

## RD Sharma Solutions For Class 8 Chapter 6 Algebraic Expressions and Identities

1. Identify the terms, their coefficients for each of the following expressions:

(i)  $7x^2yz - 5xy$

(ii)  $x^2 + x + 1$

(iii)  $3x^2y^2 - 5x^2y^2z^2 + z^2$

(iv)  $9 - ab + bc - ca$

(v)  $a/2 + b/2 - ab$

(vi)  $0.2x - 0.3xy + 0.5y$

**Solution:**

(i)  $7x^2yz - 5xy$

The given equation has two terms that are:

$7x^2yz$  and  $-5xy$

The coefficient of  $7x^2yz$  is 7

The coefficient of  $-5xy$  is  $-5$

(ii)  $x^2 + x + 1$

The given equation has three terms that are:

$x^2$ ,  $x$ ,  $1$

The coefficient of  $x^2$  is 1

The coefficient of  $x$  is 1

The coefficient of 1 is 1

(iii)  $3x^2y^2 - 5x^2y^2z^2 + z^2$

The given equation has three terms that are:

$3x^2y^2$ ,  $-5x^2y^2z^2$  and  $z^2$

The coefficient of  $3x^2y^2$  is 3

The coefficient of  $-5x^2y^2z^2$  is  $-5$

The coefficient of  $z^2$  is 1

(iv)  $9 - ab + bc - ca$

The given equation has four terms that are:

$9$ ,  $-ab$ ,  $bc$ ,  $-ca$

The coefficient of 9 is 9

The coefficient of  $-ab$  is  $-1$

The coefficient of  $bc$  is  $1$

The coefficient of  $-ca$  is  $-1$

(v)  $a/2 + b/2 - ab$

The given equation has three terms that are:

$a/2, b/2, -ab$

The coefficient of  $a/2$  is  $1/2$

The coefficient of  $b/2$  is  $1/2$

The coefficient of  $-ab$  is  $-1$

(vi)  $0.2x - 0.3xy + 0.5y$

The given equation has three terms that are:

$0.2x, -0.3xy, 0.5y$

The coefficient of  $0.2x$  is  $0.2$

The coefficient of  $-0.3xy$  is  $-0.3$

The coefficient of  $0.5y$  is  $0.5$

**2. Classify the following polynomials as monomials, binomials, trinomials. Which polynomials do not fit in any category?**

(i)  $x+y$

(ii)  $1000$

(iii)  $x+x^2+x^3+x^4$

(iv)  $7+a+5b$

(v)  $2b-3b^2$

(vi)  $2y-3y^2+4y^3$

(vii)  $5x-4y+3x$

(viii)  $4a-15a^2$

(ix)  $xy+yz+zt+tx$

(x)  $pqr$

(xi)  $p^2q+pq^2$

(xii)  $2p+2q$

**Solution:**

(i)  $x+y$

The given expression contains two terms  $x$  and  $y$

∴ It is Binomial

(ii)  $1000$

The given expression contains one term  $1000$

∴ It is Monomial

(iii)  $x+x^2+x^3+x^4$

The given expression contains four terms

∴ It belongs to none of the categories

**(iv)**  $7+a+5b$

The given expression contains three terms

∴ It is Trinomial

**(v)**  $2b-3b^2$

The given expression contains two terms

∴ It is Binomial

**(vi)**  $2y-3y^2+4y^3$

The given expression contains three terms

∴ It is Trinomial

**(vii)**  $5x-4y+3x$

The given expression contains three terms

∴ It is Trinomial

**(viii)**  $4a-15a^2$

The given expression contains two terms

∴ It is Binomial

**(ix)**  $xy + yz + zt + tx$

The given expression contains four terms

∴ It belongs to none of the categories

**(x)**  $pqr$

The given expression contains one term

∴ It is Monomial

**(xi)**  $p^2q+pq^2$

The given expression contains two terms

∴ It is Binomial

**(xii)**  $2p+2q$

The given expression contains two terms

∴ It is Binomial

## EXERCISE 6.2 PAGE NO: 6.5

1. Add the following algebraic expressions:

**(i)**  $3a^2b, -4a^2b, 9a^2b$

(ii)  $2/3a, 3/5a, -6/5a$

(iii)  $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

(iv)  $3/2a - 5/4b + 2/5c, 2/3a - 7/2b + 7/2c, 5/3a + 5/2b - 5/4c$

(v)  $11/2xy + 12/5y + 13/7x, -11/2y - 12/5x - 137xy$

(vi)  $7/2x^3 - 1/2x^2 + 5/3, 3/2x^3 + 7/4x^2 - x + 1/3, 3/2x^2 - 5/2x - 2$

**Solution:**

(i)  $3a^2b, -4a^2b, 9a^2b$

Let us add the given expression

$$3a^2b + (-4a^2b) + 9a^2b$$

$$3a^2b - 4a^2b + 9a^2b$$

$$8a^2b$$

(ii)  $2/3a, 3/5a, -6/5a$

Let us add the given expression

$$2/3a + 3/5a + (-6/5a)$$

$$2/3a + 3/5a - 6/5a$$

Let us take LCM for 3 and 5 which is 15

$$(2 \times 5)/(3 \times 5)a + (3 \times 3)/(5 \times 3)a - (6 \times 3)/(5 \times 3)a$$

$$10/15a + 9/15a - 18/15a$$

$$(10a + 9a - 18a)/15$$

$$a/15$$

(iii)  $4xy^2 - 7x^2y, 12x^2y - 6xy^2, -3x^2y + 5xy^2$

Let us add the given expression

$$4xy^2 - 7x^2y + 12x^2y - 6xy^2 - 3x^2y + 5xy^2$$

Upon rearranging

$$12x^2y - 3x^2y - 7x^2y - 6xy^2 + 5xy^2 + 4xy^2$$

$$3xy^2 + 2x^2y$$

(iv)  $3/2a - 5/4b + 2/5c, 2/3a - 7/2b + 7/2c, 5/3a + 5/2b - 5/4c$

Let us add the given expression

$$3/2a - 5/4b + 2/5c + 2/3a - 7/2b + 7/2c + 5/3a + 5/2b - 5/4c$$

Upon rearranging

$$3/2a + 2/3a + 5/3a - 5/4b - 7/2b + 5/2b + 2/5c + 7/2c - 5/4c$$

By taking LCM for (2 and 3 is 6), (4 and 2 is 4), (5, 2 and 4 is 20)

$$(9a + 4a + 10a)/6 + (-5b - 14b + 10b)/4 + (8c + 70c - 25c)/20$$

$$23a/6 - 9b/4 + 53c/20$$

$$(v) 11/2xy + 12/5y + 13/7x, -11/2y - 12/5x - 13/7xy$$

Let us add the given expression

$$11/2xy + 12/5y + 13/7x + -11/2y - 12/5x - 13/7xy$$

Upon rearranging

$$11/2xy - 13/7xy + 13/7x - 12/5x + 12/5y - 11/2y$$

By taking LCM for (2 and 7 is 14), (7 and 5 is 35), (5 and 2 is 10)

$$(11xy-12xy)/14 + (65x-84x)/35 + (24y-55y)/10$$

$$51xy/14 - 19x/35 - 31y/10$$

$$(vi) 7/2x^3 - 1/2x^2 + 5/3, 3/2x^3 + 7/4x^2 - x + 1/3, 3/2x^2 - 5/2x - 2$$

Let us add the given expression

$$7/2x^3 - 1/2x^2 + 5/3 + 3/2x^3 + 7/4x^2 - x + 1/3 + 3/2x^2 - 5/2x - 2$$

Upon rearranging

$$7/2x^3 + 3/2x^3 - 1/2x^2 + 7/4x^2 + 3/2x^2 - x - 5/2x + 5/3 + 1/3 - 2$$

$$10/2x^3 + 11/4x^2 - 7/2x + 0/6$$

$$5x^3 + 11/4x^2 - 7/2x$$

## 2. Subtract:

$$(i) -5xy \text{ from } 12xy$$

$$(ii) 2a^2 \text{ from } -7a^2$$

$$(iii) 2a-b \text{ from } 3a-5b$$

$$(iv) 2x^3 - 4x^2 + 3x + 5 \text{ from } 4x^3 + x^2 + x + 6$$

$$(v) 2/3y^3 - 2/7y^2 - 5 \text{ from } 1/3y^3 + 5/7y^2 + y - 2$$

$$(vi) 3/2x - 5/4y - 7/2z \text{ from } 2/3x + 3/2y - 4/3z$$

$$(vii) x^2y - 4/5xy^2 + 4/3xy \text{ from } 2/3x^2y + 3/2xy^2 - 1/3xy$$

$$(viii) ab/7 - 35/3bc + 6/5ac \text{ from } 3/5bc - 4/5ac$$

**Solution:**

$$(i) -5xy \text{ from } 12xy$$

Let us subtract the given expression

$$12xy - (-5xy)$$

$$5xy + 12xy$$

$$17xy$$

$$(ii) 2a^2 \text{ from } -7a^2$$

Let us subtract the given expression

$$(-7a^2) - 2a^2$$

$$-7a^2 - 2a^2$$

$$-9a^2$$

**(iii)**  $2a - b$  from  $3a - 5b$

Let us subtract the given expression

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

$$3a - 5b - 2a + b$$

$$a - 4b$$

**(iv)**  $2x^3 - 4x^2 + 3x + 5$  from  $4x^3 + x^2 + x + 6$

Let us subtract the given expression

$$(4x^3 + x^2 + x + 6) - (2x^3 - 4x^2 + 3x + 5)$$

$$4x^3 + x^2 + x + 6 - 2x^3 + 4x^2 - 3x - 5$$

$$2x^3 + 5x^2 - 2x + 1$$

**(v)**  $2/3y^3 - 2/7y^2 - 5$  from  $1/3y^3 + 5/7y^2 + y - 2$

Let us subtract the given expression

$$1/3y^3 + 5/7y^2 + y - 2 - 2/3y^3 + 2/7y^2 + 5$$

Upon rearranging

$$1/3y^3 - 2/3y^3 + 5/7y^2 + 2/7y^2 + y - 2 + 5$$

By grouping similar expressions we get,

$$-1/3y^3 + 7/7y^2 + y + 3$$

$$-1/3y^3 + y^2 + y + 3$$

**(vi)**  $3/2x - 5/4y - 7/2z$  from  $2/3x + 3/2y - 4/3z$

Let us subtract the given expression

$$2/3x + 3/2y - 4/3z - (3/2x - 5/4y - 7/2z)$$

Upon rearranging

$$2/3x - 3/2x + 3/2y + 5/4y - 4/3z + 7/2z$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (2 and 4 is 4), (3 and 2 is 6)

$$(4x - 9x)/6 + (6y + 5y)/4 + (-8z + 21z)/6$$

$$-5x/6 + 11y/4 + 13z/6$$

**(vii)**  $x^2y - 4/5xy^2 + 4/3xy$  from  $2/3x^2y + 3/2xy^2 - 1/3xy$

Let us subtract the given expression

$$2/3x^2y + 3/2xy^2 - 1/3xy - (x^2y - 4/5xy^2 + 4/3xy)$$

Upon rearranging

$$2/3x^2y - x^2y + 3/2xy^2 + 4/5xy^2 - 1/3xy - 4/3xy$$

By grouping similar expressions we get,

LCM for (3 and 1 is 3), (2 and 5 is 10), (3 and 3 is 3)

$$-1/3x^2y + 23/10xy^2 - 5/3xy$$

(viii)  $ab/7 - 35/3bc + 6/5ac$  from  $3/5bc - 4/5ac$

Let us subtract the given expression

$$3/5bc - 4/5ac - (ab/7 - 35/3bc + 6/5ac)$$

Upon rearranging

$$3/5bc + 35/3bc - 4/5ac - 6/5ac - ab/7$$

By grouping similar expressions we get,

LCM for (5 and 3 is 15), (5 and 5 is 5)

$$(9bc+175bc)/15 + (-4ac-6ac)/5 - ab/7$$

$$184bc/15 + -10ac/5 - ab/7$$

$$- ab/7 + 184bc/15 - 2ac$$

### 3. Take away:

(i)  $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$  from  $x^3/3 - 5/2x^2 + 3/5x + 1/4$

