Question 3:

(i) $\dfrac{1}{4}$ and $\dfrac{1}{3}$

Let $x = \dfrac{1}{4}$ and $y = \dfrac{1}{3}$

Then, $x < y$ because $\dfrac{1}{4} < \dfrac{1}{3}$

∴ Rational number lying between x and y

$$\begin{aligned}
&= \dfrac{1}{2}(x + y) \\
&= \dfrac{1}{2}\left(\dfrac{1}{4} + \dfrac{1}{3}\right) \\
&= \dfrac{1}{2}\left(\dfrac{3 + 4}{12}\right) \\
&= \dfrac{1}{2} \times \dfrac{7}{12} = \dfrac{7}{24}
\end{aligned}$$

Hence, $\dfrac{7}{24}$ is a rational number lying between $\dfrac{1}{4}$ and $\dfrac{1}{3}$.

(ii) $\dfrac{3}{8}$ and $\dfrac{2}{5}$

Let $x = \dfrac{3}{8}$ and $y = \dfrac{2}{5}$

Then, $x < y$ because $\dfrac{3}{8} < \dfrac{2}{5}$

∴ Rational number lying between x and y

$$\begin{aligned}
&= \dfrac{1}{2}(x + y) \\
&= \dfrac{1}{2}\left(\dfrac{3}{8} + \dfrac{2}{5}\right) \\
&= \dfrac{1}{2}\left(\dfrac{15 + 16}{40}\right) \\
&= \dfrac{1}{2} \times \dfrac{31}{40} = \dfrac{31}{80}
\end{aligned}$$

Hence, $\dfrac{31}{80}$ is a rational number lying between $\dfrac{3}{8}$ and $\dfrac{2}{5}$.

(iii) 1.3 and 1.4

Let x = 1.3 and y = 1.4

Then, x < y, because 1.3 < 1.4

∴ Rational number lying between x and y

$$= \frac{1}{2}(1.3 + 1.4)$$
$$= \frac{1}{2} \times 2.7 = \frac{2.7}{2} = 1.35$$

Hence, 1.35 is a rational number lying between 1.3 and 1.4.

(iv) 0.75 and 1.2

Let x = 0.75 and y = 1.2

Then, x < y because 0.75 < 1.2

∴ Rational number lying between x and y

$$= \frac{1}{2}(0.75 + 1.2)$$
$$= \frac{1}{2} \times 1.95 = \frac{1.95}{2} = 0.975$$

Hence, 0.975 is a rational number lying between 0.75 and 1.2

(v) -1 and $\frac{1}{2}$

Let x = -1 and y = $\frac{1}{2}$

Then, x < y, because -1 < $\frac{1}{2}$

∴ Rational number lying between x and y

$$= \frac{1}{2}\left(-1 + \frac{1}{2}\right)$$
$$= \frac{1}{2}\left(\frac{-2 + 1}{2}\right)$$
$$= \frac{1}{2} \times \frac{-1}{2} = \frac{-1}{4}$$

Hence, $\frac{-1}{4}$ is a rational number lying between -1 and $\frac{1}{2}$.

(vi) $-\frac{3}{4}$ and $-\frac{2}{5}$

Let x = $-\frac{3}{4}$ and y = $-\frac{2}{5}$

Then, x < y, because $-\frac{3}{4} < -\frac{2}{5}$

∴ Rational number lying between x and y

$$= \frac{1}{2}\left[\left(\frac{-3}{4}\right) + \left(\frac{-2}{5}\right)\right]$$
$$= \frac{1}{2}\left(\frac{-15 - 8}{20}\right)$$
$$= \frac{1}{2} \times \frac{-23}{20} = -\frac{23}{40}$$

Hence, $-\frac{23}{40}$ is rational number lying between $-\frac{3}{4}$ and $-\frac{2}{5}$.

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