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(1)

① write 3 numbers whose decimal expansions are non-terminating non-recurring.

Solution- (i) 0.3113111311113.....

(ii) 0.256 2566 25666 .....

(iii) 0.0232332333223333...

(iv) 0.15697819784326 1.....

(ii)

② Find 3 different irrational numbers between $\frac{5}{7}$ and $\frac{9}{11}$.

(iii)

Solution:- $\frac{5}{7} = 7\overline{)5}(0.714285$

-0

50

-49

10

-7

30

-28

20

-14

60

-56

40

-35

5

$\therefore \frac{5}{7} = 0.\overline{714285}$

$\frac{9}{11} = 11\overline{)9}\begin{array}{l}0.81\\ \\ -0\\ \\ 90\\ -88\\ \\ 20\\ -11\\ \\ 9\end{array}$

$\therefore \frac{9}{11} = 0.\overline{81}$

(iv)

As, the irrational numbers have non-terminating and non-repeating decimals,

∴ The required numbers between $\frac{5}{7} = 0.\overline{714285}$ and $\frac{9}{11} = 0.\overline{81}$ are

(i) 0.73007007000700007 .....

(ii) 0.80131131113111 .....

(iii) 0.76544544544444 .....

Q3 to classify the following numbers as rational or irrational.

(i) $\sqrt{23} = 4.795831523.....$ so it has non-terminating non repeating decimal expansion, Hence $\sqrt{23}$ is irrational no.

(ii) $\sqrt{225} = \sqrt{15 \times 15} = 15$

$\therefore$ 15 is a rational number.

$\therefore \sqrt{225}$ is also rational no.

$$\begin{array}{r} 15 \\ \times 15 \\ \hline 75 \\ 15\times \\ \hline 225 \end{array}$$

(iv) $(4+\sqrt{3})(4-\sqrt{3})$

$= (4)^2 - (\sqrt{3})^2$ [using Identity $(a-b)\times(a+b) = a^2-b^2$]

$= 16 - 3$

$= 13$

As 13 is rational no. so $(4+\sqrt{3})(4-\sqrt{3})$ is also rational no.

(iv) $(\sqrt{3}-\sqrt{2})^2 = (\sqrt{3})^2 - 2(\sqrt{3})(\sqrt{2}) + (\sqrt{2})^2$ [using $(a-b)^2 = a^2-2ab+b^2$]

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

$= 5 - 2\sqrt{6}$

As Sum or difference of a rational number and an irrational no. is irrational. $5-2\sqrt{6}$ is irrational

(v) $6\pi = 6 \times 3.1415 \cdots$

$= 18.857 \cdots$

$\therefore 6\pi$ is irrational no.

(vi) $\frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{2}$ is an irrational no, as dividing an irrational no. by an rational no. is always irrational

Q2 Simplify :-

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

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

$= (2\times3) + (2\times\sqrt{3}) + (3\times\sqrt{2}) + (\sqrt{2})\times(\sqrt{3})$

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

(ii) $(6-\sqrt{3})(2-\sqrt{5})$

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

$= (6\times2) - (6\times\sqrt{5}) - (2\times\sqrt{3}) + (\sqrt{5}\times\sqrt{3})$

$= 12 - 6\sqrt{5} - 2\sqrt{3} + \sqrt{15}$

(iii) $(8+5\sqrt{3})^2$ [using $(a+b)^2 = a^2+2ab+b^2$]

$= (8)^2 + 2(8)(5\sqrt{3}) + (5\sqrt{3})^2$

$= 64 + (2\times8\times5\times\sqrt{3}) + (5\sqrt{3}\times5\sqrt{3})$

$= 64 + 80\sqrt{3} + (25\times\sqrt{3}\times\sqrt{3})$

$= 64 + 80\sqrt{3} + (25\times3)$

$= 64 + 80\sqrt{3} + 75$

$= 139 + 80\sqrt{3}$