(ii)  $5a^2/2 + 3a^3/2 + a/3 - 6/5$  from  $1/3a^3 - 3/4a^2 - 5/2$

(iii)  $7/4x^3 + 3/5x^2 + 1/2x + 9/2$  from  $7/2 - x/3 - x^2/5$

(iv)  $y^3/3 + 7/3y^2 + 1/2y + 1/2$  from  $1/3 - 5/3y^2$

(v)  $2/3ac - 5/7ab + 2/3bc$  from  $3/2ab - 7/4ac - 5/6bc$

**Solution:**

(i)  $6/5x^2 - 4/5x^3 + 5/6 + 3/2x$  from  $x^3/3 - 5/2x^2 + 3/5x + 1/4$

Let us subtract the given expression

$$1/3x^3 - 5/2x^2 + 3/5x + 1/4 - (6/5x^2 - 4/5x^3 + 5/6 + 3/2x)$$

Upon rearranging

$$1/3x^3 + 4/5x^3 - 5/2x^2 - 6/5x^2 + 3/5x - 3/2x + 1/4 - 5/6$$

By grouping similar expressions we get,

LCM for (3 and 5 is 15), (2 and 5 is 10), (5 and 2 is 10), (4 and 6 is 24)

$$17/15x^3 - 37/10x^2 - 9/10x - 14/24$$

$$17/15x^3 - 37/10x^2 - 9/10x - 7/12$$

(ii)  $5a^2/2 + 3a^3/2 + a/3 - 6/5$  from  $1/3a^3 - 3/4a^2 - 5/2$

Let us subtract the given expression

$$1/3a^3 - 3/4a^2 - 5/2 - (5/2a^2 + 3/2a^3 + a/3 - 6/5)$$

Upon rearranging

$$1/3a^3 - 3/2a^3 - 3/4a^2 - 5/2a^2 - a/3 - 5/2 + 6/5$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6), (4 and 2 is 4), (2 and 5 is 10)

$$(2a^3 - 9a^3)/6 - (3a^2 + 10a^2)/4 - a/3 + (-25+12)/10$$

$$-7/6a^3 - 13/4a^2 - a/3 - 13/10$$

(iii)  $7/4x^3 + 3/5x^2 + 1/2x + 9/2$  from  $7/2 - x/3 - x^2/5$

Let us subtract the given expression

$$7/2 - x/3 - 1/5x^2 - (7/4x^3 + 3/5x^2 + 1/2x + 9/2)$$

Upon rearranging

$$-7/4x^3 - 1/5x^2 - 3/5x^2 - x/3 - x/2 + 7/2 - 9/2$$

By grouping similar expressions we get,

LCM for (3 and 2 is 6)

$$-7/4x^3 - 4/5x^2 - (2x-3x)/6 + (7-9)/2$$

$$-7/4x^3 - 4/5x^2 - 5/6x - 1$$

(iv)  $y^3/3 + 7/3y^2 + 1/2y + 1/2$  from  $1/3 - 5/3y^2$

Let us subtract the given expression

$$1/3 - 5/3y^2 - (1/3y^3 + 7/3y^2 + 1/2y + 1/2)$$

Upon rearranging

$$-1/3y^3 - 5/3y^2 - 7/3y^2 - 1/2y + 1/3 - 1/2$$

By grouping similar expressions we get,

LCM for (3 and 3 is 3), (3 and 2 is 6)

$$-1/3y^3 + (-5y^2 - 7y^2)/3 - 1/2y + (2-3)/6$$

$$-1/3y^3 - 12/3y^2 - 1/2y - 1/6$$

(v)  $2/3ac - 5/7ab + 2/3bc$  from  $3/2ab - 7/4ac - 5/6bc$

Let us subtract the given expression

$$3/2ab - 7/4ac - 5/6bc - (2/3ac - 5/7ab + 2/3bc)$$

Upon rearranging

$$3/2ab + 5/7ab - 7/4ac - 2/3ac - 5/6bc - 2/3bc$$

By grouping similar expressions we get,

LCM for (2 and 7 is 14), (4 and 3 is 12), (6 and 3 is 6)

$$(21ab+10ab)/14 - (21ac-8ac)/12 - (5bc-4bc)/6$$

$$31/14ab - 29/12ac - 3/2bc$$

**4. Subtract  $3x - 4y - 7z$  from the sum of  $x - 3y + 2z$  and  $-4x + 9y - 11z$ .**

**Solution:**



The sum of  $x - 3y + 2z$  and  $-4x + 9y - 11z$  is

$$(x - 3y + 2z) + (-4x + 9y - 11z)$$

Upon rearranging

$$x - 4x - 3y + 9y + 2z - 11z$$

$$-3x + 6y - 9z$$

Now, Let us subtract the given expression from  $-3x + 6y - 9z$

$$(-3x + 6y - 9z) - (3x - 4y - 7z)$$

Upon rearranging

$$-3x - 3x + 6y + 4y - 9z + 7z$$

$$-6x + 10y - 2z$$

**5. Subtract the sum of  $3l - 4m - 7n^2$  and  $2l + 3m - 4n^2$  from the sum of  $9l + 2m - 3n^2$  and  $-3l + m + 4n^2$ ....**

**Solution:**

Sum of  $3l - 4m - 7n^2$  and  $2l + 3m - 4n^2$

$$3l - 4m - 7n^2 + 2l + 3m - 4n^2$$

Upon rearranging

$$3l + 2l - 4m + 3m - 7n^2 - 4n^2$$

$$5l - m - 11n^2 \dots\dots\dots\text{equation (1)}$$

Sum of  $9l + 2m - 3n^2$  and  $-3l + m + 4n^2$

$$9l + 2m - 3n^2 + (-3l + m + 4n^2)$$

Upon rearranging

$$9l - 3l + 2m + m - 3n^2 + 4n^2$$

$$6l + 3m + n^2 \dots\dots\dots\text{equation (2)}$$

Let us subtract equation (i) from (ii), we get

$$6l + 3m + n^2 - (5l - m - 11n^2)$$

Upon rearranging

$$6l - 5l + 3m + m + n^2 + 11n^2$$

$$l + 4m + 12n^2$$

**6. Subtract the sum of  $2x - x^2 + 5$  and  $-4x - 3 + 7x^2$  from 5.**

**Solution:**

Sum of  $2x - x^2 + 5$  and  $-4x - 3 + 7x^2$  is

$$2x - x^2 + 5 + (-4x - 3 + 7x^2)$$

$$2x - x^2 + 5 - 4x - 3 + 7x^2$$

Upon rearranging

$$-x^2 + 7x^2 + 2x - 4x + 5 - 3$$

$$6x^2 - 2x + 2 \dots\dots\dots\text{equation (i)}$$

Let us subtract equation (i) from 5 we get,

$$5 - (6x^2 - 2x + 2)$$

$$5 - 6x^2 + 2x - 2$$

$$3 + 2x - 6x^2$$

**7. Simplify each of the following:**

**(i)  $x^2 - 3x + 5 - 1/2(3x^2 - 5x + 7)$**

**(ii)  $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$**

**(iii)  $11/2x^2y - 9/4xy^2 + 1/4xy - 1/14y^2x + 1/15yx^2 + 1/2xy$**

**(iv)  $(1/3y^2 - 4/7y + 11) - (1/7y - 3 + 2y^2) - (2/7y - 2/3y^2 + 2)$**

**(v)  $-1/2a^2b^2c + 1/3ab^2c - 1/4abc^2 - 1/5cb^2a^2 + 1/6cb^2a - 1/7c^2ab + 1/8ca^2b$**

**Solution:**

**(i)  $x^2 - 3x + 5 - 1/2(3x^2 - 5x + 7)$**

Upon rearranging

$$x^2 - 3/2x^2 - 3x + 5/2x + 5 - 7/2$$

By grouping similar expressions we get,

LCM for (1 and 2 is 2)

$$(2x^2 - 3x^2)/2 - (6x + 5x)/2 + (10-7)/2$$

$$-1/2x^2 - 1/2x + 3/2$$

**(ii)  $[5 - 3x + 2y - (2x - y)] - (3x - 7y + 9)$**

$$5 - 3x + 2y - 2x + y - 3x + 7y - 9$$

Upon rearranging

$$-3x - 2x - 3x + 2y + y + 7y + 5 - 9$$

By grouping similar expressions we get,

$$-8x + 10y - 4$$

**(iii)  $11/2x^2y - 9/4xy^2 + 1/4xy - 1/14y^2x + 1/15yx^2 + 1/2xy$**

Upon rearranging

$$11/2x^2y + 1/15x^2y - 9/4xy^2 - 1/14xy^2 + 1/4xy + 1/2xy$$

By grouping similar expressions we get,

LCM for (2 and 15 is 30), (4 and 14 is 56), (4 and 2 is 4)

$$(165x^2y + 2x^2y)/30 + (-126xy^2 - 4xy^2)/56 + (xy + 2xy)/4$$

$$167/30x^2y - 130/56xy^2 + 3/4xy$$

$$167/30x^2y - 65/28xy^2 + 3/4xy$$

$$(iv) (1/3y^2 - 4/7y + 11) - (1/7y - 3 + 2y^2) - (2/7y - 2/3y^2 + 2)$$

Upon rearranging

$$1/3y^2 - 2y^2 - 2/3y^2 - 4/7y - 1/7y - 2/7y + 11 + 3 - 2$$

By grouping similar expressions we get,

LCM for (3, 1 and 3 is 3), (7, 7 and 7 is 7)

$$(y^2 - 6y^2 + 2y^2)/3 - (4y - y - 2y)/7 + 12$$

$$-3/3y^2 - 7/7y + 12$$

$$-y^2 - y + 12$$

$$(v) -1/2a^2b^2c + 1/3ab^2c - 1/4abc^2 - 1/5cb^2a^2 + 1/6cb^2a - 1/7c^2ab + 1/8ca^2b$$

Upon rearranging

$$-1/2a^2b^2c - 1/5a^2b^2c + 1/3ab^2c + 1/6ab^2c - 1/4abc^2 - 1/7abc^2 + 1/8a^2bc$$

By grouping similar expressions we get,

LCM for (2 and 5 is 10), (3 and 6 is 6), (4 and 7 is 28)

$$-7/10a^2b^2c + 1/2ab^2c - 11/28abc^2 + 1/8a^2bc$$

## EXERCISE 6.3 PAGE NO: 6.13

Find each of the following products:

1.  $5x^2 \times 4x^3$

**Solution:**

Let us simplify the given expression

$$5 \times x \times x \times 4 \times x \times x \times x$$

$$5 \times 4 \times x^{1+1+1+1+1}$$

$$20 \times x^5$$

$$20x^5$$

2.  $-3a^2 \times 4b^4$

**Solution:**

Let us simplify the given expression

$$-3 \times a^2 \times 4 \times b^4$$

$$-12 \times a^2 \times b^4$$

$$-12a^2b^4$$

**3.  $(-5xy) \times (-3x^2yz)$**

**Solution:**

Let us simplify the given expression

$$(-5) \times (-3) \times x \times x^2 \times y \times y \times z$$

$$15 \times x^{1+2} \times y^{1+1} \times z$$

$$15x^3y^2z$$

**4.  $\frac{1}{2}xy \times \frac{2}{3}x^2yz^2$**

**Solution:**

Let us simplify the given expression

$$\frac{1}{2} \times \frac{2}{3} \times x \times x^2 \times y \times y \times z^2$$

$$\frac{1}{3} \times x^{1+2} \times y^{1+1} \times z^2$$

$$\frac{1}{3}x^3y^2z^2$$

**5.  $(-\frac{7}{5}xy^2z) \times (\frac{13}{3}x^2yz^2)$**

**Solution:**

Let us simplify the given expression

$$-\frac{7}{5} \times \frac{13}{3} \times x \times x^2 \times y^2 \times y \times z \times z^2$$

$$-\frac{91}{15} \times x^{1+2} \times y^{2+1} \times z^{1+2}$$

$$-\frac{91}{15}x^3y^3z^3$$

**6.  $(-\frac{24}{25}x^3z) \times (-\frac{15}{16}xz^2y)$**

**Solution:**

Let us simplify the given expression

$$-\frac{24}{25} \times -\frac{15}{16} \times x^3 \times x \times z \times z^2 \times y$$

$$\frac{18}{20} \times x^{3+1} \times z^{1+2} \times y$$

$$\frac{9}{10}x^4z^3y$$

**7.  $(-\frac{1}{27}a^2b^2) \times (\frac{9}{2}a^3b^2c^2)$**

**Solution:**

Let us simplify the given expression

$$-\frac{1}{27} \times \frac{9}{2} \times a^2 \times a^3 \times b^2 \times b^2 \times c^2$$

$$-\frac{1}{6} \times a^{2+3} \times b^{2+2} \times c^2$$

$$-\frac{1}{6}a^5b^4c^2$$

**8.  $(-7xy) \times (\frac{1}{4}x^2yz)$**

**Solution:**

Let us simplify the given expression

$$-7 \times \frac{1}{4} \times x \times y \times x^2 \times y \times z$$

$$-\frac{7}{4} \times x^{1+2} \times y^{1+1} \times z$$

$$-\frac{7}{4}x^3y^2z$$

**9.  $(7ab) \times (-5ab^2c) \times (6abc^2)$**

**Solution:**

Let us simplify the given expression

$$7 \times -5 \times 6 \times a \times a \times a \times b \times b^2 \times b \times c \times c^2$$

$$210 \times a^{1+1+1} \times b^{1+2+1} \times c^{1+2}$$

$$210a^3b^4c^3$$

**10.  $(-5a) \times (-10a^2) \times (-2a^3)$**

**Solution:**

Let us simplify the given expression

$$(-5) \times (-10) \times (-2) \times a \times a^2 \times a^3$$

$$-100 \times a^{1+2+3}$$

$$-100a^6$$

**11.  $(-4x^2) \times (-6xy^2) \times (-3yz^2)$**

**Solution:**

Let us simplify the given expression

$$(-4) \times (-6) \times (-3) \times x^2 \times x \times y^2 \times y \times z^2$$

$$-72 \times x^{2+1} \times y^{2+1} \times z^2$$

$$-72x^3y^3z^2$$

**12.  $(-2/7a^4) \times (-3/4a^2b) \times (-14/5b^2)$**

**Solution:**

Let us simplify the given expression

$$-\frac{2}{7} \times -\frac{3}{4} \times -\frac{14}{5} \times a^4 \times a^2 \times b \times b^2$$

