#463493

Topic: Operations of Polynomials

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

(i) $5xyz^2 - 3zy$

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

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

(iv) $3 - pq + qr - rp$

(v) $\frac{x}{2} + \frac{y}{2} - xy$

(vi) $0.3a - 0.6ab + 0.5b$

Solution

Expression	Terms	Coefficients
$5xyz^2 - 3zy$	$5xyz^2$, $-3zy$	5 -3
$1 + x + x^2$	1, x, x^2	No coefficient, 1, 1
$4x^2y^2 - 4x^2y^2z^2 + z^2$	$4x^2y^2$, $-4x^2y^2z^2$, z^2	4, -4, 1
$3 - pq + qr - rp$	3, $-pq$, $-rp$	No coefficient, -1, -1
$\frac{x}{2} + \frac{y}{2} - xy$	$\frac{x}{2}$ $\frac{y}{2}$ $-xy$	$\frac{1}{2}$ $\frac{1}{2}$ -1
$0.3a - 0.6ab + 0.5b$	$0.3a$ $-0.6ab$ $0.5b$	0.3, -0.6, 0.5

#463673

Topic: Special Products

Use suitable identities to find the following products:

(i) $(x + 4)(x + 10)$

(ii) $(x + 8)(x - 10)$

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

(iv) $\left(y^2 + \frac{3}{2}\right)\left(y^2 - \frac{3}{2}\right)$

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

Solution

We use identities

$(x + a)(x + b) = x^2 + (a + b)x + ab$ and $x^2 - y^2 = (x + y)(x - y)$

(i) $(x + 4)(x + 10)$

$= x^2 + (4 + 10)x + (4)(10)$

$= x^2 + 14x + 40$

(ii) $(x + 8)(x - 10)$

$= x^2 + (8 - 10) + (8)(-10)$

$= x^2 - 2x - 80$

(iii) $(3x + 4)(3x + 5)$

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

$= 9x^2 - 3x - 20$

(iv) $\left(y^2 + \frac{3}{2}\right)\left(y^2 - \frac{3}{2}\right)$

$= (y^2)^2 - \left(\frac{3}{2}\right)^2$

$= y^4 - \frac{9}{4}$

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

$= (3)^2 - (2x)^2 = 9 - 4x^2$

#463772

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$4(x - 5) = 4x - 5$

Solution

The statement is incorrect.

The correct statement is

$4(x - 5) = 4x - 20$

#463773

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

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

Solution

The given statement is incorrect.

The correct statement is

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

#463774

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$2x + 3y = 5xy$

Solution

The given statement is incorrect.

As we cannot apply any rule over here, the correct statement will be

$2x + 3y = 2x + 3y$

#463775

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$x + 2x + 3x = 5x$

Solution

The given statement is incorrect.

As all the terms have same variable x, we can add them.

Therefore, correct statement is

$x + 2x + 3x = 6x$

#463776

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$5y + 2y + y - 7y = 0$

Solution

The given statement is incorrect.

As all the terms have same variable, we can perform operation of addition and subtraction.

Therefore, the correct statement is

$5y + 2y + y - 7y = y$

#463777

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$3x + 2x = 5x^2$

Solution

The statement is incorrect.

As all the terms have same variable x, we can perform the operation.

Therefore the correct statement is

$3x + 2x = 5x$

#463778

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$(2x)^2 + 4(2x) + 7 = 2x^2 + 8x + 7$

Solution

The given statement is incorrect.

Only the first term is written incorrect.

Correct statement is

$(2x)^2 + 4(2x) + 7 = 4x^2 + 8x + 7$

#463779

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$(2x)^2 + 5x = 4x + 5x = 9x$

Solution

The given statement is incorrect.

Correct statement is

$(2x)^2 + 5x = 4x^2 + 5x$

#463780

Topic: Standard Identities

Find and correct errors of the following mathematical expressions:ind and correct error

$(3x + 2)^2 = 3x^2 + 6x + 4$

Solution

The statement is incorrect.

LHS can be expanded by using formula, $(a + b)^2 = a^2 + 2ab + b^2$

$\therefore (3x + 2)^2 = (3x)^2 + 2(3x)(2) + 2^2 = 9x^2 + 12x + 4$

Therefore the correct statement is

$(3x + 2)^2 = 9x^2 + 12x + 4$

#463781

Topic: Algebraic Expressions and Types

Find and correct error in the following mathematical statement.

Substituting x= -3 in

(a) $x^2 + 5x + 4$ gives $(-3)^2 + 5(-3) + 4 = 9 + 2 + 4 = 15$

(b) $x^2 - 5x + 4$ gives $(-3)^2 - 5(-3) + 4 = 9 - 15 + 4 = -2$

(c) $x^2 + 5x$ gives $(-3)^2 + 5(-3) = -9 - 15 = -24$

Solution

(a) $x^2 + 5x + 4 = (-3)^2 + 5(-3) + 4 = 9 - 15 + 4 = -2$

(b) $x^2 - 5x + 4 = (-3)^2 - 5(-3) + 4 = 9 + 15 + 4 = 28$

(c) $x^2 + 5x = (-3)^2 + 5(-3) = 9 - 15 = -6$

#463782

Topic: Standard Identities

Find and correct errors of the following mathematical expressions:

$(y - 3)^2 = y^2 - 9$

Solution

The statement is incorrect.

It can be expanded by using formula $(a + b)^2$. But instead of this the formula used here is $a^2 - b^2$ which is incorrect.

