TEXT BOOK EXERCISE 8.5

Q. 1. Use suitable identity to get each of the following products :

(*i*) $(x + y)(x + y)$

(*ii*) $(y + 2x)(y + 2x)$

(*iii*) $(a + 7b)(a + 7b)$

(*iv*) $(2a - b)(2a - b)$

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

(*vi*) $\left(x - \frac{1}{2}y\right)\left(x - \frac{1}{2}y\right)$

(*vii*) $(2x + 3y)(2x + 3y)$

(*viii*) 101×99

(*ix*) $\left(x + \frac{y}{10}\right)\left(x - \frac{y}{10}\right)$

(*x*) $61^2 - 39^2$

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

(*xii*) 54×46

(*xiii*) $(q + p)(p - q)$

Solution.

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

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

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

(*ii*) $(y+2x)(y+2x) = (y+2x)^2$

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

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

$= y^2 + 4xy + 4x^2$ **Ans.**

(*iii*) $(a+7b)(a+7b) = (a+7b)^2$

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

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

$= a^2 + 14ab + 49b^2$ **Ans.**

(*iv*) $(2a-b)(2a-b) = (2a-b)^2$

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

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

$= 4a^2 - 4ab + b^2$ **Ans.**

(*v*) $(2x-3y)(2x-3y) = (2x-3y)^2$

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

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

$= 4x^2 - 12xy + 9y^2$ **Ans.**

(*vi*) $\left(x - \frac{1}{2}y\right)\left(x - \frac{1}{2}y\right) = \left(x - \frac{1}{2}y\right)^2$

$= (x)^2 - 2 \times x \times \frac{1}{2}y + \left(\frac{1}{2}y\right)^2$

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

$= x^2 - xy + \frac{1}{4}y^2$ **Ans.**

(*vii*) $(2x+3y)(2x+3y) = (2x+3y)^2$

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

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

$= 4x^2 + 12xy + 9y^2$ **Ans.**

(*viii*) $101 \times 99 = (100 + 1)(100 - 1)$

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

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

$= 10000 - 1 = 9999$ **Ans.**

(*ix*) $\left(x + \frac{y}{10}\right)\left(x - \frac{y}{10}\right) = (x)^2 - \left(\frac{y}{10}\right)^2$

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

$= x^2 - \frac{y^2}{100}$ **Ans.**

(*x*) $61^2 - 39^2 = (61 + 39)(61 - 39)$

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

$= 100\ (22) = 2200$ **Ans.**

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

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

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

$= \frac{x^2}{4} + \frac{3}{4}xy + \frac{9}{16}y^2$ **Ans.**

(*xii*) $54 \times 46 = (50 + 4)(50 - 4)$

$= (50)^2 - (4)^2$

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

$= 2500 - 16 = 2484$ **Ans.**

(*xiii*) $(q+p)(p-q) = (p+q)(p-q)$

$= p^2 - q^2$ **Ans.**

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

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

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

(*iii*) $(x - 7)(x + 3)$

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

(*v*) $(7p + 6)(7p - 3)$

(*vi*) $(5y^2 - 1)(5y^2 + 2)$

Solution.

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

$= (x)^2 + (2+3)x + (2) \times (3)]$

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

$= x^2 + 5x + 6$ **Ans.**

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

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

$= x^2 - 3x - 10$ **Ans.**

(iii) $(x-7)(x+3)$

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

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

$= x^2 - 4x - 21$ **Ans.**

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

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

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

$= 16x^2 + 24x + 5$ **Ans.**

(v) $(7p+6)(7p-3)$

$= (7p)^2 + (6-3)\,7p + (6)(-3)$

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

$= 49p^2 + 21p - 18$ **Ans.**

(vi) $(5y^2-1)(5y^2+2)$

$= (5y^2)^2 + (-1+2)\,y^2 + (-1)(2)$

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

$= 25y^4 - 5y^2 - 2$ **Ans.**

Q. 3. Solve the following squares by using the identities :

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

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

(iii) $(-a + c)(-a + c) = (-a + c)^2$

(iv) $(1.2p - 1.5q)^2$

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

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

Solution.

