

# Mathematics

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

(Class – IX)

## Exercise 1.3

### Question 9:

Simplify the following:

(i)  $\sqrt{45} - 3\sqrt{20} + 4\sqrt{5}$

(ii)  $\frac{\sqrt{24}}{8} + \frac{\sqrt{54}}{9}$

(iii)  $4\sqrt{12} \times 7\sqrt{6}$

(iv)  $4\sqrt{28} \div 3\sqrt{7}$

(v)  $3\sqrt{3} + 2\sqrt{27} + \frac{7}{\sqrt{3}}$

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

(vii)  $\sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225}$

(viii)  $\frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}}$

(ix)  $\frac{2\sqrt{3}}{3} - \frac{\sqrt{3}}{6}$

### Answer 9:

(i)  $\sqrt{45} - 3\sqrt{20} + 4\sqrt{5}$

$= \sqrt{3 \times 3 \times 5} - 3\sqrt{2 \times 2 \times 5} + 4\sqrt{5}$

$= 3\sqrt{5} - 6\sqrt{5} + 4\sqrt{5}$

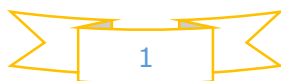
$= \sqrt{5}$

(ii)  $\frac{\sqrt{24}}{8} + \frac{\sqrt{54}}{9}$

$= \frac{\sqrt{2 \times 2 \times 2 \times 3}}{8} + \frac{\sqrt{2 \times 3 \times 3 \times 3}}{9}$

$= \frac{2\sqrt{6}}{8} + \frac{3\sqrt{6}}{9}$

$= \frac{\sqrt{6}}{4} + \frac{\sqrt{6}}{3} = \frac{3\sqrt{6} + 4\sqrt{6}}{12} = \frac{7\sqrt{6}}{12}$



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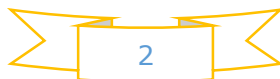
(Class – IX)

$$\begin{aligned} \text{(iii)} \quad & 4\sqrt{12} \times 7\sqrt{6} \\ &= 4\sqrt{2 \times 2 \times 3} \times 7\sqrt{2 \times 3} \\ &= 8\sqrt{3} \times 7\sqrt{2 \times 3} \\ &= 56\sqrt{3 \times 2 \times 3} \\ &= 168\sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{(iv)} \quad & 4\sqrt{28} \div 3\sqrt{7} \\ &= \frac{4\sqrt{28}}{3\sqrt{7}} = \frac{4\sqrt{2 \times 2 \times 7}}{3\sqrt{7}} = \frac{8\sqrt{7}}{3\sqrt{7}} = \frac{8}{3} \end{aligned}$$

$$\begin{aligned} \text{(v)} \quad & 3\sqrt{3} + 2\sqrt{27} + \frac{7}{\sqrt{3}} \\ &= 3\sqrt{3} + 2\sqrt{3 \times 3 \times 3} + \frac{7}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} \\ &= 3\sqrt{3} + 6\sqrt{3} + \frac{7\sqrt{3}}{3} \\ &= \left(3 + 6 + \frac{7}{3}\right)\sqrt{3} \\ &= \frac{34}{3}\sqrt{3} \end{aligned}$$

$$\begin{aligned} \text{(vi)} \quad & (\sqrt{3} - \sqrt{2})^2 \\ &= (\sqrt{3})^2 + (\sqrt{2})^2 - 2(\sqrt{3})(\sqrt{2}) \\ &= 3 + 2 - 2\sqrt{6} \\ &= 5 - 2\sqrt{6} \end{aligned}$$



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$$\begin{aligned} \text{(vii)} \quad & \sqrt[4]{81} - 8\sqrt[3]{216} + 15\sqrt[5]{32} + \sqrt{225} \\ &= \sqrt[4]{3 \times 3 \times 3 \times 3} - 8\sqrt[3]{6 \times 6 \times 6} + 15\sqrt[5]{2 \times 2 \times 2 \times 2 \times 2} + \sqrt{15 \times 15} \\ &= 3 - 8 \times 6 + 15 \times 2 + 15 \\ &= 3 - 48 + 30 + 15 = 48 - 48 = 0 \end{aligned}$$

$$\begin{aligned} \text{(viii)} \quad & \frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}} \\ &= \frac{3}{\sqrt{2 \times 2 \times 2}} + \frac{1}{\sqrt{2}} \\ &= \frac{3}{2\sqrt{2}} + \frac{1}{\sqrt{2}} \\ &= \frac{3 + 2}{2\sqrt{2}} = \frac{5}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{5\sqrt{2}}{4} \end{aligned}$$

$$\begin{aligned} \text{(ix)} \quad & \frac{2\sqrt{3}}{3} - \frac{\sqrt{3}}{6} \\ &= \frac{4\sqrt{3} - \sqrt{3}}{6} \\ &= \frac{3\sqrt{3}}{6} = \frac{\sqrt{3}}{2} \end{aligned}$$

