

Chapter 14: Factorization

Question 1

Use the below expression to solve the below problems

$$a^2 - b^2 = (a - b)(a + b)$$

a. $x^2 - 81$

b. $49a^2 - 36$

c. $121 - 49z^2$

d. $4x^2 - 9y^2$

e. $16x^2 - 225y^2$

f. $9x^2y^2 - 25$

g. $16x^2 - 81$

h. $(a + b)^2 - 9c^2$

i. $a - (x - y)^2$

j. $4(x + y)^2 - x^2$

k. $36(a + b)^2 - 16(a - b)^2$

l. $20x^2 - 45y^2$

m. $z^3 - 81z$

n. $12p^2 - 27$

o. $3z^5 - 27z^3$

p. $36a^2b^2 - 8$

q. $z^2 - x^2 - 2x - 1$

r. $9x^2 - y^2 + 4y - 4$

s. $p^2 - 2pq + q^2 - r^2$

Question 2

Use the below expression to solve the below problems

$$(a+b)^2 = (a^2 + b^2 + 2ab)$$

$$(a-b)^2 = (a^2 + b^2 - 2ab)$$

1. $p^2 + 4p + 5$

2. $x^2 + 19x + 81$

3. $3 + 6z + z^2$

4. $9 + 6x + x^2$

5. $z^2 + 6xz + 9x^2$

6. $9x^2 + 30x + 25$

7. $36z^2 + 12z + 1$

8. $9x^2 + 30x + 25$

9. $z^2 + z + 1/4$

10. $4z^2 - 6z + 9$

11. $4p^2 - 20p + 25$

12. $9x^2 - 30x + 25$

13. $1 - 2y + y^2$

14. $4 - 12y + 9y^2$

15. $x^2y^2 - 6xyz + 9z^2$

16. $p^2 - 6pq + 9p^2$

Question 3

Find and correct the errors in the statement: $(3x)^2 + 5x = 9x + 5x = 14x$

Answer

$$\text{LHS} = (2x)^2 + 5x = 4x^2 + 5x$$

$$\text{RHS} = 9x + 5x = 14x$$

$$\text{Third} = 14x$$

LHS \neq RHS = third part

Correct statement would be

$$(3x)^2 + 5x = 9x^2 + 5x$$

Question 4

Find and correct the errors in the statement: $(4x + 2)^2 = 2x^2 + 16x + 4$

Answer

$$\text{LHS} = (4x + 2)^2 = 16x^2 + 16x + 4$$

$$\text{RHS} = 2x^2 + 16x + 4$$

LHS \neq RHS

Correct statement would be

$$(4x + 2)^2 = 16x^2 + 16x + 4$$

Question 5

Find and correct the errors in the statement: $(z - 1)^2 = z^2 - 1$

Answer

$$\text{LHS} = (z - 1)^2 = z^2 - 2z + 1$$

$$\text{RHS} = z^2 - 1$$

LHS \neq RHS

Correct statement would be

$$(z - 1)^2 = z^2 - 2z + 1$$

Question 6

Find and correct the errors in the statement: $(y + 6)^2 = y^2 + 36$

Answer

$$\text{LHS} = (y + 6)^2 = y^2 + 12z + 36$$

$$\text{RHS} = y^2 + 36$$

$$\text{LHS} \neq \text{RHS}$$

Correct statement would be

$$(y + 6)^2 = y^2 + 12z + 36$$

Question 7

Factorize the following expression

a) $x(1 - b) - y(1 - b)$

b) $9r(z + 1) + 3r(z + 1)$

c) $p^2 + q^2 + 5a(p^2 + q^2)$

d) $x^2 + xy + 8x + 8y$

e) $3(x + y) - 9(x + y)^2$

f) $l(3m - 7n) - n(3m - 7n)$

g) $(2m - 5)(3a - 2b) - (2m - 5)(2b - 3a)$

h) $x(1 + y) + (7 + 7y)$

i) $(6xy + 3x) + (2y + 1)$

j) $x(y - z)^2 - a(z - y)^3$

k) $z - 7 + 7xy - xyz$

Question 8

Work out the following divisions.

(i) $(11x - 121) \div 11$

(ii) $(15x - 25) \div (3x - 5)$

(iii) $10y(9y + 21) \div 2(3y + 7)$

(iv) $9p^2q^2(3z - 12) \div 27pq(z - 4)$

Question 9

Factorize the following expressions.

(i) $z^2 + 6z + 8$

(ii) $z^2 - 10z + 21$

(iii) $z^2 + 6z - 16$

Question 10

Factor the given expressions using identity:

$$(x+y)^2 = x^2 + y^2 + 2xy$$

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

$$x^2 - y^2 = (x-y)(x+y)$$

(i) $p^2 + 6p + 9$

(ii) $4z^2 - 4z + 1$

(iii) $4p^4 + 9p^4 + 12p^2q^2$

(iv) $(a^4 - 8a^2b^2 + 16b^4) - 81$

(v) $625 - x^2 - 2xy - y^2$

Question 11

Divide as directed.

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

(ii) $39x(x + 5)(y - 2) \div 13x(y - 2)$

(iii) $12pq(p + q)(q + r)(r + p) \div 6pq(q + r)(r + p)$

(iv) $60(y - 4)(y^2 + 5y + 3) \div 5(y - 4)$

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

Question 12

Factorize the expressions.

(i) $px^2 + qx$

(ii) $7x^2 + 21y^2$

(iii) $2x^3 + 2xy^2 + 2xz^2$

(iv) $ap^2 + bq^2 + bq^2 + aq^2$

(v) $nm + n^2 + m + n$

(vi) $y(y - z) + 16(y - z)$

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

(viii) $10xy + 4x + 5y + 2$

(ix) $6xy - 4y + 6 - 9x$

Question 13

Factor completely using the formula:

(i) $576 - p^2 + 8pq - 16q^2$ (ii) $25x^2 - (y + z)^2$

(iii) $4p^2 - 4q - 3$

(iv) $81 - x^2 - y^2 - 2xy$

(v) $121 - x^2 - y^2 - 2xy$

Question 14

Factorize the expressions:

(i) $4a^2 - 12ab + 9b^2$

(ii) $36p^2 - 84pq + 49q^2$

(iii) $4a^8 - b^8$

(iv) $(z - 1)^2 + 2(z - 1)(2z + 3) + (2z + 3)^2$

(v) $p^2 - 9q^2$