

General instructions for students: whatever be the notes provided, everything must be copied in the Maths copy and then do the HOME WORK in the same copy.

MATHS

3. EXPANSIONS

STD. IX

More Applications of Special Products:

EXERCISE – 3.2

3. If $2a + 3b = 7$ and $ab = 2$, find $4a^2 + 9b^2$.

Given: $2a + 3b = 7$

$$\Rightarrow (2a + 3b)^2 = 7^2 \quad \text{Squaring both sides}$$

$$\Rightarrow (2a)^2 + (3b)^2 + 2(2a)(3b) = 49$$

$$\Rightarrow 4a^2 + 9b^2 + 12ab = 49$$

$$\Rightarrow 4a^2 + 9b^2 + 12(2) = 49 \quad ab = 2 \text{ (Given)}$$

$$\Rightarrow 4a^2 + 9b^2 + 24 = 49$$

$$\Rightarrow 4a^2 + 9b^2 = 49 - 24$$

$$\Rightarrow 4a^2 + 9b^2 = 25 \quad \text{Ans.}$$

8. If $p - q = 9$ and $pq = 36$, Evaluate i) $p + q$ ii) $p^2 - q^2$

Given: $p - q = 9$

$$\Rightarrow (p - q)^2 = 9^2 \quad \text{Squaring both sides}$$

$$\Rightarrow p^2 + q^2 - 2pq = 81$$

$$\Rightarrow p^2 + q^2 - 2(36) = 81 \quad pq = 36 \text{ (Given)}$$

$$\Rightarrow p^2 + q^2 - 72 = 81$$

$$\Rightarrow p^2 + q^2 = 81 + 72$$

$$\Rightarrow p^2 + q^2 = 153 \dots\dots\dots (i)$$

Now $(p + q)^2 = p^2 + q^2 + 2pq$

$$= 153 + 2(36) = 153 + 72 \quad \text{Using (i)}$$

$$= 225$$

$$p + q = \pm\sqrt{225} = \pm 15 \quad \text{Ans.}$$

Now $p^2 - q^2 = (p - q)(p + q)$

$$= (9)(\pm 15) = \pm 135 \quad \text{Ans.}$$

12. If $x^2 + y^2 = 34$ and $xy = 10\frac{1}{2}$, find $2(x + y)^2 + (x - y)^2$.

Given: $(x + y)^2 = x^2 + y^2 + 2xy$

$$= 34 + 2\left(\frac{21}{2}\right) \quad \text{Given: } x^2 + y^2 = 34 \text{ And } xy = 10\frac{1}{2} = \frac{21}{2}$$

$$= 34 + 21$$

$$= 55 \quad \dots\dots\dots (I)$$

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

$$= 34 - 2\left(\frac{21}{2}\right) \quad \text{Given: } x^2 + y^2 = 34 \text{ And } xy = 10\frac{1}{2} = \frac{21}{2}$$

$$= 34 - 21$$

$$= 13 \quad \dots\dots\dots (II)$$

Now $2(x + y)^2 + (x - y)^2 = 2(55) + 13 \quad \text{Using (I) and (II)}$

$$= 110 + 13$$

$$= 123 \quad \text{Ans.}$$

17. If $x - \frac{1}{x} = \sqrt{5}$, find the value of: (i) $x^2 + \frac{1}{x^2}$ (ii) $x + \frac{1}{x}$ (iii) $x^3 + \frac{1}{x^3}$

Given: $x - \frac{1}{x} = \sqrt{5}$

$$\Rightarrow \left(x - \frac{1}{x}\right)^2 = (\sqrt{5})^2$$

$$\Rightarrow x^2 + \frac{1}{x^2} - 2 = 5$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 5 + 2$$

$$\Rightarrow x^2 + \frac{1}{x^2} = 7 \quad \text{Ans.}$$

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

$$= 7 + 2 = 9$$

$$\Rightarrow x + \frac{1}{x} = \pm\sqrt{9}$$

$$\Rightarrow x + \frac{1}{x} = \pm 3 \quad \text{Ans.}$$

Squaring both sides

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

$$= (\pm 3)(7 - 1)$$

$$= (\pm 3)(6)$$

$$= \pm 18 \quad \text{Ans.}$$

HOME WORK

EXERCISE – 3.2

QUESTION NUMBERS: 4, 7, 11, 15 and 19

*****X*****X*****X*****