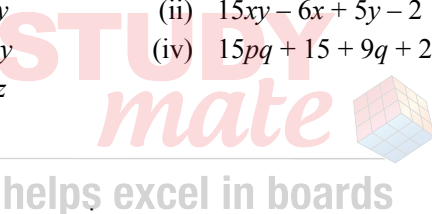
**EXERCISE 14.1**

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) $3x^2y^3, 10x^3y^2, 6x^2y^2z$
  
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) $ax^2y + bxy^2 + cxyz$
  
3. Factorise.
 

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



**TEST YOURSELF (F-1)**

1. Factorise the following expressions:
 

(i) $3x - 45$	(ii) $7x - 14y$
(iii) $5a^2 + 35a$	(iv) $-12y + 20y^3$
(v) $15a^2b + 35ab$	(vi) $pq - pqr$
(vii) $18m^3 - 45mn^2$	(viii) $17l^2 + 85m^2$
(ix) $6x^3y - 12x^2y + 15x^4$	(x) $2a^5b^3 - 14a^2b^2 + 4a^3b$
  
2. Factorise:
 

(i) $2ab + 2b + 3a$	(ii) $6xy - 4y + 6 - 9x$
(iii) $2x + 3xy + 2y + 3y^2$	(iv) $15b^2 - 3bx^2 - 5b + x^2$
(v) $a^2x^2 + axy + abx + by$	(vi) $a^2x + abx + ac + aby + b^2y + bc$
(vii) $ax^3 - bx^2 + ax - b$	(viii) $mx - my - nx + ny$
(ix) $2m^3 + 3m - 2m^2 - 3$	(x) $a^2 + 11b + 11ab + a$

**NCERT TEXTUAL EXERCISES AND ASSIGNMENTS**

**EXERCISE 14.2**

1. Factorise the following expressions.

- (i)  $a^2 + 8a + 16$
- (ii)  $p^2 - 10p + 25$
- (iii)  $25m^2 + 30m + 9$
- (iv)  $49y^2 + 84yz + 36z^2$
- (v)  $4x^2 - 8x + 4$
- (vi)  $121b^2 - 88bc + 16c^2$
- (vii)  $(l + m)^2 - 4lm$  (Hint: Expand  $(l + m)^2$  first)
- (viii)  $a^4 + 2a^2b^2 + b^4$

2. Factorise.

- (i)  $4p^2 - 9q^2$
- (ii)  $63a^2 - 112b^2$
- (iii)  $49x^2 - 36$
- (iv)  $16x^5 - 144x^3$
- (v)  $(l + m)^2 - (l - m)^2$
- (vi)  $9x^2y^2 - 16$
- (vii)  $(x^2 - 2xy + y^2) - z^2$
- (viii)  $25a^2 - 4b^2 + 28bc - 49c^2$

3. Factorise the expressions.

- (i)  $ax^2 + bx$
- (ii)  $7p^2 + 12q^2$
- (iii)  $2x^3 + 2xy^2 + 2xz^2$
- (iv)  $am^2 + bm^2 + bn^2 + an^2$
- (v)  $(lm + l) + m + 1$
- (vi)  $y(y + z) + 9(y + z)$
- (vii)  $5y^2 - 20y - 8z + 2yz$
- (viii)  $10ab + 4a + 5b + 2$
- (ix)  $6xy - 4y + 6 - 9x$

4. Factorise.

- (i)  $a^4 - b^4$
- (ii)  $p^4 - 81$
- (iii)  $x^4 - (y + z)^4$
- (iv)  $x^4 - (x - z)^4$
- (v)  $a^4 - 2a^2b^2 + b^4$

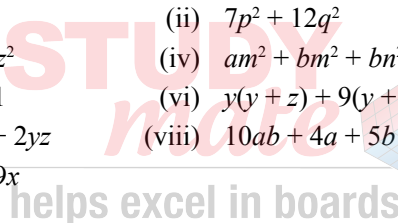
5. Factorise the following expressions.

