

## Unit 1: Real And Complex Numbers

### Exercise 1.1

1. Identify the following numbers as rational and irrational numbers and also write each one in separate column.

(i) $\frac{1}{5}$	(ii) $\frac{\sqrt{2}}{8}$	(iii) $\frac{5}{\sqrt{6}}$	(iv) $\frac{2}{8}$	(v) $\frac{1}{\sqrt{3}}$	(vi) $\sqrt{8}$
(vii) $e$	(viii) $\pi$	(ix) $\sqrt{5}$	(x) $\frac{22}{3}$	(xi) $\frac{1}{\pi}$	(xii) $\frac{11}{12}$

(i)  $\frac{1}{5}$

**Solution:**

$$\Rightarrow \frac{1}{5} = 0.2$$

(Numerator and denominator are integers)

**Ans:** Rational Number

(ii)  $\frac{\sqrt{2}}{8}$

**Solution:**

$$\Rightarrow \frac{\sqrt{2}}{8} = \frac{1.414213}{8} = 0.17677 \dots$$

(Numerator is not integer)

**Ans:** Irrational Number

(iii)  $\frac{5}{\sqrt{6}}$

**Solution:**

$$\Rightarrow \frac{5}{\sqrt{6}} = \frac{5}{2.4494} = 2.0412$$

(Denominator is not integer)

**Ans:** Irrational Number

(iv)  $\frac{2}{8}$

$$\Rightarrow \frac{2}{8} = \frac{1}{4} = 0.25$$

(Numerator and denominator are integers)

**Ans:** Rational Number

(v)  $\frac{1}{\sqrt{3}}$

**Solution:**

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{1}{1.73205} = 0.577350 \dots$$

(Denominator is not integer)

**Ans:** Irrational Number

(vi)  $\sqrt{8}$

**Solution:**

$$\Rightarrow \sqrt{8} = 2.82842 \dots$$

(Non-terminating non-recurring decimal fractions)

**Ans:** Irrational Number

(vii)  $e$

**Solution:**

$$e = 2.718281 \dots$$

( $e$  is number which cannot be written as ratio of two integers and no repeating values in decimal form.)

**Ans:** Irrational Number

(viii)  $\pi$

**Solution:**

$$\Rightarrow \pi = \frac{22}{7} = 3.1428 \dots$$

( $\pi$  is number which cannot be written as ratio of two integers and no repeating values in decimal form.)

**Ans:** Irrational Number

(ix)  $\sqrt{5}$

**Solution:**

$$\Rightarrow \sqrt{5} = 2.23606 \dots$$

(Non-terminating non-recurring decimal fractions)

**Ans:** Irrational Number

(x)  $\frac{22}{3}$

**Solution:**

$$\Rightarrow \frac{22}{3} = 7.3333 \dots$$

(Numerator and denominator are integers and non-terminating recurring decimal fractions)

**Ans:** Rational Number

(xi)  $\frac{1}{\pi}$

**Solution:**

$$\Rightarrow \frac{1}{\pi} = \frac{1}{3.14} = 0.3184 \dots$$

(Denominator is integer)

**Ans:** Irrational Number

(xii)  $\frac{11}{12}$

**Solution:**

$$\Rightarrow \frac{11}{12} = 0.91666 \dots$$

(Numerator and denominator are integers and non-terminating recurring decimal fractions)

**Ans:** Rational Number.

**2. Convert the following into decimal fraction. Also indicate them as terminating and Non-terminating decimal fractions.**

(i)  $\frac{5}{8}$  (ii)  $\frac{4}{18}$  (iii)  $\frac{1}{15}$  (iv)  $\frac{49}{8}$  (v)  $\frac{207}{15}$  (vi)  $\frac{50}{76}$

(i)  $\frac{5}{8}$

$= 0.625$

**Ans: Terminating Decimal Fraction**

$$\begin{array}{r} 0.625 \\ 8 \overline{) 50} \\ \underline{-48} \phantom{00} \\ 20 \\ \underline{-16} \phantom{00} \\ 40 \\ \underline{-40} \phantom{00} \\ 0 \end{array}$$