Therefore the correct statement is

$(y - 3)^2 = y^2 - 2 \times y \times 3 + 9 = y^2 - 6y + 9$

#463783

Topic: Standard Identities

Find and correct errors of the following mathematical expressions:

$(z + 5)^2 = z^2 + 25$

Solution

The statement is incorrect.

Above expression can be expanded by using formula $(a + b)^2 = a^2 + 2ab + b^2$

The correct statement is

$(z + 5)^2 = z^2 + 10z + 25$

#463784

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

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

Solution

The given statement is incorrect.

Correct statement is

$(a + 4)(a + 2) = a^2 + 6a + 8$

#463785

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$(a - 4)(a - 2) = a^2 - 8$

Solution

The given statement is incorrect. Middle term is missing in this expression.

Correct statement is

$(a - 4)(a - 2) = a^2 - 6a + 8$

#463786

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

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

Solution

The given statement is incorrect. Middle term is missing in the expression.

Correct statement is

$(2a + 3b)(a - b) = 2a^2 + ab - 3b^2$

#463787

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{3x^2}{3x^2} = 0$

Solution

The statement is incorrect. Like terms after cancellation leave remainder as 1.

Therefore the correct statement is

$\frac{3x^2}{3x^2} = 1$

#463788

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{3x^2+1}{3x^2} = 1+1 = 2$

Solution

The given statement is incorrect.

After separating the denominators, we get

$\frac{3x^2+1}{3x^2} = 1+\frac{1}{3x^2}$

The above statement is the correct one.

#463789

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{3x}{3x+2} = \frac{1}{2}$

Solution

The given statement is incorrect.

As we cannot separate the denominators, the statement will remain as it is.

Therefore correct statement is

$\frac{3x}{3x+2} = \frac{3x}{3x+2}$

#463790

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{3}{4x+3} = \frac{1}{4x}$

Solution

The given statement is incorrect.

As we cannot separate the denominators, the statement will remain as it is.

Therefore, correct statement is

$\frac{3}{4x+3} = \frac{3}{4x+3}$

#463791

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{4x+5}{4x} = 5$

Solution

The given statement is incorrect.

After separating the denominators, we get

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

#463792

Topic: Operations of Polynomials

Find and correct errors of the following mathematical expressions:

$\frac{7x+5}{5} = 7x$

Solution

The given statement is incorrect.

We will get correct statement by separating denominators, which is

$\frac{7x+5}{5} = 1 + \frac{7x}{5}$

#463838

Topic: Standard Form of Polynomial

Classify the following polynomials as monomials, binomials, and trinomials. Which polynomial do not fit in any of these three categories?

$x+y$, 1000, $x+x^2+x^3+x^4$, $7+y+5x$, $2y-3y^2$, $2y-3y^2+4y^3$, $5x-4y+3xy$, $4z-15z^2$, $ab+bc+cd+da$, pqr, p^2q+pq^2, $2p+2q$

Solution

Monomials :

1000, pqr

Binomials :

$x+y$, $2y-3y^2$, $4z-15z^2$, p^2q+pq^2, $2p+2q$

Trinomials :

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

Polynomials that do not fit in any of these categories are :

$x+x^2+x^3+x^4$, $ab+bc+cd+da$

#463862

Topic: Operations of Polynomials

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

Solution

(i) $28x^4 \div 56x$

$= \frac{28x^4}{56x} = \frac{x^3}{2}$

(ii) $-36y^3 \div 9y^2$

$= \frac{-36y^3}{9y^2} - 4y$

(iii) $66pq^2r^3 \div 11qr^2$

$= \frac{66pq^2r^3}{11qr^2} = 6pqr$

(iv) $34x^3y^3z^3 \div 51xy^2z^3$

$= \frac{34x^3y^3z^3}{51xy^2z^3} = \frac{2}{3}x^2y$

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

$\frac{12a^8b^8}{(-6a^6b^4)} = -2a^2b^4$

#463881

Topic: Operations of Polynomials

Divide the 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) $(p^3q^6 - p^6q^3) \div p^3q^3$

Solution

(i) $(5x^2 - 6x) \div 3x$

$= \frac{1}{3}(5x - 6)$

(ii) $(3y^8 - 4y^6 + 5y^4) \div y^4$

$= 3y^4 - 4y^2 + 5$

(iii) $8(x^3y^2z^2 + x^2y^3z^2 + x^2y^2z^3) \div 4x^2y^2z^2$

$= 2(x + y + z)$

(iv) $(x^3 + 2x^2 + 3x) \div 2x$

$= \frac{1}{2}(x^2 + 2x + 3)$

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

$= q^3 - p^3$

#463887

Topic: Operations of Polynomials

Work out the following division

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

Solution

(i) $(10x - 25) \div 5 = 2x - 5$

(ii) $(10x - 25) \div (2x - 5) = 5$

(iii) $10y(6y + 21) \div 5(2y + 7) = 6y$

(iv) $9x^2y^2(3z - 24) \div 27xy(z - 8) = xy$

(v) $96abc(3a - 12)(5b - 30) \div 144(a - 4)(b - 6) = 10abc$

#463896

Topic: Operations of Polynomials

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) $20(y+4)(y^2+5y+3) \div 5y(y+4)$

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

Solution

(i) $5(2x+1)(3x+5) \div (2x+1) = 5(3x+1)$

(ii) $26xy(x+5)(y-4) \div 13x(y-4) = 2y(x+5)$

(iii) $52pqr(p+q)(q+r)(r+p) \div 104pq(q+r)(r+p) = \frac{1}{2}r(p+q)$

(iv) $20(y+4)(y^2+5y+3) \div 5y(y+4) = 4(y^2+5y+3)$

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

#463910

Topic: Operations of Polynomials

Add following.

