

Mathematics

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

(Class – IX)

Exercise 1.3

Question 10:

Rationalise the denominator of the following:

(i) $\frac{2}{3\sqrt{3}}$

(ii) $\frac{\sqrt{40}}{\sqrt{3}}$

(iii) $\frac{3+\sqrt{2}}{4\sqrt{2}}$

(iv) $\frac{16}{\sqrt{41}-5}$

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

(vi) $\frac{\sqrt{6}}{\sqrt{2}+\sqrt{3}}$

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

(viii) $\frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

(ix) $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$

Answer 10:

(i) $\frac{2}{3\sqrt{3}}$

$$= \frac{2}{3\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{9}$$



(ii) $\frac{\sqrt{40}}{\sqrt{3}}$

$$= \frac{\sqrt{40}}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{120}}{3} = \frac{\sqrt{2 \times 2 \times 30}}{3} = \frac{2\sqrt{30}}{3}$$

(iii) $\frac{3+\sqrt{2}}{4\sqrt{2}}$

$$= \frac{3+\sqrt{2}}{4\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}+2}{8}$$

(iv) $\frac{16}{\sqrt{41}-5}$



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$$= \frac{16}{\sqrt{41} - 5} \times \frac{\sqrt{41} + 5}{\sqrt{41} + 5} = \frac{16(\sqrt{41} + 5)}{41 - 25} = \frac{16(\sqrt{41} + 5)}{16} = (\sqrt{41} + 5)$$

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

$$= \frac{2 + \sqrt{3}}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} = \frac{(2 + \sqrt{3})^2}{4 - 3} = (2 + \sqrt{3})^2 = 4 + 3 + 4\sqrt{3} = 7 + 4\sqrt{3}$$

(vi) $\frac{\sqrt{6}}{\sqrt{2}+\sqrt{3}}$

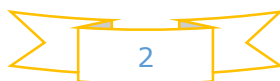
$$= \frac{\sqrt{6}}{\sqrt{2} + \sqrt{3}} \times \frac{\sqrt{2} - \sqrt{3}}{\sqrt{2} - \sqrt{3}} = \frac{\sqrt{12} - \sqrt{18}}{2 - 3}$$
$$= \frac{\sqrt{2 \times 2 \times 3} - \sqrt{2 \times 3 \times 3}}{-1} = \frac{2\sqrt{3} - 3\sqrt{2}}{-1} = 3\sqrt{2} - 2\sqrt{3}$$

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

$$= \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} \times \frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} + \sqrt{2}} = \frac{(\sqrt{3} + \sqrt{2})^2}{3 - 2}$$
$$= (\sqrt{3} + \sqrt{2})^2 = 3 + 2 + 2\sqrt{6} = 5 + 2\sqrt{6}$$

(viii) $\frac{3\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

$$= \frac{3\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} \times \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} + \sqrt{3}} = \frac{15 + 3\sqrt{15} + \sqrt{15} + 3}{5 - 3} = \frac{18 + 4\sqrt{15}}{2} = 9 + 2\sqrt{15}$$



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(ix) $\frac{4\sqrt{3}+5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$

$$= \frac{4\sqrt{3} + 5\sqrt{2}}{4\sqrt{3} + 3\sqrt{2}} \times \frac{4\sqrt{3}-3\sqrt{2}}{4\sqrt{3}-3\sqrt{2}} = \frac{16 \times 3 - 12\sqrt{6} + 20\sqrt{6} - 15 \times 2}{16 \times 3 - 9 \times 2}$$

$$= \frac{48 + 8\sqrt{6} - 30}{48 - 18} = \frac{18 + 8\sqrt{6}}{30} = \frac{9 + 4\sqrt{6}}{15}$$

