NCERT solutions for class-8 maths algebraic expressions and identities Ex-9.5

Q1. 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) $\left(3a-\dfrac{1}{2}\right)\left(3a-\dfrac{1}{2}\right)$

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

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

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

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

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

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

Ans: (i) $(x+3)(x+3)=(x+3)^2$

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

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

$=x^2+6x+9$

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

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

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

$=4y^2+20y+25$

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

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

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

$=4a^2-28a+49$

(iv) $\left(3a-\dfrac{1}{2}\right)\left(3a-\dfrac{1}{2}\right)=\left(3a-\dfrac{1}{2}\right)^2$

$=(3a)^2-2\times 3a\times \dfrac{1}{2}+\left(\dfrac{1}{2}\right)^2$

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

$$= 9a^2 - 3a + \frac{1}{4}$$

(v) $(1.1m - 0.4)(1.1m + 0.4) = (1.1m)^2 - (0.4)^2$

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

$= 1.21m^2 - 0.16$

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

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

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

$= b^4 - a^4$

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

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

$= 36x^2 - 49$

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

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

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

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

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

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

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

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

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

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

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

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

$$= 49a^2 - 126ab + 81b^2$$

Q2. Use the identity
$(x+a)(x+b) = x^2 + (a+b)x + ab$ to find the 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) $(xyz-4)(xyz-2)$

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

$=(x)^2+(3+7)x+3\times7$

[Using identity $(x+a)(x+b)=x^2+(a+b)x+ab$]

$=x^2+10x+21$

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

$=(4x)^2+(5+1)4x+5\times1$

[Using identity $(x+a)(x+b)=x^2+(a+b)x+ab$]

$=16x^2+6\times4x+5=16x^2+24x+5$

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

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

[Using identity $(x+a)(x+b)=x^2+(a+b)x+ab$]

$= 16x^2 + (-6) \times 4x + 5 = 16x^2 - 24x + 5$

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

$= (4x)^2 + \{5 \times (-1)\} \times 4x + 5 \times (-1)$

[Using identity $(x+a)(x+b) = x^2 + (a+b)x + ab$]

$= 16x^2 + (5-1) \times 4x - 5$

$= 16x^2 + 4 \times 4x - 5$

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

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

$= (2x)^2 + (5y+3y) \times 2x + 5y \times 3y$

[Using identity $(x+a)(x+b) = x^2 + (a+b)x + ab$]

$= 4x^2 + 8y \times 2x + 15y^2$

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

(vi) $\left(2a^2+9\right)\left(2a^2+5\right)$

$=\left(2a^2\right)^2+(9+5)\times 2a^2+9\times 5$

[Using identity $(x+a)(x+b)=x^2+(a+b)x+ab$]

$=4a^4+14\times 2a^2+45$

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

(vii) $\left(xyz-4\right)\left(xyz-2\right)$

$=\left(xyz\right)^2+(-4-2)\times xyz+(-4)\times(-2)$

[Using identity $(x+a)(x+b)=x^2+(a+b)x+ab$]

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

Q3. Find the following squares by using identities:

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

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

(iii) $\left(6x^2-5y\right)^2$

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

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

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

Ans: (i) $(b-7)^2 = (b)^2 - 2 \times b \times 7 + (7)^2$

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

$= b^2 - 14b + 49$

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

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

$= x^2y^2 + 6xyz + 9z^2$

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

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

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

$= 36x^4 - 60x^2y + 25y^2$

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

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

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

$= \dfrac{4}{9}m^2 + 2mn + \dfrac{9}{4}n^2$

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

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

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

$= 0.16p^2 - 0.40pq + 0.25q^2$

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

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

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

$= 4x^2y^2 + 20xy^2 + 25y^2$

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