- (i)  $p^2 + 6p + 8$
- (ii)  $q^2 - 10q + 21$
- (iii)  $p^2 + 6p - 16$

**TEST YOURSELF (F-2)**

1. Factorise:

- (i)  $a^2 + 14a + 49$
- (ii)  $x^2 - 12x + 36$
- (iii)  $4p^2 - 25q^2$
- (iv)  $25x^2 - 20xy + 4y^2$
- (v)  $169m^2 - 625n^2$
- (vi)  $x^2 + \frac{2}{3}x + \frac{1}{9}$
- (vii)  $121a^2 + 154ab + 49b^2$
- (viii)  $3x^3 - 75x$
- (ix)  $36 - 49x^2$
- (x)  $1 - 6x + 9x^2$



2. Factorise:

- |                       |                             |
|-----------------------|-----------------------------|
| (i) $x^2 + 7x + 12$   | (ii) $p^2 - 6p + 8$         |
| (iii) $m^2 - 4m - 21$ | (iv) $x^2 - 14x + 45$       |
| (v) $x^2 - 24x + 108$ | (vi) $a^2 + 13a + 12$       |
| (vii) $x^2 - 5x + 6$  | (viii) $x^2 - 14xy + 24y^2$ |
| (ix) $m^2 - 21m - 72$ | (x) $x^2 - 28x + 132$       |

3. Factorise the following:

- |                                   |                              |
|-----------------------------------|------------------------------|
| (i) $x^2 + \frac{1}{x^2} + 2$     | (ii) $x^2 + x + \frac{1}{4}$ |
| (iii) $(2m + 3n)^2 - (3m + 2n)^2$ | (iv) $63p^2q^2 - 7$          |
| (v) $5y^5 - 405y$                 | (vi) $x^4 - (2y - 3z)^2$     |

**EXERCISE 14.3**

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

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

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

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) $20(y + 4)(y^4 + 5y + 3) \div 5(y + 4)$                |
| (v) $x(x + 1)(x + 2)(x + 3) \div x(x + 1)$                  |

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

### TEST YOURSELF (F-3)

1. Simplify:

- (i)  $6x^4 \div 32x$       (ii)  $-42y^3 \div 7y^2$   
 (iii)  $30a^3b^3c^3 \div 45abc$       (iv)  $(7m^2 - 6m) \div m$   
 (v)  $(-72l^4m^5n^8) \div (-8l^2m^2n^3)$

2. Work out the following divisions:

- (i)  $5y^3 - 4y^2 + 3y \div y$       (ii)  $(9x^5 - 15x^4 - 21x^4) \div (3x^2)$   
 (iii)  $(5x^3 - 4x^2 + 3x) \div (2x)$       (iv)  $4x^2y - 28xy + 4xy^2 \div (4xy)$   
 (v)  $(8x^4yz - 4xy^3z + 3x^2yz^4) \div (xyz)$

3. Simplify the following expressions:

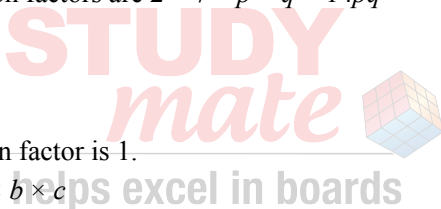
- (i)  $(x^2 + 7x + 10) \div (x + 2)$       (ii)  $(a^2 + 24a + 144) \div (a + 12)$   
 (iii)  $(m^2 + 5m - 14) \div (m + 7)$       (iv)  $(25m^2 - 4n^2) \div (5m + 2n)$   
 (v)  $(4a^2 - 4ab - 15b^2) \div (2a - 5b)$       (vi)  $(a^4 - b^4) \div (a - b)$



## NCERT Textual Exercises and Assignments

### Exercise – 14.1

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)  $3x^2y^3 = 3 \times x \times x \times y \times y \times y$   
 $10x^2y^3 = 3 \times x \times x \times y \times y \times y$   
 $6x^2y^2z = 2 \times 3 \times x \times x \times y \times y \times z$   
 Hence, common factors are  $x \times x \times y \times y = x^2y^2$



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

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

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

Taking common factors from each term,

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

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

$$3. \quad (i) \quad x^2 + xy + 8x + 8y = x(x + y) + 8(x + y)$$

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

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

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

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

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

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

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

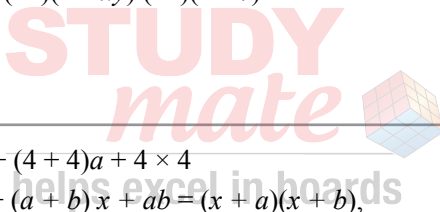
$$= (3q + 5)(5p + 3)$$

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

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

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

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



## Exercise – 14.2

$$1. \quad (i) \quad a^2 + 8a + 16 = a^2 + (4 + 4)a + 4 \times 4$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$= (l - m)^2$