(ii)  $\frac{4}{18}$

$= \frac{\cancel{4}}{\cancel{18}} = \frac{2}{9} = 0.222..$

**Ans: Non-Terminating Recurring Decimal Fraction**

$$\begin{array}{r} 0.222 \\ 9 \overline{) 20} \\ \underline{-18} \phantom{00} \\ 20 \\ \underline{-18} \phantom{00} \\ 20 \\ \underline{-18} \phantom{00} \\ 2 \end{array}$$

2 - Remainder

(iii)  $\frac{1}{15}$

$= 0.0666 ... = 0.0667$

**Ans: Non-Terminating Recurring Decimal Fraction**

$$\begin{array}{r} 0.0666 \\ 15 \overline{) 100} \\ \underline{-90} \phantom{00} \\ 100 \\ \underline{-90} \phantom{00} \\ 100 \\ \underline{-90} \phantom{00} \\ 10 \end{array}$$

10 - Rem

$$(iv) \frac{49}{8}$$

$$= 6.125$$

Ans: Terminating Decimal Fraction

$$\begin{array}{r} 6.125 \\ 8 \overline{) 49} \\ \underline{-48} \phantom{00} \\ 10 \phantom{00} \\ \underline{-8} \phantom{00} \\ 20 \phantom{00} \\ \underline{-16} \phantom{00} \\ 40 \phantom{00} \\ \underline{-40} \phantom{00} \\ \text{xx} \end{array}$$

$$(v) \frac{207}{15}$$

$$= \frac{207}{15} = \frac{69}{5} = 13.8$$

Ans: Terminating Decimal Fraction

$$\begin{array}{r} 13.8 \\ 5 \overline{) 69} \\ \underline{-5} \phantom{00} \\ 19 \phantom{00} \\ \underline{-15} \phantom{00} \\ 40 \phantom{00} \\ \underline{-40} \phantom{00} \\ \text{xx} \end{array}$$

$$(vi) \frac{50}{76}$$

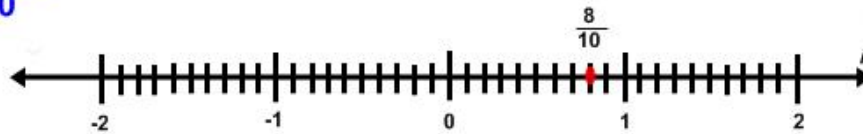
$$= \frac{50}{76} = \frac{25}{38} = 0.657$$

Ans: Non-Terminating non-Recurring Decimal Fraction

$$\begin{array}{r} 0.657 \\ 38 \overline{) 250} \\ \underline{-228} \phantom{00} \\ 220 \phantom{00} \\ \underline{-190} \phantom{00} \\ 300 \phantom{00} \\ \underline{-266} \phantom{00} \\ 34 - \text{Rem} \end{array}$$

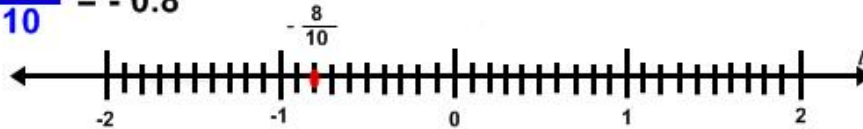
3. Represent the following rational numbers on number line.

(i)  $\frac{8}{10} = 0.8$



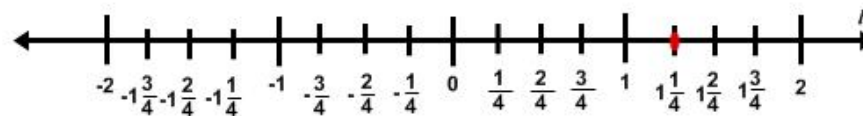
(Hint: Divide each unit in 10 small equal parts because denominator is 10)

(ii)  $-\frac{8}{10} = -0.8$



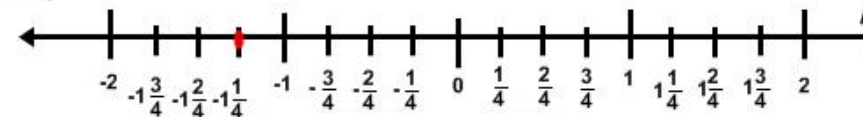
(Hint: Divide each unit in 10 small equal parts because denominator is 10)

