

IX H.W-3

Sent on : 23rd April

1) Classify the following numbers as rational or irrational with justification:-

(i) $\sqrt{196}$

(ii) $3\sqrt{18}$

(iii) $\frac{\sqrt{28}}{\sqrt{343}}$

(iv) $-\sqrt{0.4}$

(v) 0.5918

(vi) $(1+\sqrt{5}) - (4+\sqrt{5})$

(vii) 10.124124...

(viii) 1.010010001...

2) Find three rational numbers between

(i) -1 and -2

(ii) 0.1 and 0.11

(iii) $\frac{5}{7}$ and $\frac{6}{7}$

3) Express in $\frac{p}{q}$ form

(i) 0.2555...

(ii) 0.2

(iii) 0.404040...

4) Simplify (i) $(\sqrt{3}-\sqrt{2})^2$ (ii) $\frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}}$

5) Rationalise the denominators

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

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

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

6) Find the values of a and b

(i) $\frac{5+2\sqrt{3}}{7+4\sqrt{3}} = a-6\sqrt{3}$

(ii) $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + \frac{7\sqrt{5}}{11} b$

7) Rationalise the denominators and hence evaluate
 $\sqrt{2} = 1.414, \sqrt{3} = 1.732, \sqrt{5} = 2.236$

(i) $\frac{4}{\sqrt{3}}$

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

(iii) $\frac{\sqrt{10}-\sqrt{5}}{2}$

IX H.W-3 Answers

- 1) (i) $\sqrt{196} = 14$, a rational number
 (ii) $3\sqrt{18} = 3 \times 3\sqrt{2} = 9\sqrt{2}$, an irrational number
 (iii) $\frac{\sqrt{28}}{\sqrt{343}} = \frac{2\sqrt{7}}{7\sqrt{7}} = \frac{2}{7}$, a rational number
 (iv) $-\sqrt{0.4}$ is an irrational number since 0.4 is not a perfect square
 (v) 0.5918 is a rational number since the decimal expansion is terminating.
 (vi) $1 + \sqrt{5} - 4 - \sqrt{5} = -3$, a rational number
 (vii) $10.124124\ldots = 10.\overline{124}$ is a rational number since the decimal expansion is non-terminating recurring.
 (viii) $1.010010001\ldots$ is an irrational number since the decimal expansion is non-terminating non-recurring.

2) (i)
$$\begin{array}{r} -\frac{1 \times 4}{1 \times 4} \\ -\frac{4}{4} \end{array} \quad \begin{array}{r} -\frac{2 \times 4}{1 \times 4} \\ -\frac{8}{4} \end{array}$$

$\therefore$ Three rational no.s are $-\frac{5}{4}, -\frac{6}{4}, -\frac{7}{4}$
 $= -\frac{5}{4}, -\frac{3}{2}, -\frac{7}{4}$

(ii)
$$\begin{array}{r} 0.1 \\ \frac{1 \times 10}{10 \times 10} \\ \frac{10 \times 4}{100 \times 4} \\ \frac{40}{400} \end{array} \quad \begin{array}{r} 0.11 \\ \frac{11}{100} \\ \frac{11 \times 4}{100 \times 4} \\ \frac{44}{400} \end{array}$$

$\therefore$ Three rational no.s are $\frac{41}{400}, \frac{42}{400}, \frac{43}{400}$
 $= \frac{41}{400}, \frac{21}{200}, \frac{43}{400}$

$$(iii) \frac{5 \times 4}{7 \times 4}$$

$$\frac{20}{28}$$

$$\frac{6 \times 4}{7 \times 4}$$

$$\frac{24}{28}$$

$\therefore$ Three rational no.s are $\frac{21}{28}, \frac{22}{28}, \frac{23}{28}$

$$= \frac{3}{4}, \frac{11}{14}, \frac{23}{28}$$

$$3) (i) \text{ Let } x = 0.2555\ldots$$

$$10x = 2.555\ldots$$

$$100x = 25.555\ldots$$

$$\underline{90x = 23}$$

$$x = \frac{23}{90}$$

$$(ii) 0.2 = \frac{2}{10} = \frac{1}{5}$$

$$(iii) \text{ Let } x = 0.404040\ldots$$

$$100x = 40.404040\ldots$$

$$\underline{99x = 40}$$

$$x = \frac{40}{99}$$

$$4) (i) (\sqrt{3}-\sqrt{2})^2 = 3+2-2\sqrt{6} = 5-2\sqrt{6} //$$

$$(ii) \frac{3}{\sqrt{8}} + \frac{1}{\sqrt{2}} = \frac{3 \times \sqrt{2}}{2\sqrt{2} \times \sqrt{2}} + \frac{1 \times \sqrt{2} \times 2}{\sqrt{2} \times \sqrt{2} \times 2} = \frac{3\sqrt{2} + \sqrt{2} \times 2}{4} = \frac{5\sqrt{2}}{4}$$

$$5) (i) \frac{(2+\sqrt{3})^2}{4-3} = \frac{4+3+4\sqrt{3}}{1} = 7+4\sqrt{3} //$$

$$(ii) \frac{(3+\sqrt{2}) \times \sqrt{2}}{4\sqrt{2} \times \sqrt{2}} = \frac{3\sqrt{2}+2}{8} //$$

$$(iii) \frac{(3\sqrt{5}+\sqrt{3})(\sqrt{5}+\sqrt{3})}{5-3} = \frac{15+3\sqrt{15}+\sqrt{15}+3}{2} = \frac{18+4\sqrt{15}}{2}$$

$$= \underline{\underline{9+2\sqrt{15}}}$$

$$6) \quad (i) \frac{(5+2\sqrt{3})(7-4\sqrt{3})}{(7)^2 - (4\sqrt{3})^2} = \frac{35 - 20\sqrt{3} + 14\sqrt{3} - 24}{49 - 48} = 11 - 6\sqrt{3}$$

$$\therefore \boxed{a = 11}$$

$$(ii) \frac{(7+\sqrt{5})^2}{49-5} - \frac{(7-\sqrt{5})^2}{49-5} = \frac{(49+5+14\sqrt{5}) - (49+5-14\sqrt{5})}{44}$$

$$= \frac{\cancel{54} + 14\sqrt{5} - \cancel{54} + 14\sqrt{5}}{44}$$

$$= \frac{28\sqrt{5}}{44} = \frac{7\sqrt{5}}{11}$$

$$= 0 + \frac{7\sqrt{5}}{11} \times 1$$

$$\therefore \boxed{\begin{matrix} a = 0 \\ b = 1 \end{matrix}}$$

$$7) \quad (i) \frac{4\sqrt{3}}{3} = \frac{4 \times 1.732}{3} = \frac{6.928}{3} = 2.309 //$$

$$(ii) \frac{\sqrt{3} - \sqrt{2}}{3 - 2} = \sqrt{3} - \sqrt{2} = 1.732 - 1.414 = 0.318 //$$

$$(iii) \frac{\sqrt{10} - \sqrt{5}}{2} = \frac{\sqrt{5}(\sqrt{2} - 1)}{2} = \frac{2.236(1.414 - 1)}{2}$$

$$= \frac{2.236 \times \overset{0.207}{\cancel{0.414}}}{2}$$

$$= \frac{\cancel{2.1}}{2} = \underline{\underline{0.462852}}$$