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

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

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

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

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

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

(ii)  $63a^2 - 112b^2 = 7(9a^2 - 16b^2) = 7[(3a)^2 - (4b)^2]$

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

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

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

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

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

(iv)  $16x^2 - 144x^3 = 16x^3(x^2 - 9)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

$$\begin{aligned} \text{(v)} \quad (lm + 1) + m + 1 &= l(m + 1) + 1(m + 1) \\ &= (m + 1)(l + 1) \end{aligned}$$

$$\text{(vi)} \quad y(y + z) + 9(y + z) = (y + z)(y + 9)$$

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

$$\begin{aligned} \text{(viii)} \quad 10ab + 4a + 5b + 2 &= 2a(5b + 2) + 1(5b + 2) \\ &= (5b + 2)(2a + 1) \end{aligned}$$

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

$$4. \quad \text{(i)} \quad a^4 - b^4 = (a^2)^2 - (b^2)^2$$

$$\begin{aligned} &= (a^2 - b^2)(a^2 + b^2) && [\because a^2 - b^2 = (a - b)(a + b)] \\ &= (a - b)(a + b)(a^2 + b^2) && [\because a^2 - b^2 = (a - b)(a + b)] \end{aligned}$$

$$\text{(ii)} \quad p^4 - 81 = (p^2 - 9)^2$$

$$\begin{aligned} &= (p^2 - 9)(p^2 + 9) && [\because a^2 - b^2 = (a - b)(a + b)] \\ &= (p^2 - 3^2)(p^2 + 9) \end{aligned}$$

$$\begin{aligned} &= (p - 3)(p + 3)(p^2 + 9) && [\because a^2 - b^2 = (a - b)(a + b)] \end{aligned}$$

$$\text{(iii)} \quad x^4 - (y + z)^4 = (x^2)^2 - [(y + z)^2]^2$$

$$\begin{aligned} &= [x^2 - (y + z)^2][x^2 + (y + z)^2] && [\because a^2 - b^2 = (a - b)(a + b)] \\ &= [x - (y + z)][x + (y + z)][x^2 + (y + z)^2] && [\because a^2 - b^2 = (a - b)(a + b)] \end{aligned}$$

$$\begin{aligned} &= (x - y + z)(x + y + z)[x + y + z][x^2 + (y + z)^2] \end{aligned}$$

$$\text{(vi)} \quad x^4 - (x + z)^4 = (x^2)^2 - [(x + z)^2]^2$$

$$\begin{aligned} &= [x^2 - (x + z)^2][x^2 + (x + z)^2] && [\because a^2 - b^2 = (a - b)(a + b)] \\ &= [x - (x + z)][x + (x + z)][x^2 + (x + z)^2] && [\because a^2 - b^2 = (a - b)(a + b)] \end{aligned}$$

$$\begin{aligned} &= (x - x - z)(x + x + z)(x^2 + x^2 + z^2) && [\because (a - b)^2 = a^2 - 2ab + b^2] \\ &= x(2x + z)(2x^2 - 2xz + z^2) \end{aligned}$$

$$\text{(v)} \quad a^4 - 2a^2b^4 + (b^2)^2 = (a^2)^2 - 2a^2b^2 + (b^2)^2$$

$$\begin{aligned} &= (a^2 - b^2)^2 && [\because (a - b)^2 = a^2 - 2ab + b^2] \\ &= [(a - b)(a + b)]^2 && [\because a^2 - b^2 = (a - b)(a + b)] \end{aligned}$$

$$\begin{aligned} &= (a - b)(a + b)^2 && [\because (xy)^m = x^m \cdot y^m] \end{aligned}$$