$$-\frac{6}{10} \times a^{4+2} \times b^{1+2}$$

$$-\frac{3}{5}a^6b^3$$

**13.  $(7/9ab^2) \times (15/7ac^2b) \times (-3/5a^2c)$**

**Solution:**

Let us simplify the given expression

$$\frac{7}{9} \times \frac{15}{7} \times -\frac{3}{5} \times a \times a \times a^2 \times b^2 \times b \times c^2 \times c$$

$$-a^{1+1+2} \times b^{2+1} \times c^{2+1}$$

$$-a^4b^3c^3$$

**14.  $(\frac{4}{3}u^2vw) \times (-5uvw^2) \times (\frac{1}{3}v^2wu)$**

**Solution:**

Let us simplify the given expression

$$\frac{4}{3} \times -5 \times \frac{1}{3} \times u^2 \times u \times u \times v \times v \times v^2 \times w \times w^2 \times w$$

$$-\frac{20}{9} \times u^{2+1+1} \times v^{1+1+2} \times w^{1+2+1}$$

$$-\frac{20}{9}u^4v^4w^4$$

**15.  $(0.5x) \times (\frac{1}{3}xy^2z^4) \times (24x^2yz)$**

**Solution:**

Let us simplify the given expression

$$0.5 \times \frac{1}{3} \times 24 \times x \times x \times x \times y^2 \times y \times x^2 \times z^4 \times z$$

$$\frac{12}{3} \times x^{1+1+2} \times y^{2+1} \times z^{4+1}$$

$$4x^4 \times y^3 \times z^5$$

$$4x^4y^3z^5$$

**16.  $(\frac{4}{3}pq^2) \times (-\frac{1}{4}p^2r) \times (16p^2q^2r^2)$**

**Solution:**

Let us simplify the given expression

$$\frac{4}{3} \times \frac{1}{4} \times 16 \times p \times p^2 \times p^2 \times q^2 \times q^2 \times r \times r^2$$

$$-\frac{16}{3} \times p^{1+2+2} \times q^{2+2} \times r^{1+2}$$

$$-\frac{16}{3}p^5q^4r^3$$

**17.  $(2.3xy) \times (0.1x) \times (0.16)$**

**Solution:**

Let us simplify the given expression

$$2.3 \times 0.1 \times 0.16 \times x \times x \times y$$

$$0.0368 \times x^{1+1} \times y$$

$$0.0368x^2y$$

**Express each of the following products as a monomials and verify the result in each case for  $x=1$ :**

**18.  $(3x) \times (4x) \times (-5x)$**

**Solution:**

Let us simplify the given expression

$$3 \times 4 \times -5 \times x \times x \times x$$

$$-60 \times x^{1+1+1}$$

$$-60x^3$$

Verification

$$\text{LHS} = (3 \times 1) \times (4 \times 1) \times (-5 \times 1)$$

$$= 3 \times 4 \times -5$$

$$= -60$$

$$\text{RHS} = -60 (1)^3 = -60$$

Therefore, LHS = RHS.

**19.  $(4x^2) \times (-3x) \times (4/5x^3)$**

**Solution:**

Let us simplify the given expression

$$4 \times -3 \times 4/5 \times x^2 \times x \times x^3$$

$$-48/5 \times x^{2+1+3}$$

$$-48/5x^6$$

Verification

$$\text{LHS} = 4 \times 1^2 \times -3 \times 1 \times 4/5 \times 1^3$$

$$= -48/5$$

$$\text{RHS} = -48/5 \times 1^6 = -48/5$$

Therefore, LHS = RHS.

**20.  $(5x^4) \times (x^2)^3 \times (2x)^2$**

**Solution:**

Let us simplify the given expression

$$5 \times x^4 \times x^6 \times 4 \times x^2$$

$$5 \times 4 \times x^4 \times x^6 \times x^2$$

$$20 \times x^{4+6+2}$$

$$20x^{12}$$

Verification

$$\text{LHS} = (5 \times 1^4) \times (1^2)^3 \times (2 \times 1)^2$$

$$= 5 \times 4$$

$$= 20$$

$$\text{RHS} = 20 \times 1^{12} = 20$$

Therefore, LHS = RHS.

**21.  $(x^2)^3 \times (2x) \times (-4x) \times (5)$**

**Solution:**

Let us simplify the given expression

$$x^6 \times 2 \times x \times -4 \times x \times 5$$

$$2 \times -4 \times 5 \times x^6 \times x \times x$$

$$-40 \times x^{6+1+1}$$

$$-40x^8$$

Verification

$$\text{LHS} = (1^2)^3 \times (2 \times 1) \times (-4 \times 1) \times 5$$

$$= -40$$

$$\text{RHS} = -40 \times 1^8 = -40$$

Therefore, LHS = RHS.

**22. Write down the product of  $-8x^2y^6$  and  $-20xy$  verify the product for  $x = 2.5$ ,  $y = 1$**

**Solution:**

Let us simplify the given expression

$$-8 \times -20 \times x^2 \times x \times y^6 \times y$$

$$160 \times x^{2+1} \times y^{6+1}$$

$$160x^3y^7$$

Now let us verify when,  $x = 2.5$  and  $y = 1$

For  $160x^3y^7$

$$160 (2.5)^3 \times (1)^7$$

$$160 \times 15.625$$

$$2500$$

For  $-8x^2y^6$  and  $-20xy$

$$-8 \times 2.5^2 \times 1^6 \times -20 \times 1 \times 2.5$$

$$2500$$

Hence, the given expression is verified.

**23. Evaluate  $(3.2x^6y^3) \times (2.1x^2y^2)$  when  $x = 1$  and  $y = 0.5$**

**Solution:**

Let us simplify the given expression

$$3.2 \times 2.1 \times x^6 \times x^2 \times y^3 \times y^2$$

$$6.72 \times x^{6+2} \times y^{3+2}$$

$$6.72x^8y^5$$

Now let us substitute when,  $x = 1$  and  $y = 0.5$

For  $6.72x^8y^5$

$$6.72 \times 1^8 \times 0.5^5$$



0.21

**24. Find the value of  $(5x^6) \times (-1.5x^2y^3) \times (-12xy^2)$  when  $x = 1$ ,  $y = 0.5$**

**Solution:**

Let us simplify the given expression

$$5 \times -1.5 \times -12 \times x^6 \times x^2 \times x \times y^3 \times y^2$$

$$90 \times x^{6+2+1} \times y^{3+2}$$

$$90x^9y^5$$

Now let us substitute when,  $x = 1$  and  $y = 0.5$

For  $90x^9y^5$

$$90 \times (1)^9 \times (0.5)^5$$

$$2.8125$$

$$45/16$$

**25. Evaluate  $(2.3a^5b^2) \times (1.2a^2b^2)$  when  $a = 1$  and  $b = 0.5$**

**Solution:**

Let us simplify the given expression

$$2.3a^5b^2 \times 1.2a^2b^2$$

$$2.3 \times 1.2 \times a^5 \times a^2 \times b^2 \times b^2$$

$$2.76 \times a^{5+2} \times b^{2+2}$$

$$2.76a^7b^4$$

Now let us substitute when,  $a = 1$  and  $b = 0.5$

For  $2.76 a^7 b^4$

$$2.76 (1)^7 (0.5)^4$$

$$2.76 \times 1 \times 0.0025$$

$$0.1725$$

$$6.9/40$$

**26. Evaluate  $(-8x^2y^6) \times (-20xy)$  for  $x = 2.5$  and  $y = 1$**

**Solution:**

Let us simplify the given expression

$$-8 \times -20 \times x^2 \times x \times y^6 \times y$$

$$160x^{2+1}y^{6+1}$$

$$160x^3y^7$$

Now let us substitute when,  $x = 2.5$  and  $y = 1$

$$160x^3y^7$$

$$160 \times (2.5)^3 \times (1)^7$$

$$2500$$

Express each of the following products as a monomials and verify the result for  $x = 1$ ,  $y = 2$ :

**27.  $(-xy^3) \times (yx^3) \times (xy)$**

**Solution:**

Let us simplify the given expression

$$-x \times y^3 \times y \times x^3 \times x \times y$$

$$-x^{1+3+1} \times y^{3+1+1}$$

$$-x^5y^5$$

Now let us substitute when,  $x = 1$  and  $y = 2$

$$-x^5y^5$$

$$-1^5 \times 2^5$$

$$-32$$

**28.  $(1/8x^2y^4) \times (1/4x^4y^2) \times (xy) \times 5$**

**Solution:**

Let us simplify the given expression

$$1/8 \times 1/4 \times 5 \times x^2 \times x^4 \times x \times y^4 \times y^2 \times y$$

$$5/32 \times x^{2+4+1} \times y^{4+2+1}$$

$$5/32x^7y^7$$

Now let us substitute when,  $x = 1$  and  $y = 2$

$$5/32 \times 1^7 \times 2^7$$

$$5/32 \times 128$$

$$5 \times 4$$

$$20$$

**29.  $(2/5a^2b) \times (-15b^2ac) \times (-1/2c^2)$**

**Solution:**

Let us simplify the given expression

$$2/5 \times -15 \times -1/2 \times a^2 \times a \times b \times b^2 \times c \times c^2$$

$$3 \times a^{2+1} \times b^{1+2} \times c^{1+2}$$

$$3a^3b^3c^3$$

**30.  $(-4/7a^2b) \times (-2/3b^2c) \times (-7/6c^2a)$**

**Solution:**

Let us simplify the given expression

$$-4/7 \times -2/3 \times -7/6 \times a^2 \times a \times b \times b^2 \times c \times c^2$$

$$-4/9 \times a^{2+1} \times b^{2+1} \times c^{1+2}$$

$$-4/9a^3b^3c^3$$

$$31. (4/9abc^3) \times (-27/5a^3b^2) \times (-8b^3c)$$

**Solution:**

Let us simplify the given expression

$$4/9 \times -27/5 \times -8 \times a \times a^3 \times b \times b^2 \times b^3 \times c^3 \times c$$

$$96/5 \times a^{1+3} \times b^{1+2+3} \times c^{3+1}$$

$$96/5a^4b^6c^4$$

**Evaluate each of the following when  $x = 2$ ,  $y = -1$ .**

$$32. (2xy) \times (x^2y/4) \times (x^2) \times (y^2)$$

**Solution:**

Let us simplify the given expression

$$2 \times 1/4 \times x \times x^2 \times x^2 \times y \times y^2 \times y$$

$$1/2x^{1+2+2}y^{1+2+1}$$

$$1/2x^5y^4$$

Now let us substitute when,  $x = 2$  and  $y = -1$

$$\text{For } 1/2x^5y^4$$

$$1/2 \times (2)^5 \times (-1)^4$$

$$1/2 \times 32 \times 1$$

$$16$$

$$33. (3/5x^2y) \times (-15/4xy^2) \times (7/9x^2y^2)$$

**Solution:**

Let us simplify the given expression

$$3/5 \times -15/4 \times 7/9 \times x^2 \times x \times x^2 \times y \times y^2 \times y^2$$

$$-7/4 \times x^{2+1+2} \times y^{1+2+2}$$

$$7/4x^5y^5$$

Now let us substitute when,  $x = 2$  and  $y = -1$

$$\text{For } -7/4x^5y^5$$

$$-7/4 \times (2)^5 \times (-1)^5$$

$$-7/4 \times 32 \times -1$$

$$56$$

## EXERCISE 6.4 PAGE NO: 6.21

Find the following products:

1.  $2a^3(3a + 5b)$

**Solution:**

Let us simplify the given expression

$$2a^3(3a + 5b)$$

$$(2a^3 \times 3a) + (2a^3 \times 5b)$$

$$6a^{3+1} + 10a^3b$$

$$6a^4 + 10a^3b$$

2.  $-11a(3a + 2b)$

**Solution:**

Let us simplify the given expression

$$-11a(3a + 2b)$$

$$(-11a \times 3a) + (-11a \times 2b)$$

$$-33a^2 - 22ab$$

3.  $-5a(7a - 2b)$

**Solution:**

Let us simplify the given expression

$$-5a(7a - 2b)$$

$$(-5a \times 7a) - (-5a \times 2b)$$

$$-35a^2 + 10ab$$

4.  $-11y^2(3y + 7)$

**Solution:**

Let us simplify the given expression

$$-11y^2(3y + 7)$$

$$(-11y^2 \times 3y) + (-11y^2 \times 7)$$

$$-33y^3 - 77y^2$$

5.  $6x/5(x^3 + y^3)$

**Solution:**

Let us simplify the given expression

$$6/5x(x^3 + y^3)$$

$$(6/5x \times x^3) + (6/5x \times y^3)$$

$$6/5x^4 + 6/5xy^3$$

**6.  $xy(x^3 - y^3)$**

**Solution:**

Let us simplify the given expression

$$xy(x^3 - y^3)$$

$$(xy \times x^3) - (xy \times y^3)$$

$$x^4y - xy^4$$

**7.  $0.1y(0.1x^5 + 0.1y)$**

**Solution:**

Let us simplify the given expression

$$0.1y(0.1x^5 + 0.1y)$$

$$(0.1y \times 0.1x^5) + (0.1y \times 0.1y)$$

$$0.01x^5y + 0.01y^2$$

**8.  $(-7/4ab^2c - 6/25a^2c^2)(-50a^2b^2c^2)$**

**Solution:**

Let us simplify the given expression

$$(-7/4ab^2c - 6/25a^2c^2)(-50a^2b^2c^2)$$

$$(-7/4ab^2c \times -50a^2b^2c^2) - (6/25a^2c^2 \times -50a^2b^2 \times c^2)$$

$$350/4a^3b^4c^3 + 12a^4b^2c^4$$

$$175/2a^3b^4c^3 + 12a^4b^2c^4$$

**9.  $-8/27xyz(3/2xyz^2 - 9/4xy^2z^3)$**

**Solution:**

Let us simplify the given expression

$$-8/27xyz(3/2xyz^2 - 9/4xy^2z^3)$$

$$(-8/27xyz \times 3/2xyz^2) - (-8/27xyz \times 9/4xy^2z^3)$$

$$-4/9x^2y^2z^3 + 2/3x^2y^3z^4$$

**10.  $-4/27xyz(9/2x^2yz - 3/4xyz^2)$**

**Solution:**

Let us simplify the given expression

$$-4/27xyz(9/2x^2yz - 3/4xyz^2)$$

$$(-4/27xyz \times 9/2x^2yz) - (-4/27xyz \times 3/4xyz^2)$$

$$-2/3x^3y^2z^2 + 1/9x^2y^2z^3$$

**11.  $1.5x(10x^2y - 100xy^2)$**

**Solution:**

Let us simplify the given expression

$$1.5x (10x^2y - 100xy^2)$$

$$(1.5x \times 10x^2y) - (1.5x \times 100xy^2)$$

$$15x^3y - 150x^2y^2$$

**12.  $4.1xy (1.1x - y)$**

**Solution:**

Let us simplify the given expression

$$4.1xy (1.1x - y)$$

$$(4.1xy \times 1.1x) - (4.1xy \times y)$$

$$4.51x^2y - 4.1xy^2$$

**13.  $250.5xy (xz + y/10)$**

**Solution:**

Let us simplify the given expression

$$250.5xy (xz + y/10)$$

$$(250.5xy \times xz) + (250.5xy \times y/10)$$

$$250.5x^2yz + 25.05xy^2$$

**14.  $7/5x^2y (3/5xy^2 + 2/5x)$**

**Solution:**

Let us simplify the given expression

$$7/5x^2y (3/5xy^2 + 2/5x)$$

$$(7/5x^2y \times 3/5xy^2) + (7/5x^2y \times 2/5x)$$

$$21/25x^3y^3 + 14/25x^3y$$

**15.  $4/3a (a^2 + b^2 - 3c^2)$**

**Solution:**

Let us simplify the given expression

$$4/3a (a^2 + b^2 - 3c^2)$$

$$(4/3a \times a^2) + (4/3a \times b^2) - (4/3a \times 3c^2)$$

$$4/3a^3 + 4/3ab^2 - 4ac^2$$

**16. Find the product  $24x^2 (1-2x)$  and evaluate its value for  $x = 3$**

**Solution:**

Let us simplify the given expression

$$24x^2 (1 - 2x)$$

$$(24x^2 \times 1) - (24x^2 \times 2x)$$

$$24x^2 - 48x^3$$

Now let us evaluate the expression when  $x = 3$

$$24x^2 - 48x^3$$

$$24 \times (3)^2 - 48 \times (3)^3$$

$$24 \times (9) - 48 \times (27)$$

$$216 - 1296$$

$$-1080$$

**17. Find the product  $-3y(xy+y^2)$  and evaluate its value for  $x = 4$  and  $y = 5$**

**Solution:**

Let us simplify the given expression

$$-3y(xy+y^2)$$

$$(-3y \times xy) + (-3y \times y^2)$$

$$-3xy^2 - 3y^3$$

Now let us evaluate the expression when  $x = 4$  and  $y = 5$

$$-3xy^2 - 3y^3$$

$$-3 \times (4) \times (5)^2 - 3 \times (5)^3$$

$$-300 - 375$$

$$-675$$

**18. Multiply  $-3/2x^2y^3$  by  $(2x-y)$  and verify the answer for  $x = 1$  and  $y = 2$**

**Solution:**

Let us simplify the given expression

$$-3/2x^2y^3 \text{ by } (2x-y)$$

$$(-3/2x^2y^3 \times 2x) - (-3/2x^2y^3 \times y)$$

$$-3x^3y^3 + 3/2x^2y^4$$

Now let us evaluate the expression when  $x = 1$  and  $y = 2$

$$-3x^3y^3 + 3/2x^2y^4$$

$$-3 \times (1)^3 \times (2)^3 + 3/2 \times (1)^2 \times (2)^4$$

$$-3 \times (8) + 3(8)$$

$$-24+24$$

$$0$$

**19. Multiply the monomial by the binomial and find the value of each for  $x = -1$ ,  $y = 0.25$  and  $z = 0.005$ :**

**(i)  $15y^2(2 - 3x)$**

**(ii)  $-3x(y^2 + z^2)$**

- (iii)  $z^2 (x - y)$   
(iv)  $xz (x^2 + y^2)$

**Solution:**

(i)  $15y^2 (2 - 3x)$

Let us simplify the given expression

$$30y^2 - 45xy^2$$

By evaluating the values in the expression  $x = -1$ ,  $y = 25/100$  and  $z = 5/1000$

$$30 \times (25/100)^2 - 45 \times (-1) \times (25/100)^2$$

$$30 (1/16) + 45 (1/16)$$

$$15/8 + 45/16$$

$$(30+45)/16$$

$$75/16$$

(ii)  $-3x (y^2 + z^2)$

Let us simplify the given expression

$$-3xy^2 + -3xz^2$$

By evaluating the values in the expression  $x = -1$ ,  $y = 25/100$  and  $z = 5/1000$

$$-3 \times (-1) \times (25/100)^2 - 3 \times (-1) \times (5/1000)^2$$

$$(3 \times 25 \times 25 / 100 \times 100) + (3 \times 5 \times 5 / 1000 \times 1000)$$

$$3/16 + 3/40000$$

$$39/200$$

(iii)  $z^2 (x - y)$

Let us simplify the given expression

$$z^2x - z^2y$$

By evaluating the values in the expression  $x = -1$ ,  $y = 25/100$  and  $z = 5/1000$

$$z^2 (x - y)$$

$$(5/1000)^2 (-1 - 25/100)$$

$$(1/40000) (-100 - 25/100)$$

$$(1/40000) (-125/100)$$

$$(1/40000) (-5/4)$$

$$-5/160000$$

$$-1/32000$$

(iv)  $xz (x^2 + y^2)$

Let us simplify the given expression



$$x^3z + xzy^2$$

By evaluating the values in the expression  $x = -1$ ,  $y = 25/100$  and  $z = 5/1000$