(i) $ab-bc,\ bc-ca,\ ca-ab$

(ii) $a-b+ab,\ b-c+bc,\ c-a+ac$

(iii) $2p^2q^2-3pq+4,\ 5+7pq-3p^2q^2$

(iv) $l^2+m^2,\ m^2+n^2,\ n^2+l^2,\ 2lm+2mn+2nl$

Solution

i) $ab-bc+bc-ca+ca-ab=0$

ii) $a-b+ab+b-c+bc+c-a+ac=ab+bc+ac$

iii) $2p^2q^2-3pq+4+5+7pq-3p^2q^2 = -p^2q^2+4pq+9$

iv) $l^2+m^2+n^2+m^2+l^2+n^2+2lm+2mn+2nl=2l^2+2m^2+2n^2+2(lm+mn+nl)=2(l^2+m^2+n^2+lm+mn+nl)$

#464017

Topic: Operations of Polynomials

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

Solution

(i) $(y^2+7y+10) \div (y+5) = \frac{(y^2+5y+2y+10)}{y+5}$

$= \frac{y(y+5)+2(y+5)}{y+5} = \frac{(y+5)(y+2)}{(y+5)}$

$= y + 2$

(ii) $(m^2 - 14m - 32) \div (m + 2) = \frac{(m^2 - 16m + 2m - 32)}{m + 2}$

$= \frac{m(m - 16) + 2(m - 16)}{m + 2} = \frac{(m - 16)(m + 2)}{(m + 2)}$

$= m - 16$

(iii) $(5p^2 - 25p + 20) \div (p - 1) = \frac{(5p^2 - 5p - 20p + 20)}{p - 1}$

$= \frac{5p(p - 1) - 20(p - 1)}{p - 1} = \frac{(p - 1)(5p - 20)}{(p - 1)}$

$= 5p - 20 = 5(p - 4)$

(iv) $4yz(z^2 + 6z - 16) \div 2y(z + 8) = 4yz\frac{(z^2 + 8z - 2z - 16)}{2y(z + 8)}$

$= 2z\frac{z(z + 8) - 2(z + 8)}{z + 8} = 2z\frac{(z - 2)(z + 8)}{(z + 8)}$

$= 2z(z - 2)$

(v) $5pq(p^2 - q^2) \div 2p(p + q)$

$= 5pq\frac{(p - q)(p + q)}{2p(p + q)}$

$= \frac{5}{2}q(p - q)$

(vi) $12xy(9x^2 - 16y^2) \div 4xy(3x + 4y) = 12xy\frac{[(3x)^2 - (4y)^2]}{4xy(3x + 4y)}$

$= 3\frac{(3x + 4y)(3x - 4y)}{(3x + 4y)}$

$= 3(3x - 4y)$

(vii) $39y^3(50y^2 - 98) \div 26y^2(5y + 7) = 39y^3 \times 2\frac{(25y^2 - 49)}{26y^2(5y + 7)}$

$= 3y\frac{[(5y)^2 - 7^2]}{5y + 7} = 3y\frac{[(5y - 7)(5y + 7)]}{5y + 7}$

$= 3y(5y - 7)$

#464107

Topic: Operations of Polynomials

Subtract

(i) $4a - 7ab + 3b + 12$ from $12a - 9ab + 5b - 3$

(ii) $3xy + 5yz - 7zx$ from $5xy - 2yz - 2zx + 10xyz$

(iii) $4p^2q - 3pq + 5pq^2 - 8p + 7q - 10$ from $18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q$

Solution

i) $12a - 9ab + 5b - 3 - (4a - 7ab + 3b + 12) = 12a - 9ab + 5b - 3 - 4a + 7ab - 3b - 12 = 8a + 2b - 2ab - 15$

ii) $5xy - 2yz - 2zx + 10xyz - (3xy + 5yz - 7xz) = 5xy - 2yz - 2zx + 10xyz - 3xy - 5yz + 7xz = 2xy - 7yz + 5xz$

iii)

$18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q - (4p^2q - 3pq + 5q^2p - 8p + 7q - 10) = 18 - 3p - 11q + 5pq - 2pq^2 + 5p^2q - 4p^2q + 3pq - 5q^2p + 8p - 7q + 10 = 28 + 5p - 18q + 8pq - 7pq^2 + p^2q$

#464110

Topic: Operations of Polynomials

Find product of following pairs of monomials

(i) $4, 7p$

(ii) $-4p, 7p$

(iii) $-4p, 7pq$

(iv) $4p^3, -3p$

(v) $4p, 0$

Solution

(i) $4 \times 7 \times p = 28p$

(ii) $-4p \times 7p = -28p^2$

(iii) $-4p \times 7pq = -28p^2q$

(iv) $4p^3 \times 3p = -12p^4$

(v) $4p \times 0 = 0$

#464113

Topic: Operations of Polynomials

Find areas of rectangles with following pairs of monomials as their length and breadth respectively.

(i) (p, q)

(ii) $10m, 5n$

(iii) $20x^2, 5y^2$

(iv) $(4x, 3x^2)$

(v) $3mn, 4np$

Solution

Area of rectangle, A = Length × Breadth

(i) $A = l \times b = p \times q = pq$

(ii) $A = l \times b = 5n \times 10m = 50mn$

(iii) $A = l \times b = 20x^2 \times 5y^2 = 100x^2y^2$

(iv) $A = l \times b = 4x \times 3x^2 = 12x^3$

(v) $A = l \times b = 3mn \times 4np = 12mn^2p$

#464155

Topic: Operations of Polynomials

Complete the table of products

1st monomial → / 2nd monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	....	....	....	....	....
$-5y$	....	....	$-15x^2y$	....	....	...
$3x^2$	....	....	....	....	....	....
$-4xy$	....	....	....	....	....	....
$7x^2y$	....	....	....	....	....	....
$-9x^2y^2$	....	....	....	....	....	....