$$5. \quad \text{(i)} \quad p^2 + 6p + 8 = p^2 + (4 + 2)p + 4 \times 2$$

$$= p^2 + 4p + 2p + 4 \times 2$$

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

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

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

### Exercise – 14.3

$$\begin{aligned}
 1. \quad \text{(i)} \quad 28x^4 \div 56x &= \frac{28x^4}{56x} = \frac{28}{56} \times \frac{x^4}{x} \\
 &= \frac{1}{2}x^3 && [\because x^m \div x^n = x^{m-n}] \\
 \text{(ii)} \quad -36y^3 \div 9y^2 &= \frac{-36y^3}{9y^2} = \frac{-36}{9} \times \frac{y^3}{y^2} \\
 &= -4y && [\because x^m \div x^n = x^{m-n}] \\
 \text{(iii)} \quad 66pq^2 \div 11qr^2 &= \frac{66pq^2r^3}{11qr^2} = \frac{66}{11} \times \frac{pq^2r^3}{qr^2} \\
 &= 6pqr && [\because x^m \div x^n = x^{m-n}] \\
 \text{(iv)} \quad 34x^3y^3z^3 \div 51xy^2z^3 &= \frac{34x^3y^3z^3}{51xy^2z^3} = \frac{34}{51} \times \frac{x^3y^3z^3}{xy^2z^3} \\
 &= \frac{2}{3}x^2y && \underline{8x^3 - 5x^2 + 6x} \\
 \text{(v)} \quad \frac{8x^3}{2x} - \frac{5x^2}{2x} + \frac{6x}{2x} &&& 4x^2 - \frac{5}{2}x + 3 \\
 &= -2a^2b^4 &&
 \end{aligned}$$

$$\begin{aligned}
 2. \quad \text{(i)} \quad (5x^2 - 6x) \div 3x &= \frac{5x^2 - 6x}{3x} \\
 &= \frac{5x^2}{3x} - \frac{6x}{3x} = \frac{5}{3}x - 2 = \frac{1}{3}(5x - 6) \\
 \text{(ii)} \quad (3y^8 - 4y^6 + 5y^4) \div y^4 &= \frac{3y^8 - 4y^6 - 5y^4}{y^4} \\
 &= \frac{3y^8}{y^4} - \frac{4y^6}{y^4} + \frac{5y^4}{y^4} = 3y^4 - 4y^2 + 5
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad & 8(x^3y^2z^2 + x^2y^3z^2 + x^2y^3z^2) \div 4x^2y^2z^2 = \frac{8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3)}{4x^2y^2z^2} \\
 & = \frac{8x^3y^2z^2}{4x^2y^2z^2} + \frac{8x^2y^3z^2}{4x^2y^2z^2} + \frac{8x^2y^2z^3}{4x^2y^2z^2} = 2x + 2y + 2z \\
 & = 2(x + y + z)
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad & (x^3 + 2x^2 + 3x) \div 2x = \frac{x^3 + 2x^2 + 3x}{2x} \\
 & = \frac{x^3}{2x} + \frac{2x^2}{2x} + \frac{3x}{2x} = \frac{x^2}{2} + \frac{2x}{2} + \frac{3}{2} = \frac{1}{2}(x^2 + 2x + 3)
 \end{aligned}$$

$$\begin{aligned}
 \text{(v)} \quad & (p^3q^6 - p^6q^3) \div p^3q^3 = \frac{p^3q^6 - p^6q^3}{p^3q^3} \\
 & = \frac{p^3q^6}{p^3q^3} - \frac{p^6q^3}{p^3q^3} = q^3 - p^3
 \end{aligned}$$

$$\begin{aligned}
 3. \quad \text{(i)} \quad & (10x - 25) \div 5 = \frac{10x - 25}{5} \\
 & = \frac{5(2x - 5)}{5} = 2x - 5
 \end{aligned}$$

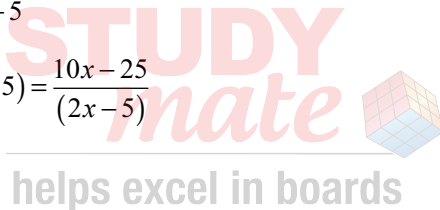
$$\begin{aligned}
 \text{(ii)} \quad & (10x - 25) \div (2x - 5) = \frac{10x - 25}{(2x - 5)} \\
 & = \frac{5(2x - 5)}{(2x - 5)} = 5
 \end{aligned}$$

$$\begin{aligned}
 \text{(iii)} \quad & 10y(6y + 21) \div 5(2y + 7) = \frac{10y(6y + 21)}{5(2y + 7)} \\
 & = \frac{2 \times 5 \times y \times 3(2y + 7)}{5(2y + 7)} = 2 \times y \times 3 = 6y
 \end{aligned}$$

$$\begin{aligned}
 \text{(iv)} \quad & 9x^2y^2(3z - 24) \div 27xy(z - 8) = \frac{9x^2y^2(3z - 24)}{27xy(z - 8)} \\
 & = \frac{9}{27} \times \frac{xy \times xy \times 3}{xy(z - 8)} = xy
 \end{aligned}$$

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

$$4. \quad \text{(i)} \quad 5(2x + 1)(3x + 5) \div (2x + 1) = \frac{5(2x + 1)(3x + 5)}{(2x + 1)}$$