(i) $(xy+3z)^2 = (xy)^2 + 2 \times xy \times 3z + (3z)^2$

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

$= x^2y^2 + 6xyz + 9z^2$ **Ans.**

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

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

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

$= \frac{4}{9}x^2 - 2xy + \frac{9}{4}y^2$ **Ans.**

(iii) $(-a+c)(-a+c) = (-a+c)^2$

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

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

$= a^2 - 2ac + c^2$ **Ans.**

(iv) $(1.2p - 1.5q)^2$

$= (1.2p)^2 - 2(1.2p) \times (1.5q) + (1.5q)^2$

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

$= 1.44p^2 - 3.6pq + 2.25q^2$ **Ans.**

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

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

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

$= x^4 + 6x^2y^2 + 9y^4$ **Ans.**

(vi) $(x - y^2z)^2 = x^2 - 2 \times x \times y^2z + (y^2z)^2$

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

$= x^2 - 2xy^2z + y^4z^2$ **Ans.**

Q. 4. Simplify :

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

(ii) $(2m + 5n)^2 + (2n + 5m)^2$

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

(iv) $(9p - 5q)^2 - (9p + 5q)^2$

Solution.

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

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

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

$= x^4 + x^4y^2 + 12x^2y + 9y^2 + 9$ **Ans.**

(ii) $(2m + 5n)^2 + (2n + 5m)^2$

$= (2m)^2 + 2 \times 2m \times 5n + (5n)^2 + (2n)^2 + 2 \times 2n \times 5m + (5m)^2$

$= 4m^2 + 20mn + 25n^2 + 4n^2 + 20mn + 25m^2$

$= 29m^2 + 29n^2 + 40mn$ **Ans.**

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

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

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

$=a^2b^2+b^2c^2$ **Ans.**

(iv) $(9p-5q)^2-(9p+5q)^2$

$=(9p)^2-2\times 9p\times 5q+(5q)^2-[(9p)^2$

$+2(9p\times 5q)+(5q)^2]$

$=81p^2-90pq+25q^2-81p^2$

$-90pq-25q^2$

$=81p^2-90pq+25q^2$

$-81p^2-90pq-25q^2$

$=-180pq$ **Ans.**

Q. 5. Prove that :

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

(ii) $(2x+3y)(2x-3y)+(3y-5z)(3y+5z)$ $+(5z-2x)(5z+2x)=0$

(iii) $(2x+5)^2-40x=(2x-5)^2$

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

Solution.

(i) L.H.S. $=(a+b)^2-(a-b)^2$

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

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

$=4ab$ = R.H.S.

L.H.S. = R.H.S.

(ii) L.H.S. $=(2x+3y)(2x-3y)+(3y-5z)$ $(3y+5z)+(5z-2x)(5z+2x)$

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

$=4x^2-9y^2+9y^2-25z^2+25z^2-4x^2$

$=0$ = R.H.S.

L.H.S. = R.H.S.

(iii) L.H.S. $=(2x+5)^2-40x$

$=(2x)^2+2\times 2x\times 5+(5)^2-40x$

$=4x^2+20x+25-40x$

$=4x^2-20x+25$

$=(2x-5)^2$ = R.H.S.

L.H.S. = R.H.S.

(iv) L.H.S. $=(x-y)^2+(x+y)^2$

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

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

= R.H.S.

L.H.S. = R.H.S.

Q. 6. Using identities, evaluate :

(i) 99^2 **(ii)** 103^2

(iii) 5.1^2 **(iv)** 9.8^2

(v) 71×69 **(vi)** 1.02×0.98

Solution.

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

$=(100)^2-2\times 100+1$

$=10000-200+1=9801$ **Ans.**

(ii) $(103)^2=(100+3)^2$

$=(100)^2+2\times 100\times 3+(3)^2$

$=10000+600+9=10609$ **Ans.**

(iii) $(5.1)^2=(5+0.1)^2$

$=(5)^2+2\times 5\times 0.1+(0.1)^2$

$=25+2\times 5\times\frac{1}{10}+0.01$

$=25+1+0.01=26.01$ **Ans**

(iv) $(9.8)^2=(10-0.2)^2$

$=(10)^2-2\times 10\times 0.2+(0.2)^2$

$=100-2\times 10\times\frac{2}{10}+0.04$

$=100-4+0.04=96.04$ **Ans.**

(v) $71\times 69=(70+1)(70-1)$

$=(70)^2-(1)^2=4900-1$

$=4899$ **Ans.**

(vi) $1.02\times 0.98=(1+0.02)(1-0.02)$

$=(1)^2-(0.02)^2=1-0.0004$

$=0.9996$ **Ans.**

Q. 7. Using $a^2-b^2=(a+b)(a-b)$ evaluate :

(i) 153^2-147^2 **(ii)** 64^2-36^2

(iii) $(1.05)^2-(.95)^2$ **(iv)** $12.1^2-7.9^2$

Solution.