(iii)  $1\frac{1}{4} = 1.25$



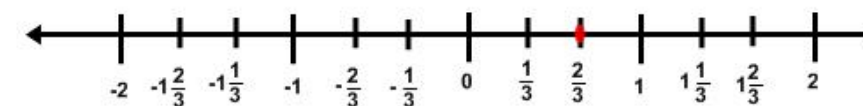
(Hint: Divide each unit in 4 small equal parts because denominator is 4)

(iv)  $-1\frac{1}{4} = -1.25$



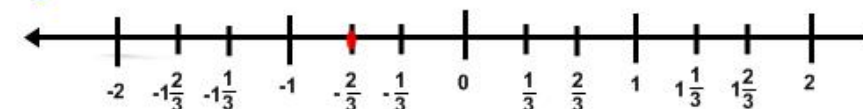
(Hint: Divide each unit in 4 small equal parts because denominator is 4)

(v)  $\frac{2}{3} = 0.666$



(Hint: Divide each unit in 3 small equal parts because denominator is 3)

(vi)  $-\frac{2}{3} = -0.666$



(Hint: Divide each unit in 3 small equal parts because denominator is 3)

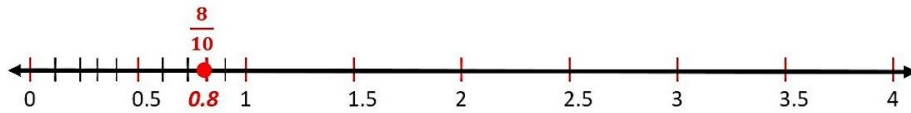
OR

(i)  $\frac{8}{10}$

**Solution:**

$$\Rightarrow \frac{8}{10} = 0.8$$

(Hint: Change fraction into decimal, Divide (0-1) unit into ten equal parts. Marked 0.8 position.)

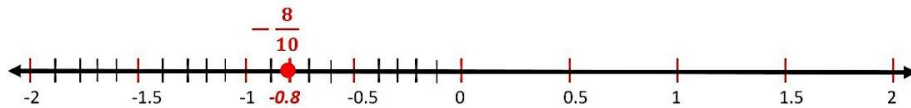


(ii)  $-\frac{8}{10}$

**Solution:**

$$\Rightarrow -\frac{8}{10} = -0.8$$

(Hint: Change fraction into decimal, Divide (0 till -1) unit into ten equal parts. Marked -0.8 position.)

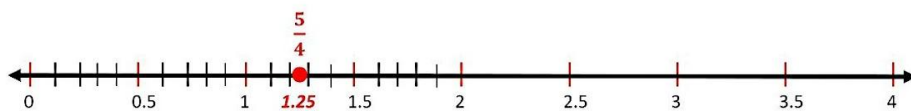


(iii)  $1\frac{1}{4}$

**Solution:**

$$\Rightarrow 1\frac{1}{4} = \frac{4+1}{4} = \frac{5}{4} = 1.25$$

(Hint: Change fraction into decimal, Divide (1 - 2) unit into ten equal parts. Marked 1.25 position.)



$$(iv) -1\frac{1}{4}$$

**Solution:**

$$\Rightarrow -1\frac{1}{4} = -\frac{4+1}{4} = -\frac{5}{4} = -1.25$$

(Hint: Change fraction into decimal, Divide (-1 till -2) unit into ten equal parts. Marked -1.25 position.)

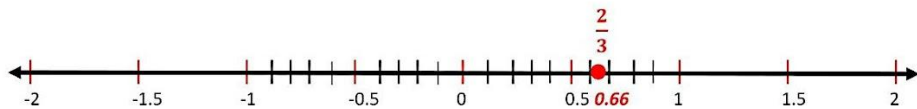


$$(v) \frac{2}{3}$$

**Solution:**

$$\Rightarrow \frac{2}{3} = 0.666$$

(Hint: Change fraction into decimal, Divide (0 - 1) unit into ten equal parts. Marked 0.666 position.)

