

## Chapter # 1

# REAL NUMBERS

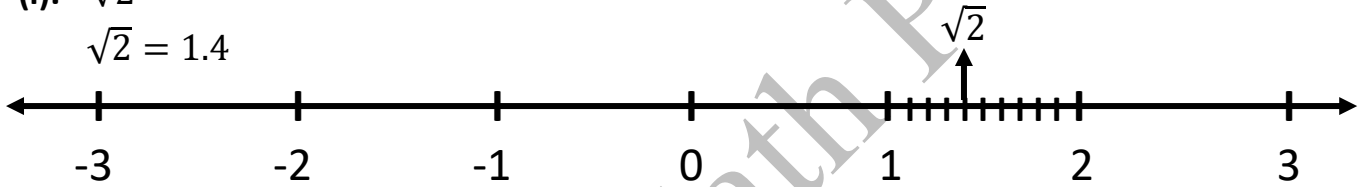
### Exercise # 1.1

**Question # 1: Identify each of the following as a rational or irrational number.**

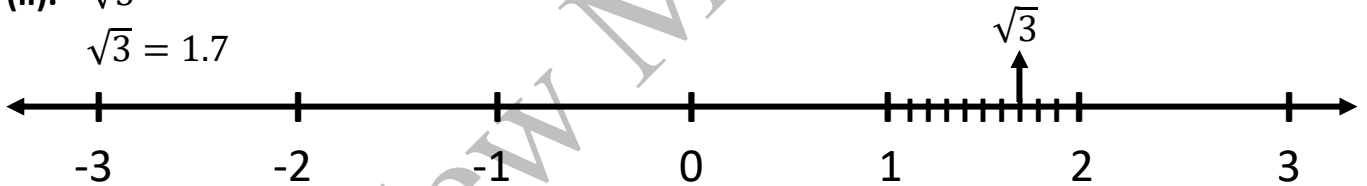
- |                                 |  |                                     |   |
|---------------------------------|--|-------------------------------------|---|
| (i) 2.353535<br>Rational        | (ii) $0.\bar{6}$<br>Rational                   | (iii) 2.236067.....<br>Irrational   | (iv) $\sqrt{7}$<br>Irrational               |
| (v) $e$<br>Irrational           | (vi) $\pi$<br>Irrational                       | (vii) $5 + \sqrt{11}$<br>Irrational | (viii) $\sqrt{3} + \sqrt{13}$<br>Irrational |
| (ix) $\frac{15}{4}$<br>Rational | (x) $(2 + \sqrt{2})(2 + \sqrt{2})$<br>Rational |                                     |   |

