

Mathematics

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(Chapter – 1) (Number Systems)(Exemplar Problems)

(Class – IX)

Exercise 1.4

Question 5:

If $x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$ and $y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$, then find the value of $x^2 + y^2$.

Answer 5:

$$\text{Given that: } x = \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$$

$$= \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}}$$

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

$$= (\sqrt{3} + \sqrt{2})^2$$

$$= 3 + 2 + 2\sqrt{6}$$

$$= 5 + 2\sqrt{6}$$

$$\text{and } y = \frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$$

$$= \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} + \sqrt{2}} \times \frac{\sqrt{3} - \sqrt{2}}{\sqrt{3} - \sqrt{2}}$$

$$= \frac{(\sqrt{3} - \sqrt{2})^2}{3 - 2}$$

$$= (\sqrt{3} - \sqrt{2})^2$$

$$= 3 + 2 - 2\sqrt{6}$$

$$= 5 - 2\sqrt{6}$$



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$$\text{Now } x^2 + y^2 = (5 + 2\sqrt{6})^2 + (5 - 2\sqrt{6})^2$$

$$= 25 + 24 + 20\sqrt{6} + 25 + 24 - 20\sqrt{6} = 98$$