$$x^3z + xzy^2$$

$$(-1)^3 \times (5/1000) + (-1) \times (5/1000) \times (25/100)^2$$

$$-1/200 - 1/16 \times 1/200$$

$$-1/200 - 1/3200$$

By taking LCM as 3200

$$(-16 - 1)/3200$$

$$-17/3200$$

**20. Simplify:**

(i)  $2x^2(x^3 - x) - 3x(x^4 + 2x) - 2(x^4 - 3x^2)$

(ii)  $x^3y(x^2 - 2x) + 2xy(x^3 - x^4)$

(iii)  $3a^2 + 2(a+2) - 3a(2a+1)$

(iv)  $x(x+4) + 3x(2x^2 - 1) + 4x^2 + 4$

(v)  $a(b-c) - b(c-a) - c(a-b)$

(vi)  $a(b-c) + b(c-a) + c(a-b)$

(vii)  $4ab(a-b) - 6a^2(b-b^2) - 3b^2(2a^2 - a) + 2ab(b-a)$

(viii)  $x^2(x^2 + 1) - x^3(x + 1) - x(x^3 - x)$

(ix)  $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

(x)  $a^2(2a - 1) + 3a + a^3 - 8$

(xi)  $3/2x^2(x^2 - 1) + 1/4x^2(x^2 + x) - 3/4x(x^3 - 1)$

(xii)  $a^2b(a-b^2) + ab^2(4ab - 2a^2) - a^3b(1-2b)$

(xiii)  $a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$

**Solution:**

(i)  $2x^2(x^3 - x) - 3x(x^4 + 2x) - 2(x^4 - 3x^2)$

Let us simplify the given expression

$$2x^5 - 2x^3 - 3x^5 - 6x^2 - 2x^4 + 6x^2$$

By grouping similar expressions we get,

$$2x^5 - 3x^5 - 2x^3 - 2x^4 - 6x^2 + 6x^2$$

$$-x^5 - 2x^4 - 2x^3$$

(ii)  $x^3y(x^2 - 2x) + 2xy(x^3 - x^4)$

Let us simplify the given expression

$$x^5y - 2x^4y + 2x^4y - 2x^5y$$

By grouping similar expressions we get,

$$-x^5y - 2x^5y$$

$$-x^5y$$

**(iii)**  $3a^2 + 2(a+2) - 3a(2a+1)$

Let us simplify the given expression

$$3a^2 + 2a + 4 - 6a^2 - 3a$$

By grouping similar expressions we get,

$$3a^2 - 6a^2 + 2a - 3a + 4$$

$$-3a^2 - a + 4$$

**(iv)**  $x(x+4) + 3x(2x^2-1) + 4x^2 + 4$

Let us simplify the given expression

$$x^2 + 4x + 6x^3 - 3x + 4x^2 + 4$$

By grouping similar expressions we get,

$$6x^3 + 5x^2 + x + 4$$

**(v)**  $a(b-c) - b(c-a) - c(a-b)$

Let us simplify the given expression

$$ab - ac - bc + ab - ca + bc$$

By grouping similar expressions we get,

$$2ab - 2ac$$

**(vi)**  $a(b-c) + b(c-a) + c(a-b)$

Let us simplify the given expression

$$ab - ac + bc - ab + ac - bc$$

By grouping similar expressions we get,

$$0$$

**(vii)**  $4ab(a-b) - 6a^2(b-b^2) - 3b^2(2a^2-a) + 2ab(b-a)$

Let us simplify the given expression

$$4a^2b - 4ab^2 - 6a^2b + 6a^2b^2 - 6a^2b^2 + 3ab^2 + 2ab^2 - 2a^2b$$

By grouping similar expressions we get,

$$4a^2b - 6a^2b - 2a^2b - 4ab^2 + 3ab^2 + 2ab^2 + 6a^2b^2 - 6a^2b^2$$

$$-4a^2b + ab^2$$

**(viii)**  $x^2(x^2+1) - x^3(x+1) - x(x^3-x)$

Let us simplify the given expression

$$x^4 + x^2 - x^4 - x^3 - x^4 + x^2$$

By grouping similar expressions we get,

$$x^4 - x^4 - x^4 - x^3 + x^2 + x^2 \\ - x^4 - x^3 + 2x^2$$

**(ix)**  $2a^2 + 3a(1 - 2a^3) + a(a + 1)$

Let us simplify the given expression

$$2a^2 + 3a - 6a^4 + a^2 + a$$

By grouping similar expressions we get,

$$-6a^4 + 3a^2 + 4a$$

**(x)**  $a^2(2a - 1) + 3a + a^3 - 8$

Let us simplify the given expression

$$2a^3 - a^2 + 3a + a^3 - 8$$

By grouping similar expressions we get,

$$3a^3 - a^2 + 3a - 8$$

**(xi)**  $3/2x^2(x^2 - 1) + 1/4x^2(x^2 + x) - 3/4x(x^3 - 1)$

Let us simplify the given expression

$$3/2x^4 - 3/2x^2 + 1/4x^4 + 1/4x^3 - 3/4x^4 + 3/4x$$

By grouping similar expressions we get,

$$3/2x^4 + 1/4x^4 - 3/4x^4 - 3/2x^2 + 1/4x^3 + 3/4x$$

$$4/4x^4 + 1/4x^3 - 3/2x^2 + 3/4x$$

$$x^4 + 1/4x^3 - 3/2x^2 + 3/4x$$

**(xii)**  $a^2b(a - b^2) + ab^2(4ab - 2a^2) - a^3b(1 - 2b)$

Let us simplify the given expression

$$a^3b - a^2b^3 + 4a^2b^3 - 2a^3b^2 - a^3b + 2a^3b^2$$

By grouping similar expressions we get,

$$-a^2b^3 + 4a^2b^3$$

$$3a^2b^3$$

**(xiii)**  $a^2b(a^3 - a + 1) - ab(a^4 - 2a^2 + 2a) - b(a^3 - a^2 - 1)$

Let us simplify the given expression

$$a^5b - a^3b + a^2b - a^5b + 2a^3b - 2a^2b - ba^3 + a^2b + b$$

By grouping similar expressions we get,

$$a^5b - a^5b - a^3b + 2a^3b - ba^3 + a^2b - 2a^2b + a^2b + b$$

$$b$$

## EXERCISE 6.5 PAGE NO: 6.30

**Multiply:**

**1.  $(5x + 3)$  by  $(7x + 2)$**

**Solution:**

Now let us simplify the given expression

$$(5x + 3) \times (7x + 2)$$

$$5x(7x + 2) + 3(7x + 2)$$

$$35x^2 + 10x + 21x + 6$$

$$35x^2 + 31x + 6$$

**2.  $(2x + 8)$  by  $(x - 3)$**

**Solution:**

Now let us simplify the given expression

$$(2x + 8) \times (x - 3)$$

$$2x(x - 3) + 8(x - 3)$$

$$2x^2 - 6x + 8x - 24$$

$$2x^2 + 2x - 24$$

**3.  $(7x + y)$  by  $(x + 5y)$**

**Solution:**

Now let us simplify the given expression

$$(7x + y) \times (x + 5y)$$

$$7x(x + 5y) + y(x + 5y)$$

$$7x^2 + 35xy + xy + 5y^2$$

$$7x^2 + 36xy + 5y^2$$

**4.  $(a - 1)$  by  $(0.1a^2 + 3)$**

**Solution:**

Now let us simplify the given expression

$$(a - 1) \times (0.1a^2 + 3)$$

$$a(0.1a^2 + 3) - 1(0.1a^2 + 3)$$

$$0.1a^3 + 3a - 0.1a^2 - 3$$

$$0.1a^3 - 0.1a^2 + 3a - 3$$

**5.  $(3x^2 + y^2)$  by  $(2x^2 + 3y^2)$**

**Solution:**

Now let us simplify the given expression

$$(3x^2 + y^2) \times (2x^2 + 3y^2)$$

$$3x^2 \times (2x^2 + 3y^2) + y^2 \times (2x^2 + 3y^2)$$

$$6x^4 + 9x^2y^2 + 2x^2y^2 + 3y^4$$

$$6x^4 + 11x^2y^2 + 3y^4$$

**6.  $(\frac{3}{5}x + \frac{1}{2}y)$  by  $(\frac{5}{6}x + 4y)$**

**Solution:**

Now let us simplify the given expression

$$(\frac{3}{5}x + \frac{1}{2}y) \times (\frac{5}{6}x + 4y)$$

$$\frac{3}{5}x \times (\frac{5}{6}x + 4y) + \frac{1}{2}y \times (\frac{5}{6}x + 4y)$$

$$\frac{15}{30}x^2 + \frac{12}{5}xy + \frac{5}{12}xy + \frac{4}{2}y^2$$

$$\frac{1}{2}x^2 + \frac{169}{60}xy + 2y^2$$

**7.  $(x^6 - y^6)$  by  $(x^2 + y^2)$**

**Solution:**

Now let us simplify the given expression

$$(x^6 - y^6) \times (x^2 + y^2)$$

$$x^6 \times (x^2 + y^2) - y^6 \times (x^2 + y^2)$$

$$x^8 + x^6y^2 - x^2y^6 - y^8$$

**8.  $(x^2 + y^2)$  by  $(3a + 2b)$**

**Solution:**

Now let us simplify the given expression

$$(x^2 + y^2) \times (3a + 2b)$$

$$x^2 \times (3a + 2b) + y^2 \times (3a + 2b)$$

$$3ax^2 + 3ay^2 + 2bx^2 + 2by^2$$

**9.  $(-3d - 7f)$  by  $(5d + f)$**

**Solution:**

Now let us simplify the given expression

$$(-3d - 7f) \times (5d + f)$$

$$-3d(5d + f) - 7f(5d + f)$$

$$-15d^2 - 3df - 35df - 7f^2$$

$$-15d^2 - 38df - 7f^2$$

**10.  $(0.8a - 0.5b)$  by  $(1.5a - 3b)$**

**Solution:**

Now let us simplify the given expression

$$(0.8a - 0.5b) \times (1.5a - 3b)$$

$$0.8a(1.5a - 3b) - 0.5b(1.5a - 3b)$$

$$1.2a^2 - 2.4ab - 0.75ab + 1.5b^2$$

$$1.2a^2 - 3.15ab + 1.5b^2$$

**11.  $(2x^2y^2 - 5xy^2)$  by  $(x^2 - y^2)$**

**Solution:**

Now let us simplify the given expression

$$(2x^2y^2 - 5xy^2) \times (x^2 - y^2)$$

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

$$2x^4y^2 - 5x^3y^2 - 2x^2y^4 + 5xy^4$$

**12.  $(x/7 + x^2/2)$  by  $(2/5 + 9x/4)$**

**Solution:**

Now let us simplify the given expression

$$(x/7 + x^2/2) \times (2/5 + 9x/4)$$

$$x/7(2/5 + 9x/4) + x^2/2(2/5 + 9x/4)$$

$$2x/35 + (9x^2)/28 + x^2/5 + (9x^3)/8$$

$$9/8x^3 + 73/140x^2 + 2/35x$$

**13.  $(-a/7 + a^2/9)$  by  $(b/2 - b^2/3)$**

**Solution:**

Now let us simplify the given expression

$$(-a/7 + a^2/9) \times (b/2 - b^2/3)$$

$$-a/7(b/2 - b^2/3) + a^2/9(b/2 - b^2/3)$$

$$-ab/14 + ab^2/21 + a^2b/18 - a^2b^2/27$$

**14.  $(3x^2y - 5xy^2)$  by  $(1/5x^2 + 1/3y^2)$**

**Solution:**

Now let us simplify the given expression

$$(3x^2y - 5xy^2) \times (1/5x^2 + 1/3y^2)$$

$$3x^2y(1/5x^2 + 1/3y^2) - 5xy^2(1/5x^2 + 1/3y^2)$$

$$3/5x^4y + 3/3x^2y^3 - x^3y^2 + 5/3xy^4$$

$$3/5x^4y + x^2y^3 - x^3y^2 + 5/3xy^4$$

**15.  $(2x^2 - 1)$  by  $(4x^3 + 5x^2)$**

**Solution:**

Now let us simplify the given expression

$$(2x^2 - 1) \times (4x^3 + 5x^2)$$

$$2x^2 (4x^3 + 5x^2) - 1 (4x^3 + 5x^2)$$

$$8x^5 + 10x^4 - 4x^3 - 5x^2$$

**16.  $(2xy + 3y^2)$  by  $(3y^2 - 2)$**

**Solution:**

Now let us simplify the given expression

$$(2xy + 3y^2) \times (3y^2 - 2)$$

$$2xy (3y^2 - 2) + 3y^2 (3y^2 - 2)$$

$$6xy^3 - 4xy + 9y^4 - 6y^2$$

**Find the following products and verify the results for  $x = -1$ ,  $y = -2$ :**

**17.  $(3x - 5y)(x + y)$**

**Solution:**

Now let us simplify the given expression

$$(3x - 5y) \times (x + y)$$

$$(3x - 5y) \times (x + y)$$

$$x(3x - 5y) + y(3x - 5y)$$

$$3x^2 - 5xy + 3xy - 5y^2$$

$$3x^2 - 2xy - 5y^2$$

Let us substitute the given values  $x = -1$  and  $y = -2$ , then

$$(3x - 5y) \times (x + y)$$

$$[3(-1) - 5(-2)] \times [(-1) + (-2)]$$

$$(-3 + 10) \times (-1 - 2)$$

$$7 \times -3$$

$$-21$$

$$3x^2 - 2xy - 5y^2$$

$$3(-1)^2 - 2(-1)(-2) - 5(-2)^2$$

$$3 - 4 - 20$$

$$-21$$

$\therefore$  the given expression is verified.

**18.  $(x^2y - 1)(3 - 2x^2y)$**

**Solution:**

Now let us simplify the given expression

$$(x^2y - 1) \times (3 - 2x^2y)$$

$$x^2y(3 - 2x^2y) - 1(3 - 2x^2y)$$

$$3x^2y - 2x^4y^2 - 3 + 2x^2y$$

$$5x^2y - 2x^4y^2 - 3$$

Let us substitute the given values  $x = -1$  and  $y = -2$ , then

$$(x^2y - 1) \times (3 - 2x^2y)$$

$$[(-1)^2(-2) - 1] \times [3 - 2(-1)^2(-2)]$$

$$(-2 - 1) \times (3 + 4)$$

$$-3 \times 7$$

$$-21$$

$$5x^2y - 2x^4y^2 - 3$$

$$[-2(-1)^2(-2)^2 + 5(-1)^2(2) - 3]$$

$$-8 - 10 - 3$$

$$-21$$

$\therefore$  the given expression is verified.

**19.  $(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5})$**

**Solution:**

Now let us simplify the given expression

$$(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5})$$

$$(\frac{1}{3}x)^2 - (\frac{y^2}{5})^2$$

$$(\frac{1}{3}x - \frac{y^2}{5})(\frac{1}{3}x + \frac{y^2}{5})$$

$$\frac{1}{9}x^2 - \frac{1}{25}y^4$$

Let us substitute the given values  $x = -1$  and  $y = -2$ , then

$$(\frac{1}{3}x - \frac{y^2}{5}) \times (\frac{1}{3}x + \frac{y^2}{5})$$

$$(\frac{1}{3}(-1) - \frac{(-2)^2}{5}) \times (\frac{1}{3}(-1) + \frac{(-2)^2}{5})$$

$$(-\frac{17}{15}) \times (\frac{7}{15})$$

$$-\frac{119}{225}$$

$$\frac{1}{9}x^2 - \frac{1}{25}y^4$$

$$\frac{1}{9}(-1)^2 - \frac{1}{25}(-2)^4$$

$$\frac{1}{9} - \frac{16}{25}$$

$$-\frac{119}{225}$$

$\therefore$  the given expression is verified.

**Simplify:**

**20.  $x^2(x + 2y)(x - 3y)$**

**Solution:**



Now let us simplify the given expression

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

$$x^2 (x^2 - 3xy + 2xy - 3y^2)$$

$$x^2 (x^2 - xy - 6y^2)$$

$$x^4 - x^3y - 6x^2y^2$$

**21.  $(x^2 - 2y^2) (x + 4y)x^2y^2$**

**Solution:**

Now let us simplify the given expression

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

$$(x^3 + 4x^2y - 2xy^2 - 8y^3) \times x^2y^2$$

$$x^5y^2 + 4x^4y^3 - 2x^3y^4 - 8x^2y^5$$

**22.  $a^2b^2 (a + 2b) (3a + b)$**

**Solution:**

Now let us simplify the given expression

$$a^2b^2 (a + 2b) (3a + b)$$

$$a^2b^2 (3a^2 + ab + 6ab + 2b^2)$$

$$a^2b^2 (3a^2 + 7ab + 2b^2)$$

$$3a^4b^2 + 7a^3b^3 + 2a^2b^4$$

**23.  $x^2 (x - y) y^2 (x + 2y)$**

**Solution:**

Now let us simplify the given expression

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

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

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

$$x^4y^2 + x^3y^3 - 2x^2y^4$$

**24.  $(x^3 - 2x^2 + 5x - 7) (2x - 3)$**

**Solution:**

Now let us simplify the given expression

$$(x^3 - 2x^2 + 5x - 7) (2x - 3)$$

$$2x^4 - 4x^3 + 10x^2 - 14x - 3x^3 + 6x^2 - 15x + 21$$

$$2x^4 - 7x^3 + 16x^2 - 29x + 21$$

**25.  $(5x + 3) (x - 1) (3x - 2)$**

**Solution:**

Now let us simplify the given expression

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

$$(5x^2 - 2x - 3)(3x - 2)$$

$$15x^3 - 6x^2 - 9x - 10x^2 + 4x + 6$$

$$15x^3 - 16x^2 - 5x + 6$$

**26.  $(5 - x)(6 - 5x)(2 - x)$**

**Solution:**

Now let us simplify the given expression

$$(5 - x)(6 - 5x)(2 - x)$$

$$(x^2 - 7x + 10)(6 - 5x)$$

$$-5x^3 + 35x^2 - 50x + 6x^2 - 42x + 60$$

$$60 - 92x + 41x^2 - 5x^3$$

**27.  $(2x^2 + 3x - 5)(3x^2 - 5x + 4)$**

**Solution:**

Now let us simplify the given expression

$$(2x^2 + 3x - 5)(3x^2 - 5x + 4)$$

$$6x^4 + 9x^3 - 15x^2 - 10x^3 - 15x^2 + 25x + 8x^2 + 12x - 20$$

$$6x^4 - x^3 - 22x^2 + 37x - 20$$

**28.  $(3x - 2)(2x - 3) + (5x - 3)(x + 1)$**

**Solution:**

Now let us simplify the given expression

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

$$6x^2 - 9x - 4x + 6 + 5x^2 + 5x - 3x - 3$$

$$11x^2 - 11x + 3$$

**29.  $(5x - 3)(x + 2) - (2x + 5)(4x - 3)$**

**Solution:**

Now let us simplify the given expression

$$(5x - 3)(x + 2) - (2x + 5)(4x - 3)$$

$$5x^2 + 10x - 3x - 6 - 8x^2 + 6x - 20x + 15$$

$$-3x^2 - 7x + 9$$

**30.  $(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$**

**Solution:**

Now let us simplify the given expression

$$(3x + 2y)(4x + 3y) - (2x - y)(7x - 3y)$$

$$12x^2 + 9xy + 8xy$$

$$12x^2 + 9xy + 8xy + 6y^2 - 14x^2 + 6xy + 7xy - 3y^2$$

$$-2x^2 + 3y^2 + 30xy$$

$$31. (x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$$

**Solution:**

Now let us simplify the given expression

$$(x^2 - 3x + 2)(5x - 2) - (3x^2 + 4x - 5)(2x - 1)$$

$$5x^3 - 15x^2 + 10x - 2x^2 + 6x - 4 - (6x^3 + 8x^2 - 10x - 3x^2 - 4x + 5)$$

$$5x^3 - 6x^3 - 15x^2 - 2x^2 - 5x^2 + 16x + 14x - 4 - 5$$

$$-x^3 - 22x^2 + 30x - 9$$

$$32. (x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$$

**Solution:**

Now let us simplify the given expression

$$(x^3 - 2x^2 + 3x - 4)(x - 1) - (2x - 3)(x^2 - x + 1)$$

$$x^4 - 2x^3 + 3x^2 - 4x - x^3 + 2x^2 - 3x + 4 - (2x^3 - 2x^2 + 2x - 3x^2 + 3x - 3)$$