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

$$\begin{aligned} \text{(ii)} \quad 26xy(x+5)(y-4) \div 13x(y-4) &= \frac{26xy(x+5)(y-4)}{13x(y-4)} \\ &= \frac{13 \times 2 \times xy(x+5)(y-4)}{13x(y-4)} = 2y(x+5) \end{aligned}$$

$$\begin{aligned} \text{(iii)} \quad 52pqr(p+q)(q+r)(r+p) \div 104pq(q+r)(r+p) \\ &= \frac{52pqr(p+q)(q+r)(r+p)}{104pq(q+r)(r+p)} \\ &= \frac{52pqr(p+q)(q+r)(r+p)}{52 \times 2 \times pq(q+r)(r+p)} = \frac{1}{2}r(p+q) \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad 20(y+4)(y^2+5y+3) \div (y+4) &= \frac{20(y+4)(y^2+5y+3)}{5(y+4)} \\ &= 4(y^2+5y+3) \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad x(x+1)(x+2)(x+3) \div x(x+1) &= \frac{x(x+1)(x+2)(x+3)}{x(x+1)} \\ &= (x+2)(x+3) \end{aligned}$$

$$\begin{aligned} 5. \quad \text{(i)} \quad (y^2+7y+10) \div (y+5) &= \frac{y^2+7y+10}{(y+5)} \\ &= \frac{y^2+(2+5)y+2 \times 5}{(y+5)} = \frac{y^2+2y+5y+2 \times 5}{(y+5)} \\ &= \frac{(y+2)(y+5)}{(y+5)} \quad [\because x^2+(a+b)x+ab=(x+a)(x+b)] \end{aligned}$$

$$\begin{aligned} \text{(ii)} \quad (m^2-14m+32) \div (m+2) &= \frac{m^2-14m+32}{(m+2)} \\ &= \frac{m^2+(-16+2)m+(-16) \times 2}{(m+2)} \\ &= \frac{(m-16)(m+2)}{(m+2)} \quad [\because x^2+(a+b)x+ab=(x+a)(x+b)] \\ &= (m-16) \end{aligned}$$

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

$$\begin{aligned}
 &= \frac{(5p-5)(p-4)}{(p-1)} = \frac{5(p-1)(p-4)}{(p-1)} \\
 &= 5(p-4)
 \end{aligned}$$

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

$$\begin{aligned}
 \text{(v)} \quad 5pq(p^2 - q^2) \div 2p(p+q) &= \frac{5pq(p^2 - q^2)}{2p(p+q)} \\
 &= \frac{5pq(p-q)(p+q)}{2p(p+q)} & [\because a^2 - b^2 = (a-b)(a+b)] \\
 &= \frac{5}{2}q(p-q)
 \end{aligned}$$