(i) $153^2-147^2=(153+147)(153-147)$

$=(300)(6)=1800$ **Ans.**

(ii) $64^2-36^2=(64+36)(64-36)$

$=(100)(28)=2800$ **Ans.**

(iii) $(1.05)^2-(.95)^2=(1.05+.95)(1.05-.95)$

$=(2)(0.1)=0.20$ **Ans.**

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

$=(20)(4.2)=20\times\frac{42}{10}$

$=84$ **Ans.**

Q. 8. Using $(x + a)(x + b) = x^2 + (a + b)x + ab$, find :

(i) 105×102 **(ii) 5.1×5.2**

(iii) 46×49 **(iv) 103×94**

(v) 9.3×9.2 **(vi) 10.3×9.8**

Solution.

(i) $105 \times 102 = (100 + 5)(100 + 2)$
$= 100^2 + (5 + 2)\,100 + 5 \times 2$
$= 10000 + 700 + 10$
$= 10710$ **Ans.**

(ii) $5.1 \times 5.2 = (5 + 0.1)(5 + 0.2)$
$= (5)^2 + (0.1 + 0.2)(5) + 0.1 \times 0.2$
$= 25 + 1.5 + 0.02$
$= 26.52$ **Ans.**

(iii) $46 \times 49 = (-50 - 4)(50 - 1)$
$= (50)^2 + (-4 - 1)\,50 + (-4)(-1)$
$= 2500 - 250 + 4$
$= 2254$ **Ans.**

(iv) $103 \times 94 = (100 + 3)(100 - 6)$
$= (100)^2 + (3 - 6)\,100 + (3)(-6)$
$= 10000 + (-3)\,100 - 18$
$= 10000 - 300 - 16$
$= 9692$ **Ans.**

(v) $9.3 \times 9.2 = (9 + 0.3)(9 + 0.2)$
$= (9)^2 + (0.3 + 0.2)\,9 + 0.3 \times 0.2$
$= 81 + (0.5) \times 9 + 0.06$
$= 81 + 4.5 + 0.06$
$= 85.56$ **Ans.**

(vi) $10.3 \times 9.8 = (10 + 0.3)(10 - 0.2)$
$= (10)^2 + (0.3 - 0.2) \times 10 - 0.3 \times 0.2$
$= 100 + 1 - 0.6 = 100 + 0.94$
$= 100.94$ **Ans.**

Q. 9. Multiple Choice Questions :

(i) Complete the identity $(a + b)^2 =$
(a) $a^2 - b^2$
(b) $a^2 + b^2 + 2ab$
(c) $a^2 + b^2 - 2ab$
(d) $a^2 + b^2$.

(ii) Complete the identity : $a^2 - 2ab + b^2 =$ .....
(a) $(a - b)^2$ (b) $a - b^2$
(c) $a - b$ (d) $a^2 - b^2$.

(iii) Complete the identity : $(a + b)(a - b)$:
(a) $a^2 + b^2$ (b) $a^2 - b$
(c) $a^2 - b^2$ (d) $a - b$.

(iv) Complete the identity : $(x + a)(x + b) = x^2 +$ ..... $x +$ .....
(a) a^2b, $a + b$ (b) $(a + b)$, ab
(c) $a^2 + b^2$, a^2b^2 (d) $a - b$, ab.

(v) To solve $(y + 5)(y - 5)$ identify the suitable identity :
(a) $(a + b)^2 = a^2 + 2ab + b^2$
(b) $(a - b)^2 = (a^2 - 2ab + b^2)$
(c) $(a + b)(a - b) = a^2 - b^2$
(d) $a^2 + b^2 = ab$.

