Question 3.Find the following squares by using the identities.

(i) $(b - 7)^2$ (ii) $(xy + 3z)^2$ (iii) $(6x^2 - 5y)^2$

(iv) $(23\ m + 32\ n)^2$ (v) $(0.4p - 0.5q)^2$ (vi) $(2xy + 5y)^2$

Solution:

$$(i)\ (b - 7)^2 = (b)^2 - 2(b)\,(7) + (7)^2$$
$$= b^2 - 14b + 49$$
$$[\text{using } (a - b)^2 = a^2 - 2ab + b^2]$$

$$(ii)\ (xy + 3z)^2$$
$$= (xy)^2 + 2(xy)(3z) + (3z)^2$$
$$[\text{using } (a + b)^2 = a^2 + 2ab + b^2]$$
$$= x^2y^2 + 6xyz + 9y^2$$

$$(iii)\ (6x^2 - 5y)^2$$
$$= (6x^2)^2 - 2(6x^2)\,(5y) + (5y)^2$$
$$[\text{using } (a - b)^2 = a^2 - 2ab + b^2]$$
$$= 36x^4 - 60x^2y + 25y^2$$

Question 4.Simplify:

(i) $(a^2 - b^2)^2$ (ii) $(2x + 5)^2 - (2x - 5)^2$ (iii) $(7m - 8n)^2 + (7m + 8n)$

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

$$(i)\ (a^2 - b^2)^2$$
$$= (a^2)^2 - 2a^2b^2 + (b^2)^2$$
$$= a^4 - 2a^2b^2 + b^4$$
$$[\text{using } (a - b)^2 = a^2 - 2ab + b^2]$$

Question 5.Show that:

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

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

(iii) $(43\ m - 34\ n)^2 + 2mn = 169\ m^2 + 916\ n^2$

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

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

Solution:

(*i*) To Show that:

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

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

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

$= 9x^2 + 42x + 49 - 84x$

$= 9x^2 - 42x + 49$

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

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

LHS = RHS

Hence, proved.

(*ii*) To show that:

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

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

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

$= 81p^2 - 90pq + 25q^2 + 180pq$

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

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

$= (9p + 5q)^2$ = RHS

LHS = RHS

Hence, proved.

Question 6. 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:

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

$= (9)^2 - 2(9)(0.1) + (0.1)^2$

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

$= 81 - 1.8 + 0.01$

$= 81.01 - 1.8$

$= 79.21$

Hence, $8.9^2 = 79.21$

(*ix*) $1.05 \times 9.5 = (1 + 0.5)(10 - 0.5)$

$= 1(10 - 0.5) + 0.05(10 - 0.5)$

$= 10 - 0.5 + 0.05 \times 10 - 0.05 \times 0.5$

$= 10 - 0.5 + 0.5 - 0.025$

$= 10.5 - 0.525$

$= 9.975$

Hence, $1.05 \times 9.5 = 9.975$