Solution

1st monomial → / 2nd monomial ↓	$2x$	$-5y$	$3x^2$	$-4xy$	$7x^2y$	$-9x^2y^2$
$2x$	$4x^2$	$-10xy$	$6x^3$	$-8x^2y$	$14x^3y$	$-18x^3y^2$
$-5y$	$-10xy$	$25y^2$	$-15x^2y$	$20xy^2$	$-35x^2y^2$	$45x^2y^3$
$3x^2$	$6x^3$	$-15x^2y$	$9x^4$	$-12x^3y$	$21x^4y$	$-27x^4y^2$
$-4xy$	$-8x^2y$	$20xy^2$	$-12x^3y$	$16x^2y^2$	$-28x^3y^2$	$36x^3y^3$
$7x^2y$	$14x^3y$	$-35x^2y^2$	$21x^4y$	$-28x^3y^2$	$49x^4y^2$	$-63x^4y^3$
$-9x^2y^2$	$-18x^3y^2$	$45x^2y^3$	$-27x^4y^2$	$36x^3y^3$	$-63x^4y^3$	$81x^4y^4$

#464163

Topic: Operations of Polynomials

Obtain the volume of rectangular boxes with following length, breadth and height respectively.

(i) $5a$, $3a^2$, $7a^4$

(ii) $2p$, $4q$, $8r$

(iii) xy, $2x^2y$, $2xy^2$

(iv) a, $2b$, $3c$

Solution

Volume = Length × Breadth × Height

$V = l \times b \times h$

(i) $V = 5a \times 3a^2 \times 7a^4 = 105a^7$

(ii) $V = l \times b \times h = 2p \times 4q \times 8r = 64pqr$

(iii) $V = l \times b \times h$

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

$= 4x^4y^4$

(iv) $V = l \times b \times h = a \times 2b \times 3c = 6abc$

#464168

Topic: Operations of Polynomials

Obtain the product of

(i) $xy,\ yz,\ zx$

(ii) $a,\ -a^2,\ a^3$

(iii) $2,\ 4y,\ 8y^2,\ 16y^3$

(iv) $a,\ 2b,\ 3c,\ 6abc$

(v) $m,\ -mn,\ mnp$

Solution

(i) $xy \times yz \times zx = x^2y^2z^2$

(ii) $a \times -a^2 \times a^3 = -a^6$

(iii) $2 \times 4y \times 8y^2 \times 16y^3 = 1024y^6$

(iv) $a \times 2b \times 3c \times 6abc = 36a^2b^2c^2$

(v) $m \times -mn \times mnp = -m^3n^2p$

#464179

Topic: Operations of Polynomials

Carry out the multiplication of expressions in each of the following pairs.

(i) $4p,\ q + r$

(ii) $ab,\ a - b$

(iii) $a + b,\ 7a^2b^2$

(iv) $(a^2 - 9) \times (4a)$

(v) $pq + qr + rp,\ 0$

Solution

(i) $(4p) \times (q + r)$

$= (4p \times q) + (4p \times r)$

$= 4pq + 4pr$

(ii) $ab \times (a - b)$

$= (ab \times a) + (ab \times (-b))$

$= a^2b^2 - ab^2$

(iii) $(a + b) \times (7a^2b^2)$

$= (a \times 7a^2b^2) + (b \times 7a^2b^2)$

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

(iv) $(a^2 \times 4a) + (-9 \times 4a)$

$= 4a^3 - 36a$

(v) $(pq \times 0) + (qr \times 0) + (rp \times 0)$

$= 0 + 0 + 0$

$= 0$

#464188

Topic: Operations of Polynomials

Complete the table.

First expression	Second expression	Product
(i) a	$b + c + d$	.....
(ii) $x + y - 5$	$5xy$	.....
(iii) p	$6p^2 - 7p + 5$	.....
(iv) $4p^2q^2$	$p^2 - q^2$	.....
(v) $a + b + c$	abc	.....

Solution

(i) $a(b + c + d) = ab + ac + ad$

(ii) $(x + y - 5)5xy = 5x^2y + 5xy^2 - 25xy$

(iii) $p(6p^2 - 7p + 5) = 6p^3 - 7p^2 + 5p$

(iv) $4p^2q^2(p^2 - q^2) = 4p^4q^2 - 4p^2q^4$

(v) $(a + b + c)abc = a^2bc + ab^2c + abc^2$

#464194

Topic: Operations of Polynomials

Find the product.

(i) $a^2 \times (2a^{22}) \times (4a^{26})$

(ii) $\left(\frac{2}{3}xy\right) \times \left(-\frac{9}{10}x^2y^2\right)$

(iii) $\left(\frac{-10}{3}pq^3\right) \times \left(\frac{6}{5}p^3q\right)$

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

Solution

(i) As all the terms are having same base, then we can add the powers.