(vi) Solve : $\left(\frac{3}{2}p + \frac{2}{3}q\right)\left(\frac{3}{2}p - \frac{2}{3}q\right)$
(a) $\frac{3}{2}p^2 - \frac{2}{3}q^2$ (b) $\frac{9}{4}p^2 - \frac{4}{9}q^2$
(c) $\frac{3}{2}p^2 - \frac{2}{3}q$ (d) $\frac{9}{4}p^2 + \frac{4}{9}q^2$

(vii) To multiply $(2x - 3)(2x + 5)$, identify the identity that should be used :
(a) $(a + b)(a - b) = a^2 - b^2$
(b) $(a + b)^2 = a^2 + 2ab + b^2$
(c) $(x + a)(x + b) = x^2 + (a + b)x + ab$
(d) $(a - b)^2 = a^2 - 2ab + b^2$.

(viii) If $(2p + 3q)$ and $(2p - 3q)$ are sides of rectangle than its area is :
(a) $2p^2 + 3q^2$ (b) $4p^2 + 3q^2$
(c) $4p^2 - 9q^2$ (d) $6p^2q^2$.

Ans. (i) (b) $a^2 + b^2 + 2ab$
(ii) (a) $(a - b)^2$
(iii) (c) $a^2 - b^2$
(iv) (b) $(a + b)$, ab
(v) (c) $(a + b)(a - b) = a^2 - b^2$
(vi) (b) $\frac{9}{4}p^2 - \frac{4}{9}q^2$
(vii) (c) $(x + a)(x + b) = x^2 + (a + b)x + ab$
(viii) (c) $4p^2 - 9q^2$.

Objective Type Questions

1. Multiple Choice Questions :

(*i*) $0.645 \times 0.645 + 2 \times 0.645 \times 0.355 + 0.355 \times 0.355 =$ .....

(*a*) 1 (*b*) 0

(*c*) – 1 (*d*) 2.

Ans. (*a*) 1.

(*ii*) $(a+b)^2 + (a-b)^2 =$ .....

(*a*) $2a + 2b$

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

(*c*) $-4ab$

(*d*) $2a^2 - 2b^2$.

Ans. (*b*) $2a^2 + 2b^2$.

(*iii*) Find the value of $51^2 - 49^2$

(*a*) 200 (*b*) 100

(*c*) 400 (*d*) 300.

Ans. (*a*) 200.

(*iv*) Identify $(a^2 - b^2)$ = ...

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

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

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

(*d*) $(a+b)^2$

Ans. (*c*) $(a+b)(a-b)$.

(*v*) What will be the area of rectangle with length 3 *mn* and breadth 4 *np* ?

(*a*) 14 *mnp* (*b*) 12 *mnp*

(*c*) 12 mn^2p (*d*) 12 m^2np.

Ans. (*c*) 12 mn^2p.

(*vi*) Find the value of the expression $(x - 3) + 2$ for $x = 1$.

(*a*) 1 (*b*) – 1

(*c*) 0 (*d*) 2.

Ans. (*c*) 0.

(*vii*) Find the sum of $ab - bc$, $bc - ca$ and $ca - ab$.

(*a*) $2abc$

(*b*) 3

(*c*) $2ab + 2bc + 2ca$

(*d*) 0

Ans. (*d*) 0.

(*viii*) $(a + b)^2 = a^2 +$ ..... $+ b^2$

(*a*) ab (*b*) 0

(*c*) $2ab$ (*d*) $-2ab$.

Ans. (*c*) $2ab$.

2. Choose True/False for the following questions :

(*i*) Expressions are formed from variables and constants. (True/False)

Ans. True.

(*ii*) Terms are added to form expressions. (True/False)

Ans. True.

(*iii*) With the change of value of variable in the expression, the value of expression does not change. (True/False)

Ans. False.

(*iv*) $7x$ and $7y$ are like terms. (True/False)

Ans. False.

(*v*) The sum of $ab - bc$, $bc - ca$, $ca - ab$ is zero. (True/False)

Ans. True.

3. Fill in the blanks :

(*i*) Terms are formed as a product of ..... .

Ans. factors.

(*ii*) Expression that contain only one term is called a ..... .

Ans. monomial.

(*iii*) The terms $7x$ and $14x$ are ..... terms.

Ans. like.

(*iv*) A monomial multiplied by monomial always give a ..... .

Ans. monomial.

(*v*) $(a - b)^2$ = ...

Ans. $a^2 - 2ab + b^2$.