**Question # 2: Represent the following numbers on number line.**

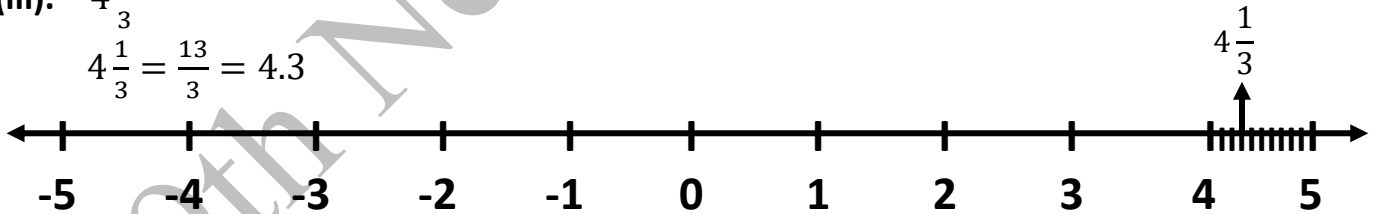
(i).  $\sqrt{2}$   
 $\sqrt{2} = 1.4$



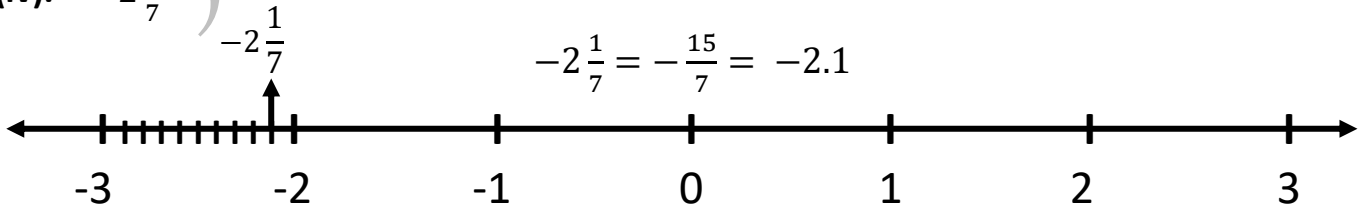
(ii).  $\sqrt{3}$   
 $\sqrt{3} = 1.7$



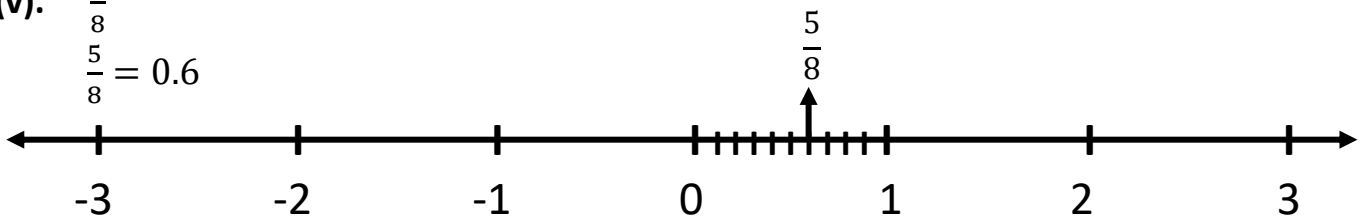
(iii).  $4\frac{1}{3}$   
 $4\frac{1}{3} = \frac{13}{3} = 4.3$



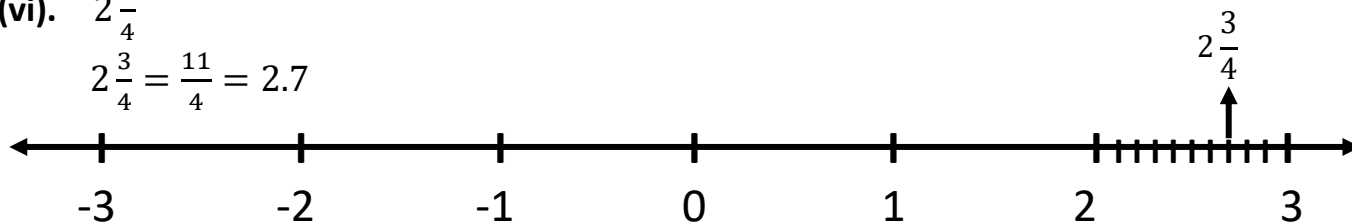
(iv).  $-2\frac{1}{7}$   
 $-2\frac{1}{7} = -\frac{15}{7} = -2.1$



(v).  $\frac{5}{8}$   
 $\frac{5}{8} = 0.6$



(vi).  $2\frac{3}{4}$   
 $2\frac{3}{4} = \frac{11}{4} = 2.7$



**Question # 3: Express the following as rational number  $\frac{p}{q}$  where  $p$  and  $q$  are integers and  $q \neq 0$ :**

(i).  $0.\overline{4}$

Let,

$$x = 0.444 \dots \text{ (A)}$$

Multiply by '10' on both sides,

$$10x = 4.444 \dots \text{ (B)}$$

Subtract eq (A) from eq (B)

$$10x - x = 4.444 \dots - 0.444 \dots$$

$$9x = 4$$

$$x = \frac{4}{9} \text{ (Answer)}$$

(ii).  $0.\overline{37}$

Let,

$$x = 0.373737 \dots \text{ (A)}$$

Multiply by '100' on both sides,

$$100x = 37.373737 \dots \text{ (B)}$$

Subtract eq (A) from eq (B)