$$x^4 - 3x^3 + 5x^2 - 7x + 4 - 2x^3 + 5x^2 - 5x + 3$$

$$x^4 - 5x^3 + 10x^2 - 12x + 7$$

## EXERCISE 6.6 PAGE NO: 6.43

1. Write the following squares of binomials as trinomials:

(i)  $(x + 2)^2$

(ii)  $(8a + 3b)^2$

(iii)  $(2m + 1)^2$

(iv)  $(9a + 1/6)^2$

(v)  $(x + x^2/2)^2$

(vi)  $(x/4 - y/3)^2$

(vii)  $(3x - 1/3x)^2$

(viii)  $(x/y - y/x)^2$

(ix)  $(3a/2 - 5b/4)^2$

(x)  $(a^2b - bc^2)^2$

(xi)  $(2a/3b + 2b/3a)^2$

**(xii)  $(x^2 - ay)^2$**

**Solution:**

**(i)  $(x + 2)^2$**

Let us express the given expression in trinomial

$$x^2 + 2(x)(2) + 2^2$$

$$x^2 + 4x + 4$$

**(ii)  $(8a + 3b)^2$**

Let us express the given expression in trinomial

$$(8a)^2 + 2(8a)(3b) + (3b)^2$$

$$64a^2 + 48ab + 9b^2$$

**(iii)  $(2m + 1)^2$**

Let us express the given expression in trinomial

$$(2m)^2 + 2(2m)(1) + 1^2$$

$$4m^2 + 4m + 1$$

**(iv)  $(9a + 1/6)^2$**

Let us express the given expression in trinomial

$$(9a)^2 + 2(9a)(1/6) + (1/6)^2$$

$$81a^2 + 3a + 1/36$$

**(v)  $(x + x^2/2)^2$**

Let us express the given expression in trinomial

$$(x)^2 + 2(x)(x^2/2) + (x^2/2)^2$$

$$x^2 + x^3 + 1/4x^4$$

**(vi)  $(x/4 - y/3)^2$**

Let us express the given expression in trinomial

$$(x/4)^2 - 2(x/4)(y/3) + (y/3)^2$$

$$1/16x^2 - xy/6 + 1/9y^2$$

**(vii)  $(3x - 1/3x)^2$**

Let us express the given expression in trinomial

$$(3x)^2 - 2(3x)(1/3x) + (1/3x)^2$$

$$9x^2 - 2 + 1/9x^2$$

**(viii)  $(x/y - y/x)^2$**

Let us express the given expression in trinomial

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

$$x^2/y^2 - 2 + y^2/x^2$$

$$(ix) (3a/2 - 5b/4)^2$$

Let us express the given expression in trinomial

$$(3a/2)^2 - 2 (3a/2) (5b/4) + (5b/4)^2$$

$$9/4a^2 - 15/4ab + 25/16b^2$$

$$(x) (a^2b - bc^2)^2$$

Let us express the given expression in trinomial

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

$$a^4b^2 - 2a^2b^2c^2 + b^2c^4$$

$$(xi) (2a/3b + 2b/3a)^2$$

Let us express the given expression in trinomial

$$(2a/3b)^2 + 2 (2a/3b) (2b/3a) + (2b/3a)^2$$

$$4a^2/9b^2 + 8/9 + 4b^2/9a^2$$

$$(xii) (x^2 - ay)^2$$

Let us express the given expression in trinomial

$$(x^2)^2 - 2 (x^2) (ay) + (ay)^2$$

$$x^4 - 2x^2ay + a^2y^2$$

**2. Find the product of the following binomials:**

$$(i) (2x + y) (2x + y)$$

$$(ii) (a + 2b) (a - 2b)$$

$$(iii) (a^2 + bc) (a^2 - bc)$$

$$(iv) (4x/5 - 3y/4) (4x/5 + 3y/4)$$

$$(v) (2x + 3/y) (2x - 3/y)$$

$$(vi) (2a^3 + b^3) (2a^3 - b^3)$$

$$(vii) (x^4 + 2/x^2) (x^4 - 2/x^2)$$

$$(viii) (x^3 + 1/x^3) (x^3 - 1/x^3)$$

**Solution:**

$$(i) (2x + y) (2x + y)$$

Let us find the product of the given expression

$$2x (2x + y) + y (2x + y)$$

$$4x^2 + 2xy + 2xy + y^2$$

$$4x^2 + 4xy + y^2$$

$$(ii) (a + 2b) (a - 2b)$$

Let us find the product of the given expression

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

$$a^2 - 2ab + 2ab - 4b^2$$

$$a^2 - 4b^2$$

**(iii)**  $(a^2 + bc)(a^2 - bc)$

Let us find the product of the given expression

$$a^2(a^2 - bc) + bc(a^2 - bc)$$

$$a^4 - a^2bc + bca^2 - b^2c^2$$

$$a^4 - b^2c^2$$

**(iv)**  $(4x/5 - 3y/4)(4x/5 + 3y/4)$

Let us find the product of the given expression

$$4x/5(4x/5 + 3y/4) - 3y/4(4x/5 + 3y/4)$$

$$16/25x^2 + 12/20yx - 12/20xy - 9y^2/16$$

$$16/25x^2 - 9/16y^2$$

**(v)**  $(2x + 3/y)(2x - 3/y)$

Let us find the product of the given expression

$$2x(2x - 3/y) + 3/y(2x - 3/y)$$

$$4x^2 - 6x/y + 6x/y - 9/y^2$$

$$4x^2 - 9/y^2$$

**(vi)**  $(2a^3 + b^3)(2a^3 - b^3)$

Let us find the product of the given expression

$$2a^3(2a^3 - b^3) + b^3(2a^3 - b^3)$$

$$4a^6 - 2a^3b^3 + 2a^3b^3 - b^6$$

$$4a^6 - b^6$$

**(vii)**  $(x^4 + 2/x^2)(x^4 - 2/x^2)$

Let us find the product of the given expression

$$x^4(x^4 - 2/x^2) + 2/x^2(x^4 - 2/x^2)$$

$$x^8 - 2x^2 + 2x^2 - 4/x^4$$

$$(x^8 - 4/x^4)$$

**(viii)**  $(x^3 + 1/x^3)(x^3 - 1/x^3)$

Let us find the product of the given expression

$$x^3(x^3 - 1/x^3) + 1/x^3(x^3 - 1/x^3)$$

$$x^6 - 1 + 1 - 1/x^6$$

$$x^6 - 1/x^6$$

**3. Using the formula for squaring a binomial, evaluate the following:**

**(i)  $(102)^2$**

**(ii)  $(99)^2$**

**(iii)  $(1001)^2$**

**(iv)  $(999)^2$**

**(v)  $(703)^2$**

**Solution:**

**(i)  $(102)^2$**

We can express 102 as  $100 + 2$

So,  $(102)^2 = (100 + 2)^2$

Upon simplification we get,

$$(100 + 2)^2 = (100)^2 + 2(100)(2) + 2^2$$

$$= 10000 + 400 + 4$$

$$= 10404$$

**(ii)  $(99)^2$**

We can express 99 as  $100 - 1$

So,  $(99)^2 = (100 - 1)^2$

Upon simplification we get,

$$(100 - 1)^2 = (100)^2 - 2(100)(1) + 1^2$$

$$= 10000 - 200 + 1$$

$$= 9801$$

**(iii)  $(1001)^2$**

We can express 1001 as  $1000 + 1$

So,  $(1001)^2 = (1000 + 1)^2$

Upon simplification we get,

$$(1000 + 1)^2 = (1000)^2 + 2(1000)(1) + 1^2$$

$$= 1000000 + 2000 + 1$$

$$= 1002001$$

**(iv)  $(999)^2$**

We can express 999 as  $1000 - 1$

So,  $(999)^2 = (1000 - 1)^2$

Upon simplification we get,

$$\begin{aligned}(1000 - 1)^2 &= (1000)^2 - 2(1000)(1) + 1^2 \\ &= 1000000 - 2000 + 1 \\ &= 998001\end{aligned}$$

**(v)**  $(703)^2$

We can express 700 as  $700 + 3$

So,  $(703)^2 = (700 + 3)^2$

Upon simplification we get,

$$\begin{aligned}(700 + 3)^2 &= (700)^2 + 2(700)(3) + 3^2 \\ &= 490000 + 4200 + 9 \\ &= 494209\end{aligned}$$

**4. Simplify the following using the formula:  $(a - b)(a + b) = a^2 - b^2$  :**

**(i)**  $(82)^2 - (18)^2$

**(ii)**  $(467)^2 - (33)^2$

**(iii)**  $(79)^2 - (69)^2$

**(iv)**  $197 \times 203$

**(v)**  $113 \times 87$

**(vi)**  $95 \times 105$

**(vii)**  $1.8 \times 2.2$

**(viii)**  $9.8 \times 10.2$

**Solution:**

**(i)**  $(82)^2 - (18)^2$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$\begin{aligned}(82)^2 - (18)^2 &= (82 - 18)(82 + 18) \\ &= 64 \times 100 \\ &= 6400\end{aligned}$$

**(ii)**  $(467)^2 - (33)^2$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$\begin{aligned}(467)^2 - (33)^2 &= (467 - 33)(467 + 33) \\ &= (434)(500) \\ &= 217000\end{aligned}$$

**(iii)**  $(79)^2 - (69)^2$



Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$(79)^2 - (69)^2 = (79 + 69)(79 - 69)$$

$$= (148)(10)$$

$$= 1480$$

**(iv)**  $197 \times 203$

We can express 203 as  $200 + 3$  and 197 as  $200 - 3$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$197 \times 203 = (200 - 3)(200 + 3)$$

$$= (200)^2 - (3)^2$$

$$= 40000 - 9$$

$$= 39991$$

**(v)**  $113 \times 87$

We can express 113 as  $100 + 13$  and 87 as  $100 - 13$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$113 \times 87 = (100 - 13)(100 + 13)$$

$$= (100)^2 - (13)^2$$

$$= 10000 - 169$$

$$= 9831$$

**(vi)**  $95 \times 105$

We can express 95 as  $100 - 5$  and 105 as  $100 + 5$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$95 \times 105 = (100 - 5)(100 + 5)$$

$$= (100)^2 - (5)^2$$

$$= 10000 - 25$$

$$= 9975$$

**(vii)**  $1.8 \times 2.2$

We can express 1.8 as  $2 - 0.2$  and 2.2 as  $2 + 0.2$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$1.8 \times 2.2 = (2 - 0.2) (2 + 0.2)$$

$$= (2)^2 - (0.2)^2$$

$$= 4 - 0.04$$

$$= 3.96$$

**(viii)**  $9.8 \times 10.2$

We can express 9.8 as  $10 - 0.2$  and 10.2 as  $10 + 0.2$

Let us simplify the given expression using the formula  $(a - b) (a + b) = a^2 - b^2$

We get,

$$9.8 \times 10.2 = (10 - 0.2) (10 + 0.2)$$

$$= (10)^2 - (0.2)^2$$

$$= 100 - 0.04$$

$$= 99.96$$

**5. Simplify the following using the identities:**

**(i)**  $((58)^2 - (42)^2)/16$

**(ii)**  $178 \times 178 - 22 \times 22$

**(iii)**  $(198 \times 198 - 102 \times 102)/96$

**(iv)**  $1.73 \times 1.73 - 0.27 \times 0.27$

**(v)**  $(8.63 \times 8.63 - 1.37 \times 1.37)/0.726$

**Solution:**

**(i)**  $((58)^2 - (42)^2)/16$

Let us simplify the given expression using the formula  $(a - b) (a + b) = a^2 - b^2$

We get,

$$((58)^2 - (42)^2)/16 = ((58-42) (58+42))/16$$

$$= ((16) (100))/16$$

$$= 100$$

**(ii)**  $178 \times 178 - 22 \times 22$

Let us simplify the given expression using the formula  $(a - b) (a + b) = a^2 - b^2$

We get,

$$178 \times 178 - 22 \times 22 = (178)^2 - (22)^2$$

$$= (178-22) (178+22)$$

$$= 200 \times 156$$

$$= 31200$$

**(iii)**  $(198 \times 198 - 102 \times 102)/96$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$\begin{aligned}(198 \times 198 - 102 \times 102)/96 &= ((198)^2 - (102)^2)/96 \\ &= ((198-102)(198+102))/96 \\ &= (96 \times 300)/96 \\ &= 300\end{aligned}$$