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

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

## Exercise – 14.4

1. L.H.S. =  $4(x - 5) = 4x - 20 \neq$  R.H.S.  
Hence the correct mathematical statement is  $4(x - 5) = 4x - 20$ .
2. L.H.S. =  $x(3x + 2) = 3x^2 + 2x \neq$  R.H.S.  
Hence, the correct mathematical statement is  $x(3x + 2) = 3x^2 + 2x$
3. L.H.S. =  $2x + 3y \neq$  R.H.S.  
Hence the correct mathematical statement is  $2x + 3y = 2x + 3y$ .
4. L.H.S. =  $x + 2x + 3x = 6x \neq$  R.H.S.  
Hence the correct mathematical statement is  $x + 2x + 3x = 6x$ .
5. L.H.S. =  $5y + 2y + y - 7y = 8y - 7y = y \neq$  R.H.S.  
Hence the correct mathematical statement is  $5y + 2y + y - 7y = y$ .
6. L.H.S. =  $3x + 2x = 5x \neq$  R.H.S.  
Hence the correct mathematical statement is  $3x + 2x = 5x$ .
7. L.H.S. =  $(2x)^2 + 4(2x) + 7 = 4x^2 + 8x + 7 \neq$  R.H.S.  
Hence the correct mathematical statement is  $(2x)^2 + 4(2x) + 7 = 4x^2 + 8x + 7$ .
8. L.H.S. =  $(2x)^2 + 5x = 4x^2 + 5x \neq$  R.H.S.  
Hence the correct mathematical statement is  $(2x)^2 + 5x = 4x^2 + 5x$ .
9. L.H.S. =  $(3x + 2)^2(3x)^2 + 2 \times 3x \times 2 + (2)^2 = 9x^2 + 12x + 4 \neq$  R.H.S.  
Hence the correct mathematical statement is  $(3x + 2)^2 = 9x^2 + 12x + 4$ .
10. (a) L.H.S. =  $x^2 + 5x + 4$   
Putting  $x = -3$  in given expression,  
 $= (-3)^2 + 5(-3) + 4 = 9 - 15 + 4 = -2 \neq$  R.H.S.  
Hence  $x^2 + 5x + 4$  gives  $(-3)^2 + 5(-3) + 4 = 9 - 15 + 4 = -2$ .
- (b) L.H.S. =  $x^2 - 5x + 4$   
Putting  $x = -3$  in given expression,  
 $= (-3)^2 - 5(-3) + 4 = 9 + 15 + 4 = 28 \neq$  R.H.S.  
Hence  $x^2 - 5x + 4$  gives  $(-3)^2 - 5(-3) + 4 = 9 + 15 + 4 = 28$ .
- (c) L.H.S. =  $x^2 + 5x$   
Putting  $x = -3$  in given expression,  
 $= (-3)^2 + 5(-3) = 9 - 15 = -6 \neq$  R.H.S.  
Hence  $x^2 + 5x$  gives  $(-3)^2 + 5(-3) = 9 - 15 = -6$ .
11. L.H.S. =  $(y - 3)^2 = y^2 - 2 \times y \times 3 + (3)^2$  [ $\because (a-b)^2 = a^2 - 2ab + b^2$ ]  
 $= y^2 - 6y + 9 \neq$  R.H.S.  
Hence, the correct statement is  $(y - 3)^2 = y^2 - 6y + 9$ .
12. L.H.S. =  $(z + 5)^2 = z^2 + 2 \times z \times 5 + (5)^2 = z^2 + 10z + 25$   
[ $\because (a + b)^2 = a^2 + 2ab + b^2$ ]

Hence the correct statement is  $(z + 5)^2 = z^2 + 10z + 25$ .

13. L.H.S. =  $(2a + 3b)(a - b) = 2a(a - b) + 3b(a - b) = 2a^2 - 2ab + 3ab - 3b^2 = 2a^2 + ab - 3b^2 \neq$   
R.H.S.

Hence the correct statement is  $(2a + 3b)(a - b) = 2a^2 + ab - 3b^2$ .

14. L.H.S. =  $(a + 4)(a + 2) = a(a + 2) + 4(a + 2)$   
 $= a^2 + 2a + 4a + 8 = a^2 + 6a + 8 \neq$  R.H.S.

Hence the correct statement is  $(a + 4)(a + 2) = a^2 + 6a + 8$ .

15. L.H.S. =  $(a - 4)(a - 2) = a(a - 2) - 4(a - 2) = a^2 - 2a - 4a + 8 = a^2 - 6a + 8 \neq$  R.H.S.

Hence the correct statement is  $(a - 4)(a - 2) = a^2 - 6a + 8$ .

16. L.H.S. =  $\frac{3x^2}{3x^2} = \frac{1}{1} = 1 \neq$  R.H.S.

Hence the correct statement =  $\frac{3x^2}{3x^2} = 1$ .

17. L.H.S. =  $\frac{3x^2 + 1}{3x^2} = \frac{3x^2}{3x^2} = \frac{1}{3x^2} = 1 + \frac{1}{3x^2} \neq$  R.H.S.

Hence the correct statement =  $\frac{3x^2 + 1}{3x^2} = 1 + \frac{1}{3x^2}$ .

18. L.H.S. =  $\frac{3x}{3x + 2} \neq$  R.H.S.

Hence, the correct statement is  $\frac{3x^2 + 1}{3x^2} = 1 + \frac{1}{3x^2}$

19. L.H.S. =  $\frac{3}{4x + 3} \neq$  R.H.S.

Hence the correct statement is  $\frac{3}{4x + 3} = \frac{3}{4x + 3}$

20. L.H.S. =  $\frac{4x + 5}{4x} = \frac{4x}{4x} + \frac{5}{4x} = 1 + \frac{5}{4x} \neq$  R.H.S.

Hence the correct statement is  $\frac{4x + 5}{4x} = 1 + \frac{5}{4x}$

21. L.H.S. =  $\frac{7x + 5}{5} = \frac{7x}{5} + \frac{5}{5} = \frac{7x}{5} + 1 \neq$  R.H.S

Hence the correct statement is  $\frac{7x + 5}{5} = \frac{7x}{5} + 1$ .