$\therefore 8a^{2+22+26} = 8a^{50}$

(ii) $\left(\frac{2}{3} \times y\right)\left(\frac{-9}{10}x^2y^2\right) = \frac{-3}{5}x^3y^3$

(iii) $\left(\frac{-10}{3}pq^3\right) \times \left(\frac{6}{5}p^3q\right) = -4p^4q^4$

(iv) $x \times x^2 \times x \times x^3 \times x^4 = x^{2+3+4} = x^{10}$

#464198

Topic: Operations of Polynomials

(a) Simplify $3x(4x - 5) + 3$ and find its value for

(i) $x = 3$ (ii) $x = \frac{1}{2}$

(b) Simplify $a(a^2 + a + 1) + 5$ and find its value for

(i) $a = 0$ (ii) $a = 1$ (iii) $a = -1$

Solution

[a] (i) $3x(4x - 5) + 3$

$= 3 \times 3(4 \times 3 - 5) + 3$

$= 9(7) + 3 = 66$

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

$= 3 \times \frac{1}{2}(4 \times \frac{1}{2} - 5) + 3$

$= \frac{3}{2}(2 - 5) + 3$

$= \frac{-3}{2}$

[b] (i) $a(a^2 + a + 1) + 5$

$= 0 + 5$

$= 5$

(ii) $a(a^2 + a + 1) + 5$

$= 1(3) + 5$

$= 8$

(iii) $a(a^2 + a + 1) + 5$

$-1(1 - 1 + 1) + 5$

$-1 + 5$

$= 4$

#464215

Topic: Operations of Polynomials

(a) Add: $p(p - q)$, $q(q - r)$ & $r(r - p)$

(b) Add: $2x(z - x - y)$ & $27(z - y - x)$

(c) Subtract: $3l(l - 4m + 5n)$ from $4l(10n - 3m + 2l)$

(d) Subtract: $3a(a + b + c) - 2b(a - b + c)$ from $4c(-a + b + c)$

Solution

a) $p(p - q) + q(q - r) + r(r - p) = p^2 - pq + q^2 - qr + r^2 - pr = p^2 + q^2 + r^2 - pq - qr - rp$

b) $2x(z - x - y) + 27(z - y - x) = 2xz - 2x^2 - 2xy + 27z - 27y - 27z$

c) $4l(10n - 3m + 2l) - 3l(l - 4m + 5n) = 40ln - 12lm + 8l^2 - 3l^2 + 12lm - 15ln = 25ln + 5l^2$

d) $4c(-a + b + c) - [3a(a + b + c) - 2b(a - b + c)] = -4ac + 4bc + 4c^2 - [3a^2 + 3ab + 3ac - 2ab + 2b^2 - 2bc] = -4ac + 4bc + 4c^2 - 3a^2 - ab - 3ac - 2b^2 + 2bc$

#464477

Topic: Operations of Polynomials

Multiply the binomials

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

(ii) $(y - 8)$ and $(3y - 4)$

(iii) $(2.5l - 0.5m)$ and $(2.5l + 0.5m)$

(iv) $(a + 3b)$ and $(x + 5)$

(v) $(2pq + 3q^2)$ and $(3pq - 2q^2)$

(vi) $\left(\frac{3}{4}a^2 + 3b^2\right)$ and $\left(a^2 - \frac{2}{3}b^2\right)$

Solution

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

$= 8x^2 - 6x + 20x - 15$

$= 8x^2 + 14x - 15$

(ii) $y(3y - 4) - 8(3y - 4)$

$= 3y^2 - 28y + 32$

(iii) $2.5l(2.5l + 0.5m) - 0.5m(2.5l + 0.5m)$

$= 6.25l^2 - 0.25m^2$ $((a + b)(a - b) = a^2 - b^2)$

(iv) $(a + 3b)(x + 5)$

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

$= ax + 5a + 3bx + 15b$

(v) $2pq(3pq - 2q^2) + 3q(3pq - 2q^2)$

$= 6p^2q^2 - 4pq^3 + 9pq^3 - 6q^4$

$= 6p^2q^2 - 5pq^3 - 6q^4$

(vi) $\frac{3}{4}a^2\left(4a^2 - \frac{8}{3}b^2\right) + 12b^2\left(a^2 - \frac{2}{3}b^2\right)$

$= 3a^4 - 2a^2b^2 + 12a^2b^2 - 8b^4$

$= 3a^4 - 8b^4 + 10a^2b^2$

#464478

Topic: Operations of Polynomials

Find the product

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

(ii) $(x + 7y)(7x - y)$

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

(iv) $(p^2 - q^2)(2p + q)$

Solution

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

$= 15 + 5x - 6x - 2x$

$= 15 - x - 2x^2$

(ii) $x(7x - y) + 7y(7x - y)$

$= 7x^2 - xy + 49xy - 7y^2$

$= 7x^2 - 7y^2 + 48xy$

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

$= a^3 + a^2b^2 + ab + b^3$

(iv) $p^2(2p + q) - q^2(2p + q)$

$= 2p^3 + p^2q - 2pq^2 - q^3$

#464485

Topic: Operations of Polynomials

Simplify

(i) $(x^2 - 5)(x + 5) + 25$

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

(iii) $(t + 8^2)(t^2 - s)$

(iv) $(a + b)(c - d) + (a - b)(c + d) + 2(ac + bd)$

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

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

(vii) $(1.5x - 4y)(1.5x + 4y + 3) - 4.5x + 12y$

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

Solution

(i) $x^2(x + 5) - 5(x + 5) + 25$

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

(ii) $a^2b^3 + 3a^2 + 5b^3 + 15 + 5$

$a^2b^3 + 3a^2 + 5b^3 + 20$

(iii) $t(t^2 - s) + s^2(t^2 - s)$

$= t^3 - st + s^2t^2 - s^3$

(iv) $= a(c - d) + b(c - d) + a(c + d) - b(c + d) + 2(ac + bd)$

$ac - ad + bc - bd + ac + ad - bc - - bd + 2ac + 2bd$

$= 4ac$

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

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

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

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

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

$= x^3 + y^3$

(vii) $2.25x^2 + 6xy + 4.5x - 6xy - 16y^2 - 12y - 4.5x + 12y$

$= 2.25x^2 - 16y^2$

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

$a^2 + ab - ac + ab + b^2 - bc + ac + bc - c^2$

$= a^2 + b^2 - c^2 + (ab + ab) + (bc - bc) + (ca - ca)$

$= a^2 + b^2 - c^2 + 2ab$

#464491

Topic: Standard Identities

Use a suitable identity to get each of the following products.