**(iv)**  $1.73 \times 1.73 - 0.27 \times 0.27$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$\begin{aligned}1.73 \times 1.73 - 0.27 \times 0.27 &= (1.73)^2 - (0.27)^2 \\ &= (1.73-0.27)(1.73+0.27) \\ &= 1.46 \times 2 \\ &= 2.92\end{aligned}$$

**(v)**  $(8.63 \times 8.63 - 1.37 \times 1.37)/0.726$

Let us simplify the given expression using the formula  $(a - b)(a + b) = a^2 - b^2$

We get,

$$\begin{aligned}(8.63 \times 8.63 - 1.37 \times 1.37)/0.726 &= ((8.63)^2 - (1.37)^2)/0.726 \\ &= ((8.63-1.37)(8.63+1.37))/0.726 \\ &= (7.26 \times 10)/0.726 \\ &= 72.6/0.726 \\ &= 100\end{aligned}$$

**6. Find the value of x, if:**

**(i)**  $4x = (52)^2 - (48)^2$

**(ii)**  $14x = (47)^2 - (33)^2$

**(iii)**  $5x = (50)^2 - (40)^2$

**Solution:**

**(i)**  $4x = (52)^2 - (48)^2$

Let us simplify to find the value of x by using the formula  $(a - b)(a + b) = a^2 - b^2$

$$4x = (52)^2 - (48)^2$$

$$4x = (52 - 48)(52 + 48)$$

$$4x = 4 \times 100$$

$$4x = 400$$

$$x = 100$$

**(ii)**  $14x = (47)^2 - (33)^2$

Let us simplify to find the value of x by using the formula  $(a - b)(a + b) = a^2 - b^2$

$$14x = (47)^2 - (33)^2$$

$$14x = (47 - 33)(47 + 33)$$

$$14x = 14 \times 80$$

$$x = 80$$

**(iii)**  $5x = (50)^2 - (40)^2$

Let us simplify to find the value of x by using the formula  $(a - b)(a + b) = a^2 - b^2$

$$5x = (50)^2 - (40)^2$$

$$5x = (50 - 40)(50 + 40)$$

$$5x = 10 \times 90$$

$$5x = 900$$

$$x = 180$$

**7. If  $x + 1/x = 20$ , find the value of  $x^2 + 1/x^2$ .**

**Solution:**

We know that  $x + 1/x = 20$

So when squaring both sides, we get

$$(x + 1/x)^2 = (20)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 400$$

$$x^2 + 2 + 1/x^2 = 400$$

$$x^2 + 1/x^2 = 398$$

**8. If  $x - 1/x = 3$ , find the values of  $x^2 + 1/x^2$  and  $x^4 + 1/x^4$ .**

**Solution:**

We know that  $x - 1/x = 3$

So when squaring both sides, we get

$$(x - 1/x)^2 = (3)^2$$

$$x^2 - 2 \times x \times 1/x + (1/x)^2 = 9$$

$$x^2 - 2 + 1/x^2 = 9$$

$$x^2 + 1/x^2 = 9 + 2$$

$$x^2 + 1/x^2 = 11$$

Now again when we square on both sides we get,

$$(x^2 + 1/x^2)^2 = (11)^2$$

$$x^4 + 2 \times x^2 \times 1/x^2 + (1/x^2)^2 = 121$$

$$x^4 + 2 + 1/x^4 = 121$$

$$x^4 + 1/x^4 = 121 - 2$$

$$x^4 + 1/x^4 = 119$$

$$\therefore x^2 + 1/x^2 = 11$$

$$x^4 + 1/x^4 = 119$$

**9. If  $x^2 + 1/x^2 = 18$ , find the values of  $x + 1/x$  and  $x - 1/x$ .**

**Solution:**

We know that  $x^2 + 1/x^2 = 18$

When adding 2 on both sides, we get

$$x^2 + 1/x^2 + 2 = 18 + 2$$

$$x^2 + 1/x^2 + 2 \times x \times 1/x = 20$$

$$(x + 1/x)^2 = 20$$

$$x + 1/x = \sqrt{20}$$

When subtracting 2 from both sides, we get

$$x^2 + 1/x^2 - 2 \times x \times 1/x = 18 - 2$$

$$(x - 1/x)^2 = 16$$

$$x - 1/x = \sqrt{16}$$

$$x - 1/x = 4$$

**10. If  $x + y = 4$  and  $xy = 2$ , find the value of  $x^2 + y^2$**

**Solution:**

We know that  $x + y = 4$  and  $xy = 2$

Upon squaring on both sides of the given expression, we get

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

$$x^2 + y^2 + 2xy = 16$$

$$x^2 + y^2 + 2(2) = 16 \quad (\text{since } xy=2)$$

$$x^2 + y^2 + 4 = 16$$

$$x^2 + y^2 = 16 - 4$$

$$x^2 + y^2 = 12$$

**11. If  $x - y = 7$  and  $xy = 9$ , find the value of  $x^2 + y^2$**

**Solution:**

We know that  $x - y = 7$  and  $xy = 9$

Upon squaring on both sides of the given expression, we get

$$(x - y)^2 = 7^2$$

$$x^2 + y^2 - 2xy = 49$$

$$x^2 + y^2 - 2(9) = 49 \quad (\text{since } xy=9)$$

$$x^2 + y^2 - 18 = 49$$

$$x^2 + y^2 = 49 + 18$$

$$x^2 + y^2 = 67$$

**12. If  $3x + 5y = 11$  and  $xy = 2$ , find the value of  $9x^2 + 25y^2$**

**Solution:**

We know that  $3x + 5y = 11$  and  $xy = 2$

Upon squaring on both sides of the given expression, we get

$$(3x + 5y)^2 = 11^2$$

$$(3x)^2 + (5y)^2 + 2(3x)(5y) = 121$$

$$9x^2 + 25y^2 + 2(15xy) = 121 \quad (\text{since } xy=2)$$

$$9x^2 + 25y^2 + 2(15(2)) = 121$$

$$9x^2 + 25y^2 + 60 = 121$$

$$9x^2 + 25y^2 = 121 - 60$$

$$9x^2 + 25y^2 = 61$$

**13. Find the values of the following expressions:**

**(i)  $16x^2 + 24x + 9$  when  $x = 7/4$**

**(ii)  $64x^2 + 81y^2 + 144xy$  when  $x = 11$  and  $y = 4/3$**

**(iii)  $81x^2 + 16y^2 - 72xy$  when  $x = 2/3$  and  $y = 3/4$**

**Solution:**

**(i)  $16x^2 + 24x + 9$  when  $x = 7/4$**

Let us find the values using the formula  $(a + b)^2 = a^2 + b^2 + 2ab$

$$(4x)^2 + 2(4x)(3) + 3^2$$

$$(4x + 3)^2$$

Evaluating when  $x = 7/4$

$$[4(7/4) + 3]^2$$

$$(7 + 3)^2$$

$$100$$

**(ii)  $64x^2 + 81y^2 + 144xy$  when  $x = 11$  and  $y = 4/3$**

Let us find the values using the formula  $(a + b)^2 = a^2 + b^2 + 2ab$

$$(8x)^2 + 2(8x)(9y) + (9y)^2 \quad (8x + 9y)$$

Evaluating when  $x = 11$  and  $y = 4/3$

$$[8(11) + 9(4/3)]^2$$

$$(88 + 12)^2$$

$$(100)^2$$

$$10000$$

**(iii)**  $81x^2 + 16y^2 - 72xy$  when  $x = 2/3$  and  $y = 3/4$

Let us find the values using the formula  $(a + b)^2 = a^2 + b^2 + 2ab$

$$(9x)^2 + (4y)^2 - 2(9x)(4y)$$

$$(9x - 4y)^2$$

Putting  $x = 2/3$  and  $y = 3/4$

$$[9(2/3) - 4(3/4)]^2$$

$$(6 - 3)^2$$

$$3^2$$

$$9$$

**14. If  $x + 1/x = 9$  find the value of  $x^4 + 1/x^4$ .**

**Solution:**

We know that  $x + 1/x = 9$

So when squaring both sides, we get

$$(x + 1/x)^2 = (9)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 81$$

$$x^2 + 2 + 1/x^2 = 81$$

$$x^2 + 1/x^2 = 81 - 2$$

$$x^2 + 1/x^2 = 79$$

Now again when we square on both sides we get,

$$(x^2 + 1/x^2)^2 = (79)^2$$

$$x^4 + 2 \times x^2 \times 1/x^2 + (1/x^2)^2 = 6241$$

$$x^4 + 2 + 1/x^4 = 6241$$

$$x^4 + 1/x^4 = 6241 - 2$$

$$x^4 + 1/x^4 = 6239$$

$$\therefore x^4 - 1/x^4 = 6239$$

**15. If  $x + 1/x = 12$  find the value of  $x - 1/x$ .**

**Solution:**

We know that  $x + 1/x = 12$

So when squaring both sides, we get

$$(x + 1/x)^2 = (12)^2$$

$$x^2 + 2 \times x \times 1/x + (1/x)^2 = 144$$

$$x^2 + 2 + 1/x^2 = 144$$

$$x^2 + 1/x^2 = 144 - 2$$

$$x^2 + 1/x^2 = 142$$

When subtracting 2 from both sides, we get

$$x^2 + 1/x^2 - 2 \times x \times 1/x = 142 - 2$$

$$(x - 1/x)^2 = 140$$

$$x - 1/x = \sqrt{140}$$

**16. If  $2x + 3y = 14$  and  $2x - 3y = 2$ , find value of  $xy$ . [Hint: Use  $(2x+3y)^2 - (2x-3y)^2 = 24xy$ ]**

**Solution:**

We know that the given equations are

$$2x + 3y = 14 \dots \text{equation (1)}$$

$$2x - 3y = 2 \dots \text{equation (2)}$$

Now, let us square both the equations and subtract equation (2) from equation (1), we get,

$$(2x + 3y)^2 - (2x - 3y)^2 = (14)^2 - (2)^2$$

$$4x^2 + 9y^2 + 12xy - 4x^2 - 9y^2 + 12xy = 196 - 4$$

$$24xy = 192$$

$$xy = 8$$

$\therefore$  the value of  $xy$  is 8.

**17. If  $x^2 + y^2 = 29$  and  $xy = 2$ , find the value of**

**(i)  $x + y$**

**(ii)  $x - y$**

**(iii)  $x^4 + y^4$**

**Solution:**

**(i)  $x + y$**

We know that

$$x^2 + y^2 = 29$$

$$x^2 + y^2 + 2xy - 2xy = 29$$

$$(x + y)^2 - 2(2) = 29$$

$$(x + y)^2 = 29 + 4$$

$$x + y = \pm \sqrt{33}$$

**(ii)  $x - y$**

We know that

$$x^2 + y^2 = 29$$



$$x^2 + y^2 + 2xy - 2xy = 29$$

$$(x - y)^2 + 2(2) = 29$$

$$(x - y)^2 + 4 = 29$$

$$(x - y)^2 = 25$$

$$(x - y) = \pm 5$$

**(iii)**  $x^4 + y^4$

We know that

$$x^2 + y^2 = 29$$

Squaring both sides, we get

$$(x^2 + y^2)^2 = (29)^2$$

$$x^4 + y^4 + 2x^2y^2 = 841$$

$$x^4 + y^4 + 2(2)^2 = 841$$

$$x^4 + y^4 = 841 - 8$$

$$x^4 + y^4 = 833$$

**18. What must be added each of the following expression to make it a whole square?**

**(i)**  $4x^2 - 12x + 7$

**(ii)**  $4x^2 - 20x + 20$

**Solution:**

**(i)**  $4x^2 - 12x + 7$

$$(2x)^2 - 2(2x)(3) + 3^2 - 3^2 + 7$$

$$(2x - 3)^2 - 9 + 7$$

$$(2x - 3)^2 - 2$$

$\therefore$  2 must be added to the expression to make it a whole square.

**(ii)**  $4x^2 - 20x + 20$

$$(2x)^2 - 2(2x)(5) + 5^2 - 5^2 + 20$$

$$(2x - 5)^2 - 25 + 20$$

$$(2x - 5)^2 - 5$$

$\therefore$  5 must be added to the expression to make it a whole square.