$$100x - x = 37.373737 \dots - 0.373737 \dots$$

$$99x = 37$$

$$x = \frac{37}{99} \text{ (Answer)}$$

(iii).  $0.\overline{21}$

Let,

$$x = 0.212121 \dots \text{ (A)}$$

Multiply by '100' on both sides,

$$100x = 21.212121 \dots \text{ (B)}$$

Subtract eq (A) from eq (B)

$$100x - x = 21.212121 \dots - 0.212121 \dots$$

$$99x = 21$$

$$x = \frac{21}{99} \text{ (Answer)}$$

**Question # 4: Name the property used in the following:**

(i)  $(a + 4) + b = a + (4 + b)$

Associative property w.r.t addition

(iii)  $x - x = 0$

Additive inverse

(v)  $16 + 0 = 16$

Additive identity

(vii)  $4 \times (5 \times 8) = (4 \times 5) \times 8$

Associative property w.r.t multiplication

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

Commutative property w.r.t addition

(iv)  $a(b + c) = ab + ac$

Left distributive property

(vi)  $100 \times 1 = 100$

Multiplicative identity

(viii)  $ab = ba$

Commutative property w.r.t multiplication

**Question # 5: Name the property used in the following:**

(i)  $-3 < -1 \Rightarrow 0 < 2$

Additive property

(iii) If  $a < b$  then  $a + c < b + c$

Additive property

(ii) If  $a < b$  then  $\frac{1}{a} > \frac{1}{b}$

Reciprocal property

(iv) If  $ac < bc$  and  $c > 0$  then  $a < b$

Multiplicative property

(v) If  $ac < bc$  and  $c < 0$  then  $a > b$   
 Multiplicative property

(vi) Either  $a > b$  or  $a = b$  or  $a < b$   
 Trichotomy property

**Question # 6: Insert two rational numbers between:**

(i).  $\frac{1}{3}$  and  $\frac{1}{4}$

$$\begin{aligned} 1^{\text{st}} \text{ rational number} &= \left(\frac{1}{3} + \frac{1}{4}\right) \div 2 \\ &= \left(\frac{4+3}{12}\right) \times \frac{1}{2} \\ &= \frac{7}{12} \times \frac{1}{2} \\ &= \frac{7}{24} \end{aligned}$$

$$\begin{aligned} 2^{\text{nd}} \text{ rational number} &= \left(\frac{1}{3} + \frac{7}{24}\right) \div 2 \\ &= \left(\frac{8+7}{24}\right) \times \frac{1}{2} \\ &= \frac{15}{24} \times \frac{1}{2} \\ &= \frac{15}{48} \end{aligned}$$

3	3,24
2	1,8
2	1,4
2	1,2
	1,1

(iii).  $\frac{3}{5}$  and  $\frac{4}{5}$

$$\begin{aligned} 1^{\text{st}} \text{ rational number} &= \left(\frac{3}{5} + \frac{4}{5}\right) \div 2 \\ &= \left(\frac{3+4}{5}\right) \times \frac{1}{2} \\ &= \frac{7}{5} \times \frac{1}{2} \\ &= \frac{7}{10} \end{aligned}$$

$$\begin{aligned} 2^{\text{nd}} \text{ rational number} &= \left(\frac{3}{5} + \frac{7}{10}\right) \div 2 \\ &= \left(\frac{6+7}{10}\right) \times \frac{1}{2} \\ &= \frac{13}{10} \times \frac{1}{2} \\ &= \frac{13}{20} \end{aligned}$$

2	5, 10
5	5, 5
	1, 1

(ii). 3 and 4

$$\begin{aligned} 1^{\text{st}} \text{ rational number} &= (3 + 4) \div 2 \\ &= (7) \times \frac{1}{2} \\ &= \frac{7}{2} \end{aligned}$$

$$\begin{aligned} 2^{\text{nd}} \text{ rational number} &= \left(3 + \frac{7}{2}\right) \div 2 \\ &= \left(\frac{6+7}{2}\right) \times \frac{1}{2} \\ &= \frac{13}{2} \times \frac{1}{2} \\ &= \frac{13}{4} \end{aligned}$$