(i) $(x + 3)\ (x + 3)$

(ii) $(2y + 5)\ (2y + 5)$

(iii) $(2a - 7)\ (2a - 7)$

(iv) $\left(3a - \frac{1}{2}\right)\left(3a - \frac{1}{2}\right)$

(v) $(1.1m - 0.4)\ (1.1m + 0.4)$

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

(vii) $(6x - 7)\ (6x + 7)$

(viii) $(-a + c)\ (-a + c)$

(ix) $\left(\frac{x}{2} + \frac{3y}{4}\right)\left(\frac{x}{2} + \frac{3y}{4}\right)$

(x) $(7a - 9b)\ (7a - 9b)$

Solution

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

$= x^2 + 6x + 9$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

(ii) $(2y+5)^2$

$= 4y^2 + 25 + 20y$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

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

$= 4a^2 - 28a + 49$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

(iv) $3a^2 - 2(3a)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^2$

$= 9a^2 - 3a + \frac{1}{4}$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

(v) $(1.1m - 0.4)(1.1m + 0.4)$

$= 1.21m^2 - 0.16$ $\because [(a^2 - b^2) = (a+b)(a-b)]$

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

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

$= b^4 - a^4$ $\because [(a^2 - b^2) = (a+b)(a-b)]$

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

$= (6x)^2 - (7)^2$

$= 36x^2 - 49$ $\because [(a^2 - b^2) = (a+b)(a-b)]$

(viii) $(-a+c)(-a+c)$

$= (-a+c)^2$

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

(ix) $\left(\frac{x}{2} + \frac{3y}{4}\right)\left(\frac{x}{2} + \frac{3y}{4}\right)$

$= \left(\frac{x}{2} + \frac{3y}{4}\right)^2$

$= \left(\frac{x}{2}\right)^2 + 2\left(\frac{x}{2}\right)\left(\frac{3y}{4}\right) + \left(\frac{3y}{4}\right)^2$

$= \frac{x^2}{4} + \frac{3xy}{4} + \frac{9y^2}{16}$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

(x) $(7a - 9b)(7a - 9b)$

$= (7a - 9b)^2$

$= 49a^2 - 126ab + 81b^2$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

#464495

Topic: Standard Identities

Use the identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find following products.

(i) $(x + 3)(x + 7)$

(ii) $(4x + 5)(4x + 1)$

(iii) $(4x - 5)(4x - 1)$

(iv) $(4x + 5)(4x - 1)$

(v) $(2x + 5y)(2x + 3y)$

(vi) $(2a^2 + 9)(2a^2 + 5)$

(vii) $(xyz - 4)(xyz - 2)$

Solution

(i) $(x + 3)(x + 7)$

$= x^3 + (3 + 7)x + (3)(7)$

$= x^2 + 10x + 21$

(ii) $(4x)^2 + (5 + 1)\,4x + (5)(1)$

$= 16x^2 + 24x + 5$

(iii) $(4x - 5)(4x - 1)$

$= (4x)^2 + [(-5) + (-1)]4x + (-5)(-1)$

$= 16x^2 - 24x + 5$

(iv) $(4x)^2 + [(5) + (-1)]4x + (5)(-1)$

$16x^2 + 16x - 5$

(v) $(2x)^2 + (5y + 3y)(2x) + (5y)(3y)$

$= 4x^2 + 16xy + 15y^2$

(vi) $(2a^2)^2 + (9 + 5)(2a^2) + (9)(5)$

$= 4a^2 + 28a^2 + 45$

(vii) $(xyz)^2 + [(-4) + (-2)](xyz) + (-4)(-2)$

$= x^2y^2z^2 - 6xyz + 8$

#464924

Topic: Standard Identities

Find the square of the following numbers

(i) 32

(ii) 35

(iii) 86

(iv)93

(v) 71

(vi) 46

Solution

(i) $32^2 = (30 + 2)(30 + 2)$

$= 900 + 60 + 60 + 4$

$= 1024$

(ii) $35^2 = (30 + 5)(30 + 5)$

$= 900 + 150 + 150 + 25$

$= 1225$

(iii) $86^2 = (80 + 6)(80 + 6)$

$= 6400 + 480 + 480 + 36$

$= 7396$

(iv) $93^2 = (90 + 3)(90 + 3)$

$= 8100 + 270 + 270 + 9$

$= 8649$

(v) $71^2 = (70 + 1)(70 + 1)$

$= 4900 + 140 + 1$

$= 5041$

(vi) $46^2 = (40 + 6)(40 + 6)$

$= 1600 + 480 + 36$

$= 2080 + 36$

$= 2116$.

#466259

Topic: Standard Identities

Find the following squares by using the identities.

