IX | Homework-1

1) Express $0.6 + 0.\overline{7} + 0.4\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$

2) Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$

(i) 0.2 (ii) $0.888\ldots$ (iii) $5.\overline{2}$ (iv) $0.2555\ldots$

(v) $0.1\overline{34}$ (vi) $0.00323232\ldots$ (viii) $0.404040\ldots$

3) Insert a rational number and an irrational number between the following:-

(i) 2 and 3

(ii) 0 and 0.1

(iii) $\frac{1}{3}$ and $\frac{1}{2}$

(iv) $-\frac{2}{5}$ and $\frac{1}{2}$

(v) 0.15 and 0.16

(vi) $\sqrt{2}$ and $\sqrt{3}$

(vii) 2.357 and 3.121

(viii) 0.0001 and 0.001

(ix) 3.375289 and 6.375738

4) Find three rational no.s between

(i) -1 and -2

(ii) 0.1 and 0.11

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

(iv) $\frac{1}{4}$ and $\frac{1}{5}$

5) Find which of the variables x, y, z and u represent rational numbers and which irrational numbers

(i) $x^2 = 5$

(ii) $y^2 = 9$

(iii) $z^2 = 0.04$

(iv) $u^2 = \frac{17}{4}$

6) Let x and y be rational and irrational numbers respectively. Is $(x+y)$ necessarily an irrational number? Justify

7) Let x be rational and y be irrational. Is xy necessarily irrational? Justify

8) State whether true or false? Justify

(i) There are infinitely many integers between any two integers

(ii) No. of rational numbers between 15 and 18 is finite

IX Homework - 1 Answers

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1) $0.6 = \frac{6}{10}$

$0.\bar{7}$

Let $x = 0.7777\ldots \rightarrow (1)$

$10x = 7.7777\ldots \rightarrow (2)$

(2) − (1), $9x = 7$

$x = \frac{7}{9}$

$0.4\bar{7}$

Let $y = 0.47777\ldots$

$10y = 4.77777\ldots \rightarrow (3)$

$100y = 47.77777\ldots \rightarrow (4)$

(4) − (3), $90y = 43$

$y = \frac{43}{90}$

$\therefore 0.6 + 0.\bar{7} + 0.4\bar{7}$

$= \frac{6^{\times 9}}{10_{\times 9}} + \frac{7^{\times 10}}{9_{\times 10}} + \frac{43}{90}$

$= \frac{54 + 70 + 43}{90}$

$= \frac{167}{90}$, which is in the form $\frac{p}{q}$ where $q \neq 0$

2) (i) $0.2 = \frac{\cancel{2}^{1}}{\cancel{10}_{5}} = \frac{1}{5}$, which is in the form $\frac{p}{q}$; $q \neq 0$

(ii) Let $x = 0.8888\ldots \rightarrow (1)$

$10x = 8.8888\ldots \rightarrow (2)$

(2) − (1), $9x = 8$

$x = \frac{8}{9}$, which is in the form $\frac{p}{q}$; $q \neq 0$

(iii) Let $x = 5.2222\ldots \rightarrow (1)$

$10x = 52.2222\ldots \rightarrow (2)$

(2) − (1), $9x = 47$

$x = \frac{47}{9}$, which is in the form $\frac{p}{q}$; $q \neq 0$

(iv) Let $x = 0.2555\ldots \rightarrow (1)$

$10x = 2.5555\ldots \rightarrow (2)$

$100x = 25.5555\ldots \rightarrow (3)$

(3) − (2), $90x = 23$

$x = \frac{23}{90}$, which is in the form $\frac{p}{q}$; $q \neq 0$

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(v) Let $x = 0.1343434\ldots$

$10x = 1.343434\ldots \rightarrow (1)$

$1000x = 134.343434\ldots \rightarrow (2)$

(2) − (1), $990x = 133$

$x = \frac{133}{990}$, which is in the form $\frac{p}{q}; q \neq 0$

(vi) Let $x = 0.00323232\ldots$

$100x = 0.323232\ldots \rightarrow (1)$

$10000x = 32.323232\ldots \rightarrow (2)$

(2) − (1), $9900x = 32$

$x = \frac{\cancel{32}\ 8}{\cancel{9900}\ 2475} = \frac{8}{2475}$, which is in the form $\frac{p}{q}; q \neq 0$

(vii) Let $x = 0.404040\ldots \rightarrow (1)$

$100x = 40.404040\ldots \rightarrow (2)$

(2) − (1), $99x = 40$

$x = \frac{40}{99}$, which is in the form $\frac{p}{q}; q \neq 0$

3) (i) 2 and 3

rational number → 2.5

irrational number → 2.505005000 5...