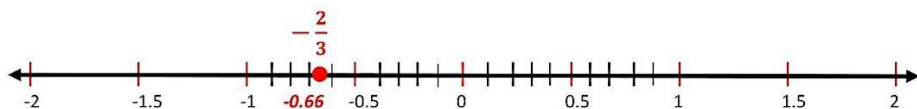


$$(vi) -\frac{2}{3}$$

**Solution:**

$$\Rightarrow -\frac{2}{3} = -0.666$$

(Hint: Change fraction into decimal, Divide (0 till 1) unit into ten equal parts. Marked 0.666 position.)



#### 4. Can you make a list of all rational number between 1 and 2?

Ans: It is Infinite rational number because the the rational number between two whole numbers are always infinite.

**And**

**Ans.** The possible list of the Number are  $\frac{5}{4}, \frac{3}{2}, \frac{7}{4}, \frac{9}{8}, \dots$



- (i)  $\frac{5}{4} = 1.25$
- (ii)  $\frac{3}{2} = 1.5$
- (iii)  $\frac{7}{4} = 1.75$
- (iv)  $\frac{9}{8} = 1.125$

### 5. Give reason, why pi ( $\pi$ ) is an irrational number?

Ans:  $\pi = \frac{22}{7} = 3.14285....$

Pi ( $\pi$ ) is an irrational number because it has non-terminal and non recurring decimal fraction.

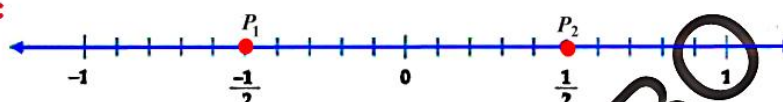
### 6. Tick (✓) the correct statements.

- (i)  $\frac{5}{7}$  is an example of irrational number. ✓
- (ii)  $\pi$  is an irrational number. ✓
- (iii) 0.31591... is an example of non-terminating and non-repeating decimal fraction. ✓
- (iv) 0.123 is an example of recurring decimal fraction. ✗
- (v)  $\frac{1}{3}, \frac{2}{3}$  are lying between 0 and 1. ✓
- (vi)  $\frac{1}{\sqrt{3}}$  is an example of rational number. ✗

#### Examples

**Example 01** Represent the numbers  $-\frac{1}{2}$  and  $\frac{1}{2}$  on the number line  $l$

**Solution:**

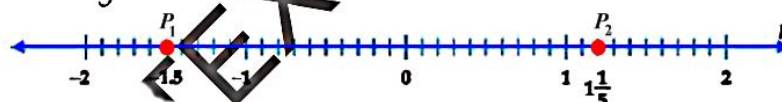


Thus, in the above figure the point  $P_1$  represents number  $-\frac{1}{2}$  and the point  $P_2$  represents  $\frac{1}{2}$ .

**Example 02** Represent  $-1.5$  and  $1\frac{1}{5}$  on the number line.

**Solution:**

Similar in the figure, point  $P_1$  represents number  $-1.5$  and  $P_2$  represent number  $1\frac{1}{5}$ .



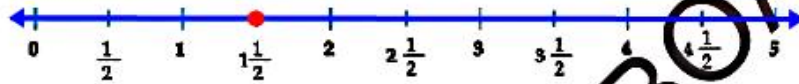
**Example 03**

Show the following terminating decimal fractions on the number line.

i.  $\frac{3}{2}$

ii.  $\frac{5}{4}$

i.  $\frac{3}{2} = 1\frac{1}{2}$



ii.  $\frac{5}{4} = 1\frac{1}{4}$

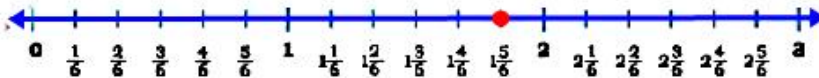
**Example 04**

Show the following non-terminating recurring decimal fractions on number line.

i.  $\frac{11}{6}$

ii.  $-\frac{5}{3}$

i.  $\frac{11}{6} = 1\frac{5}{6}$



iii.  $-\frac{5}{3} = -1\frac{2}{3}$