(i) $(b - 7)^2$

(ii) $(xy + 3z)^2$

(iii) $(6x^2 - 5y)^2$

(iv) $\left(\frac{2}{3}m + \frac{3}{2}n\right)^2$

(v) $(0.4p - 0.5q)^2$

(vi) $(2xy + 5y)^2$

Solution

i) $(b-7)^2$

$= b^2 + 7^2 - 2(b)(7)$

$= b^2 + 49 - 14b$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

ii) $(xy+3z)^2$

$= (xy)^2 + (3z)^2 + 2(xy)(3z)$

$= x^2y^2 + 9z^2 + 6xyz$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

iii) $(6x-5y)^2$

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

$= 36x^2 + 25y^2 - 60xy$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

iv) $\left(\frac{2}{3}m + \frac{3}{2}n\right)^2$

$= \left(\frac{2}{3}m\right)^2 + \left(\frac{3}{2}n\right)^2 + 2\left(\frac{2}{3}m\right)\left(\frac{3}{2}n\right)$

$= \frac{4}{16}m^2 + \frac{9}{4}n^2 + 2mn$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

v) $(0.4p - 0.5q)^2$

$= (0.4p)^2 + (0.5q)^2 - 2(0.4p)(0.5q)$

$= 0.16p^2 + 0.25q^2 - 4pq$ $\because [(a-b)^2 = a^2 + b^2 - 2ab]$

vi) $(2xy + 5y)^2$

$= (2xy)^2 + (5y)^2 + 2(2xy)(5y)$

$= 4x^2y^2 + 25y^2 + 20xy^2$ $\because [(a+b)^2 = a^2 + b^2 + 2ab]$

$= y^2(4x^2 + 20x + 25)$

#466260

Topic: Standard Identities

Simplify:

(i) $(a^2 - b^2)^2$

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

(iii) $(7m - 8n)^2 + (7m + 8n)^2$

(iv) $(4m + 5n)^2 + (4n + 5m)^2$

(v) $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

(vi) $(ab + bc)^2 - 2ab^2c$

(vii) $(m^2 - n^2m)^2 + 2m^3n^2$

Solution

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

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

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

Let $A = 2x + 5$ and $B = 2x - 5$

$\therefore (2x + 5)^2 - (2x - 5)^2 = A^2 - B^2$

$= (A + B)(A - B)$

$= [2x + 5 + (2x - 5)][2x + 5 - (2x - 5)]$

$= [2x + 5 + 2x - 5][2x + 5 - 2x + 5]$

$= (4x)(10)$

$= 40x$

iii) $(7m - 8n)^2 + (7m + 8n)^2$

$= (7m)^2 + (8n)^2 - 2(7m)(8n) + (7m)^2 + (8n)^2 + 2(7m)(8n)$

$= 49m^2 + 64n^2 - 112mn + 49m^2 + 64n^2 + 112mn$

$= 98m^2 + 128n^2$

iv) $(4m + 5n)^2 + (5m + 4n)^2$

$= (4m)^2 + (5n)^2 + 2(4m)(5n) + (5m)^2 + (4n)^2 + 2(5m)(4n)$

$= 16m^2 + 25n^2 + 40mn + 25m^2 + 16n^2 + 40mn$

$= 41m^2 + 41n^2 + 80mn$

v) $(2.5p - 1.5q)^2 - (1.5p - 2.5q)^2$

$= (2.5p)^2 + (1.5q)^2 - 2(2.5p)(1.5q) - [(1.5p)^2 + (2.5q)^2 - 2(1.5p)(2.5q)]$

$= 6.25p^2 + 2.25q^2 - 7.5pq - 2.25p^2 - 6.25q^2 + 7.5pq$

$= 4p^2 - 4q^2$

$= 4(p^2 - q^2)$

$= 4(p - q)(p + q)$

vi) $(ab + bc)^2 - 2ab^2c$

$= (ab)^2 + (bc)^2 + 2(ab)(bc) - 2ab^2c$

$= a^2b^2 + b^2c^2 + 2ab^2c - 2ab^2c$

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

vii) $(m^2 - n^2m)^2 + 2m^3n^2$

$= (m^2)^2 + (n^2m)^2 - 2(m^2)(n^2m) + 2m^3n^2$

$= m^4 + m^2n^4 - 2m^3n^2 + 2m^3n^2$

$= m^2(m^2 - n^4)$

#466261

Topic: Standard Identities

Show that:

(i) $(3x + 7)^2 - 84x = (3x - 7)^2$

(ii) $(9p - 5q)^2 + 180pq = (9p + 5q)^2$

(iii) $\left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn = \frac{16}{9}m^2 + \frac{9}{16}n^2$

(iv) $(4pq + 3q)^2 - (4pq - 3q)^2 = 48pq^2$

(v) $(a - b)(a + b) + (b - c)(b + c) + (c - a)(c + a) = 0$

Solution

We know that

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

and,

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

Now,

(i)

$(3x + 7)^2 - 84x$

$= (3x)^2 + 7^2 + 2(3x)(7) - 84x = (3x)^2 + 7^2 + 42x - 84x$

$= (3x)^2 + 7^2 - 42x = (3x - 7)^2$

(ii)

$(9p - 5q)^2 + 180pq$

$= (9p)^2 + (5q)^2 - 2(9p)(5q) + 180pq = (9p)^2 + (5q)^2 - 90pq + 180pq$

$= (9p)^2 + (5q)^2 + 90pq = (9p + 5q)^2$

(iii)

$\left(\frac{4}{3}m - \frac{3}{4}n\right)^2 + 2mn$

$= \left(\frac{4}{3}m\right)^2 + \left(\frac{3}{4}n\right)^2 - 2\left(\frac{4}{3}m\right)\left(\frac{3}{4}n\right) + 2mn$

$= \left(\frac{4}{3}m\right)^2 + \left(\frac{3}{4}n\right)^2 - 2mn + 2mn$

$= \frac{16}{9}m^2 + \frac{9}{16}n^2$

(iv)