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(ii) 0 and 0.1

$\frac{0\times10}{10\times10}$ $\frac{1\times10}{10\times10}$

$\frac{0}{100}$ $\frac{10}{100}$

rational number → $\frac{5}{100} = 0.05$

Irrational number → 0.0505505550...

(iii) $\frac{1}{3}$ and $\frac{1}{2}$

$\frac{1\times2}{3\times2}$ $\frac{1\times3}{2\times3}$

$\frac{2\times10}{6\times10}$ $\frac{3\times10}{6\times10}$

$\frac{20}{60}$ $\frac{30}{60}$

rational number → $\frac{23}{60}$ or 0.4

$\frac{1}{3} = 0.333...$

$\frac{1}{2} = 0.5$

Irrational number → 0.4040040004...

(iv) $-\frac{2}{5}$ and $\frac{1}{2}$

$-\frac{2}{5} = -0.4$

$\frac{1}{2} = 0.5$

rational number → 0

irrational number → 0.2020020002...

(v) 0.15 and 0.16

rational number → 0.155

Irrational number → 0.151511511115...

(vi) $\sqrt{2}$ and $\sqrt{3}$

$\sqrt{2} = 1.414...$

$\sqrt{3} = 1.732...$

rational number → 1.5

Irrational number → 1.525225222 5...

(vii) 2.357 and 3.121

rational number → 2.9

Irrational number → 3.1010010001...

(viii) 0.0001 and 0.001

0.0001

0.0010

rational number → 0.0009

Irrational number → 0.000505005000 5...

(ix) 3.375289

6.375738

rational number → 5

Irrational number → 5.0100100001...

4) (i) −1 and −2

$-\frac{1 \times 4}{1 \times 4}$ $\quad$ $-\frac{2 \times 4}{1 \times 4}$

$-\frac{4}{4}$ $\quad$ $-\frac{8}{4}$

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

$= -\frac{5}{4}, -\frac{3}{2}, -\frac{7}{4}$

(ii) 0.1 and 0.11

$\frac{1 \times 10}{10 \times 10}$ $\quad$ $\frac{11}{100}$

$\frac{10 \times 4}{100 \times 4}$ $\quad$ $\frac{11 \times 4}{100 \times 4}$

$\frac{40}{400}$ $\quad$ $\frac{44}{400}$

∴ Three rational nos are $\frac{41}{400}, \frac{\cancel{42}\,21}{\cancel{400}\,200}, \frac{43}{400}$

$= \frac{41}{400}, \frac{21}{200}, \frac{43}{400}$

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

$\frac{5\times4}{7\times4}$ $\frac{6\times4}{7\times4}$

$\frac{20}{28}$ $\frac{24}{28}$

$\therefore$ The three rational no.s are $\cancel{\frac{21}{28}}^{\frac{3}{4}}, \cancel{\frac{22}{28}}^{\frac{11}{14}}, \frac{23}{28}$

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

(iv) $\frac{1}{4}$ and $\frac{1}{5}$

$\frac{1\times5}{4\times5}$ $\frac{1\times4}{5\times4}$

$\frac{5\times4}{20\times4}$ $\frac{4\times4}{20\times4}$

$\frac{20}{80}$ $\frac{16}{80}$

$\therefore$ The three rational no.s are $\frac{17}{80}, \cancel{\frac{18}{80}}^{\frac{9}{40}}, \frac{19}{80}$

$= \frac{17}{80}, \frac{9}{40}, \frac{19}{80}$

5) (i) $x^2 = 5$

$\Rightarrow x = \sqrt{5}$, irrational number

(ii) $y^2 = 9$

$\Rightarrow y = \sqrt{9} = 3$, a rational number

(iii) $z^2 = 0.04$

$\Rightarrow z = \sqrt{0.04} = 0.2$, a rational number

(iv) $u^2 = \frac{17}{4}$

$u = \sqrt{\frac{17}{4}} = \frac{\sqrt{17}}{2}$, an irrational number

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6) Yes, Sum of a rational and an irrational number is always irrational
eg:- $2 + (5+\sqrt{7}) = 7+\sqrt{7}$, an irrational number
7) No, xy can be either rational or irrational.
$2 \times \sqrt{5} = 2\sqrt{5}$, an irrational number
$0 \times \sqrt{5} = 0$, a rational number
8) (i) False, between 1 and 5, there are only 3 integers.
(ii) False, there are infinitely many rational numbers between any two given rational numbers.