**19. Simplify:**

**(i)**  $(x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

**(ii)**  $(2x - 1)(2x + 1)(4x^2 + 1)(16x^4 + 1)$

**(iii)**  $(7m - 8n)^2 + (7m + 8n)^2$

**(iv)**  $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

$$(v) (m^2 - n^2m)^2 + 2m^3n^2$$

**Solution:**

$$(i) (x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$$

B7 grouping the values

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

$$[(x^2)^2 - (y^2)^2](x^4 + y^4)$$
$$(x^4 - y^4)(x^4 + y^4)$$

$$[(x^4)^2 - (y^4)^2]$$
$$x^8 - y^8$$

$$(ii) (2x - 1)(2x + 1)(4x^2 + 1)(16x^4 + 1)$$

Let us simplify the expression by grouping

$$[(2x)^2 - (1)^2](4x^2 + 1)(16x^4 + 1)$$
$$(4x^2 - 1)(4x^2 + 1)(16x^4 + 1)$$

$$[(4x^2)^2 - (1)^2](16x^4 + 1)$$
$$(16x^4 - 1)(16x^4 + 1)$$

$$[(16x^4)^2 - (1)^2]$$
$$256x^8 - 1$$

$$(iii) (7m - 8n)^2 + (7m + 8n)^2$$

Upon expansion

$$(7m)^2 + (8n)^2 - 2(7m)(8n) + (7m)^2 + (8n)^2 + 2(7m)(8n)$$

$$(7m)^2 + (8n)^2 - 112mn + (7m)^2 + (8n)^2 + 112mn$$

$$49m^2 + 64n^2 + 49m^2 + 64n^2$$

By grouping the similar expression we get,

$$98m^2 + 64n^2 + 64n^2$$

$$98m^2 + 128n^2$$

$$(iv) (2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$$

Upon expansion

$$(2.5p)^2 + (1.5q)^2 - 2(2.5p)(1.5q) - (1.5p)^2 - (2.5q)^2 + 2(1.5p)(2.5q)$$

$$6.25p^2 + 2.25q^2 - 2.25p^2 - 6.25q^2$$

By grouping the similar expression we get,

$$4p^2 - 6.25q^2 + 2.25q^2$$

$$4p^2 - 4q^2$$

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

$$(v) (m^2 - n^2m)^2 + 2m^3n^2$$

Upon expansion using  $(a + b)^2$  formula

$$(m^2)^2 - 2(m^2)(n^2)(m) + (n^2m)^2 + 2m^3n^2$$

$$m^4 - 2m^3n^2 + (n^2m)^2 + 2m^3n^2$$

$$m^4 + n^4m^2 - 2m^3n^2 + 2m^3n^2$$

$$m^4 + m^2n^4$$

**20. Show that:**

**(i)  $(3x + 7)^2 - 84x = (3x - 7)^2$**

**(ii)  $(9a - 5b)^2 + 180ab = (9a + 5b)^2$**

**(iii)  $(4m/3 - 3n/4)^2 + 2mn = 16m^2/9 + 9n^2/16$**

**(iv)  $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$**

**(v)  $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$**

**Solution:**

**(i)  $(3x + 7)^2 - 84x = (3x - 7)^2$**

Let us consider LHS  $(3x + 7)^2 - 84x$

By using the formula  $(a + b)^2 = a^2 + b^2 + 2ab$

$$(3x)^2 + (7)^2 + 2(3x)(7) - 84x$$

$$(3x)^2 + (7)^2 + 42x - 84x$$

$$(3x)^2 + (7)^2 - 42x$$

$$(3x)^2 + (7)^2 - 2(3x)(7)$$

$$(3x - 7)^2 = \text{R.H.S}$$

Hence, proved

**(ii)  $(9a - 5b)^2 + 180ab = (9a + 5b)^2$**

Let us consider LHS  $(9a - 5b)^2 + 180ab$

By using the formula  $(a + b)^2 = a^2 + b^2 + 2ab$

$$(9a)^2 + (5b)^2 - 2(9a)(5b) + 180ab$$

$$(9a)^2 + (5b)^2 - 90ab + 180ab$$

$$(9a)^2 + (5b)^2 + 90ab$$

$$(9a)^2 + (5b)^2 + 2(9a)(5b)$$

$$(9a + 5b)^2 = \text{R.H.S}$$

Hence, proved

**(iii)  $(4m/3 - 3n/4)^2 + 2mn = 16m^2/9 + 9n^2/16$**

Let us consider LHS  $(4m/3 - 3n/4)^2 + 2mn$

$$(4m/3)^2 + (3n/4)^2 - 2mn + 2mn$$

$$(4m/3)^2 + (3n/4)^2$$

$$16/9m^2 + 9/16n^2 = \text{R.H.S}$$

Hence, proved

$$\text{(iv)} (4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$$

Let us consider LHS  $(4pq + 3q)^2 - (4pq - 3q)^2$

$$(4pq)^2 + (3q)^2 + 2(4pq)(3q) - (4pq)^2 - (3q)^2 + 2(4pq)(3q)$$

$$24pq^2 + 24pq^2$$

$$48pq^2 = \text{RHS}$$

Hence, proved

$$\text{(v)} (a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$$

Let us consider LHS  $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a)$

By using the identity  $(a - b)(a + b) = a^2 - b^2$

We get,

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

$$a^2 - b^2 + b^2 - c^2 + c^2 - a^2$$

$$0 = \text{R.H.S}$$

Hence, proved

## EXERCISE 6.7 PAGE NO: 6.47

1. Find the following products:

$$\text{(i)} (x + 4)(x + 7)$$

$$\text{(ii)} (x - 11)(x + 4)$$

$$\text{(iii)} (x + 7)(x - 5)$$

$$\text{(iv)} (x - 3)(x - 2)$$

$$\text{(v)} (y^2 - 4)(y^2 - 3)$$

$$\text{(vi)} (x + 4/3)(x + 3/4)$$

$$\text{(vii)} (3x + 5)(3x + 11)$$

$$\text{(viii)} (2x^2 - 3)(2x^2 + 5)$$

$$\text{(ix)} (z^2 + 2)(z^2 - 3)$$

$$\text{(x)} (3x - 4y)(2x - 4y)$$

$$\text{(xi)} (3x^2 - 4xy)(3x^2 - 3xy)$$

$$\text{(xii)} (x + 1/5)(x + 5)$$

$$\text{(xiii)} (z + 3/4)(z + 4/3)$$

**(xiv)  $(x^2 + 4)(x^2 + 9)$**

**(xv)  $(y^2 + 12)(y^2 + 6)$**

**(xvi)  $(y^2 + 5/7)(y^2 - 14/5)$**

**(xvii)  $(p^2 + 16)(p^2 - 1/4)$**

**Solution:**

**(i)  $(x + 4)(x + 7)$**

Let us simplify the given expression

$$x(x + 7) + 4(x + 7)$$

$$x^2 + 7x + 4x + 28$$

$$x^2 + 11x + 28$$

**(ii)  $(x - 11)(x + 4)$**

Let us simplify the given expression

$$x(x + 4) - 11(x + 4)$$

$$x^2 + 4x - 11x - 44$$

$$x^2 - 7x - 44$$

**(iii)  $(x + 7)(x - 5)$**

Let us simplify the given expression

$$x(x - 5) + 7(x - 5)$$

$$x^2 - 5x + 7x - 35$$

$$x^2 + 2x - 35$$

**(iv)  $(x - 3)(x - 2)$**

Let us simplify the given expression

$$x(x - 2) - 3(x - 2)$$

$$x^2 - 2x - 3x + 6$$

$$x^2 - 5x + 6$$

**(v)  $(y^2 - 4)(y^2 - 3)$**

Let us simplify the given expression

$$y^2(y^2 - 3) - 4(y^2 - 3)$$

$$y^4 - 3y^2 - 4y^2 + 12$$

$$y^4 - 7y^2 + 12$$

**(vi)  $(x + 4/3)(x + 3/4)$**

Let us simplify the given expression

$$x(x + 3/4) + 4/3(x + 3/4)$$

$$x^2 + 3x/4 + 4x/3 + 12/12$$

$$x^2 + 3x/4 + 4x/3 + 1$$

$$x^2 + 25x/12 + 1$$

$$\text{(vii)} (3x + 5)(3x + 11)$$

Let us simplify the given expression

$$3x(3x + 11) + 5(3x + 11)$$

$$9x^2 + 33x + 15x + 55$$

$$9x^2 + 48x + 55$$

$$\text{(viii)} (2x^2 - 3)(2x^2 + 5)$$

Let us simplify the given expression

$$2x^2(2x^2 + 5) - 3(2x^2 + 5)$$

$$4x^4 + 10x^2 - 6x^2 - 15$$

$$4x^4 + 4x^2 - 15$$

$$\text{(ix)} (z^2 + 2)(z^2 - 3)$$

Let us simplify the given expression

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

$$z^4 - 3z^2 + 2z^2 - 6$$

$$z^4 - z^2 - 6$$

$$\text{(x)} (3x - 4y)(2x - 4y)$$

Let us simplify the given expression

$$3x(2x - 4y) - 4y(2x - 4y)$$

$$6x^2 - 12xy - 8xy + 16y^2$$

$$6x^2 - 20xy + 16y^2$$

$$\text{(xi)} (3x^2 - 4xy)(3x^2 - 3xy)$$

Let us simplify the given expression

$$3x^2(3x^2 - 3xy) - 4xy(3x^2 - 3xy)$$

$$9x^4 - 9x^3y - 12x^3y + 12x^2y^2$$

$$9x^4 - 21x^3y + 12x^2y^2$$

$$\text{(xii)} (x + 1/5)(x + 5)$$

Let us simplify the given expression

$$x(x + 1/5) + 5(x + 1/5)$$

$$x^2 + x/5 + 5x + 1$$

$$x^2 + 26/5x + 1$$

**(xiii)**  $(z + 3/4)(z + 4/3)$

Let us simplify the given expression

$$z(z + 4/3) + 3/4(z + 4/3)$$

$$z^2 + 4/3z + 3/4z + 12/12$$

$$z^2 + 4/3z + 3/4z + 1$$

$$z^2 + 25/12z + 1$$

**(xiv)**  $(x^2 + 4)(x^2 + 9)$

Let us simplify the given expression

$$x^2(x^2 + 9) + 4(x^2 + 9)$$

$$x^4 + 9x^2 + 4x^2 + 36$$

$$x^4 + 13x^2 + 36$$

**(xv)**  $(y^2 + 12)(y^2 + 6)$

Let us simplify the given expression

$$y^2(y^2 + 6) + 12(y^2 + 6)$$

$$y^4 + 6y^2 + 12y^2 + 72$$

$$y^4 + 18y^2 + 72$$

**(xvi)**  $(y^2 + 5/7)(y^2 - 14/5)$

Let us simplify the given expression

$$y^2(y^2 - 14/5) + 5/7(y^2 - 14/5)$$

$$y^4 - 14/5y^2 + 5/7y^2 - 2$$

$$y^4 - 73/35y^2 - 2$$

**(xvii)**  $(p^2 + 16)(p^2 - 1/4)$

Let us simplify the given expression

$$p^2(p^2 - 1/4) + 16(p^2 - 1/4)$$

$$p^4 - 1/4p^2 + 16p^2 - 4$$

$$p^4 + 63/4p^2 - 4$$

**2. Evaluate the following:**

**(i)  $102 \times 106$**

**(ii)  $109 \times 107$**

**(iii)  $35 \times 37$**

**(iv)  $53 \times 55$**

**(v)  $103 \times 96$**

**(vi)  $34 \times 36$**

**(vii)  $994 \times 1006$**

**Solution:**

**(i)  $102 \times 106$**

We can express 102 as  $100 + 2$  and 106 as  $100 + 6$

Now let us simplify

$$\begin{aligned}102 \times 106 &= (100 + 2)(100 + 6) \\&= 100(100 + 6) + 2(100 + 6) \\&= 10000 + 600 + 200 + 12 \\&= 10812\end{aligned}$$

**(ii)  $109 \times 107$**

We can express 109 as  $100 + 9$  and 107 as  $100 + 7$

Now let us simplify

$$\begin{aligned}109 \times 107 &= (100 + 9)(100 + 7) \\&= 100(100 + 7) + 9(100 + 7) \\&= 10000 + 700 + 900 + 63 \\&= 11663\end{aligned}$$

**(iii)  $35 \times 37$**

We can express 35 as  $30 + 5$  and 37 as  $30 + 7$

Now let us simplify

$$\begin{aligned}35 \times 37 &= (30 + 5)(30 + 7) \\&= 30(30 + 7) + 5(30 + 7) \\&= 900 + 210 + 150 + 35 \\&= 1295\end{aligned}$$

**(iv)  $53 \times 55$**

We can express 53 as  $50 + 3$  and 55 as  $50 + 5$

Now let us simplify

$$\begin{aligned}53 \times 55 &= (50 + 3)(50 + 5) \\&= 50(50 + 5) + 3(50 + 5) \\&= 2500 + 250 + 150 + 15 \\&= 2915\end{aligned}$$

**(v)  $103 \times 96$**

We can express 103 as  $100 + 3$  and 96 as  $100 - 4$

Now let us simplify



$$\begin{aligned}103 \times 96 &= (100 + 3)(100 - 4) \\&= 100(100 - 4) + 3(100 - 4) \\&= 10000 - 400 + 300 - 12 \\&= 10000 - 112 \\&= 9888\end{aligned}$$

**(vi)**  $34 \times 36$

We can express 34 as  $30 + 4$  and 36 as  $30 + 6$

Now let us simplify

$$\begin{aligned}34 \times 36 &= (30 + 4)(30 + 6) \\&= 30(30 + 6) + 4(30 + 6) \\&= 900 + 180 + 120 + 24 \\&= 1224\end{aligned}$$

**(vii)**  $994 \times 1006$

We can express 994 as  $1000 - 6$  and 1006 as  $1000 + 6$

Now let us simplify

$$\begin{aligned}994 \times 1006 &= (1000 - 6)(1000 + 6) \\&= 1000(1000 + 6) - 6(1000 + 6) \\&= 1000000 + 6000 - 6000 - 36 \\&= 999964\end{aligned}$$