$(4pq + 3q)^2 - (4pq - 3q)^2$

$= (4pq)^2 + (3q)^2 + 2(4pq)(3q) - \left((4pq)^2 + (3q)^2 - 2(4pq)(3q)\right)$

$= (4pq)^2 + (3q)^2 + 2(4pq)(3q) - (4pq)^2 - (3q)^2 + 2(4pq)(3q)$

$= 24pq^2 + 24pq^2 = 48pq^2$

(v)

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

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

$= 0$

#466262

Topic: Special Products

Using identities, evaluate

(i) 71^2 (ii) 99^2 (iii) 102^2 (iv) 998^2

(v) 5.2^2 (vi) 297×303 (vii) 78×82

(viii) 8.9^2 (ix) 1.05×9.5

Solution

i) $71^2 = (70 + 1)^2$

$= (70)^2 + 1^2 + 2(70)(1)$ $\because [(a + b)^2 = a^2 + b^2 + 2ab]$

$= 4900 + 1 + 140$

$= 5041$

ii) $99^2 = (100 - 1)^2$

$= (100)^2 + 1^2 - 2(100)(1) \quad \because [(a - b)^2 = a^2 + b^2 - 2ab]$

$= 10000 + 1 - 200$

$= 9801$

iii) $102^2 = (100 + 2)^2$

$= (100)^2 + 2^2 + 2(100)(2) \quad \because [(a + b)^2 = a^2 + b^2 + 2ab]$

$= 10000 + 4 + 400$

$= 10404$

iv) $998^2 = (1000 - 2)^2$

$= (1000)^2 + 2^2 - 2(1000)(2) \quad \because [(a - b)^2 = a^2 + b^2 - 2ab]$

$= 1000000 + 4 - 4000$

$= 996004$

v) $5.2^2 = (5 + 0.2)^2$

$= (5)^2 + (0.2)^2 + 2(5)(0.2) \quad \because [(a + b)^2 = a^2 + b^2 + 2ab]$

$= 25 + 0.04 + 2$

$= 27.04$

vi) $297 \times 303 = (300 - 3)(300 + 3)$

$= (300)^2 - (3)^2 \quad \because [(a^2 - b^2) = (a + b)(a - b)]$

$= 90000 - 9$

$= 89991$

vii) $78 \times 82 = (80 - 2)(80 + 2)$

$= (80)^2 - (2)^2 \quad \because [(a^2 - b^2) = (a + b)(a - b)]$

$= 6400 - 4$

$= 6396$

viii) $(8.9)^2 = (9 - 0.1)^2$

$= (9)^2 + (0.1)^2 - 2(9)(0.1) \quad \because [(a - b)^2 = a^2 + b^2 - 2ab]$

$= 81 + 0.01 - 1.8$

$= 79.21$

vii) $1.05 \times 9.5 = \frac{105}{100} \times \frac{95}{10}$

$= \frac{1}{1000} \times (105 \times 95)$

$= \frac{1}{1000} \times (100 + 5)(100 - 5)$

$= \frac{1}{1000} \times [(100)^2 - (5)^2]$

$= \frac{1}{1000} \times (10000 - 25)$

$= \frac{9975}{1000} = 9.975$

#466263

Topic: Standard Identities

Using $a^2 - b^2 = (a + b)(a - b)$, find

(i) $51^2 - 49^2$

(ii) $1.02^2 - 0.98^2$

(iii) $153^2 - 147^2$

(iv) $12.1^2 - 7.9^2$

Solution

i) $51^2 - 49^2$

$= (51 - 49)(51 + 49)$

$= 2 \times 100$

$= 200$

ii) $(1.02)^2 - (0.98)^2$

$= (1.02 - 0.98)(1.02 + 0.98)$

$= 0.04 \times 2$

$= 0.08$

iii) $153^2 - 147^2$

$= (153 - 147)(153 + 147)$

$= 6 \times 300$

$= 1800$

iv) $12.1^2 - 7.9^2$

$= (12.1 - 7.9)(12.1 + 7.9)$

$= 4.2 \times 20$

$= 8.4$

We know that

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

(i) $51^2 - 49^2 = (51 - 49)(51 + 49) = 2 \times 100 = 200$

(ii) $1.02^2 - 0.98^2 = (1.02 - 0.98)(1.02 + 0.98) = 0.04 \times 2.00 = 0.08$

(iii) $153^2 - 147^2 = (153 - 147)(153 + 147) = 6 \times 300 = 1800$

(iv) $12.1^2 - 7.9^2 = (12.1 - 7.9)(12.1 + 7.9) = 4.2 \times 20 = 84$

#466264

Topic: Special Products

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

(i) 103×104

(ii) 5.1×5.2

(iii) 103×98

(iv) 9.7×9.8

Solution

i) $103 \times 104 = (100 + 3)(100 + 4)$

$= (100)^2 + (3 + 4)100 + (3)(4)$

$= 10000 + 700 + 12$

$= 10712$

ii) $5.1 \times 5.2 = (5 + 0.1)(5 + 0.2)$

$= (5)^2 + (0.1 + 0.2)5 + (0.1)(0.2)$

$= 25 + 1.5 + 0.02$

$= 26.52$

iii) $103 \times 98 = (100 + 3)(100 - 2)$

$= (100)^2 + (3 - 2)100 + (3)(-2)$

$= 10000 + 100 - 6$

$= 10094$

iv) $9.7 \times 9.8 = (9 + 0.7)(9 + 0.8)$

$= (9)^2 + (0.7 + 0.8)9 + (0.7)(0.8)$

$= 81 + 13.5 + 0.56$

$= 95.06$