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Exercise 1.1

Q.1 Identify each of the following as a rational or irrational number.

i) 2.353353

SOL: Rational Number

ii) $0.\overline{6}$

SOL: Rational Number

iii) 2.236067.....

SOL: Irrational Number

iv) $\sqrt{7}$

SOL: Irrational Number

v) e

SOL: Irrational Number

vi) π

SOL: Irrational Number

Vii) $5 + \sqrt{11}$

SOL: Irrational Number

viii) $\sqrt{3} + \sqrt{13}$

SOL: Irrational Number

ix) $\frac{15}{4} = 3.75$

SOL: Rational Number

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x) $(2-\sqrt{2})(2+\sqrt{2}) = 2^2 - \sqrt{2}^2 = 4-2 = 2$

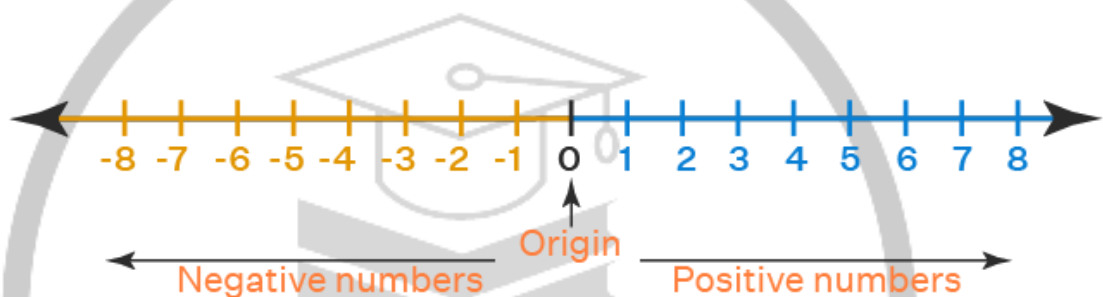
SOL: Rational Number

Q.2 Represent the Following Numbers on number line.

i. $\sqrt{2}$

To represent $\sqrt{2}$ on a number line, follow these steps:

1. **Draw a Number Line:** Mark integers like 0, 1, 2, and so on.



Construct a Right-Angle Triangle:

- From point 0, draw a horizontal line segment to point 1 (mark it as point A).
- At point A, draw a vertical line segment 1 unit long (mark the endpoint as point B).

2. **Apply the Pythagorean Theorem:**

The line segment from point 0 to point B (diagonal OB) forms a right triangle with sides of length 1 unit each.

3. **Mark the Point on the Number Line:**

Use a compass to measure the length of OB and transfer it onto the number line from point 0. This point represents

This method geometrically demonstrates $\sqrt{2}$ as an irrational number located between 1 and 2 on the number line.

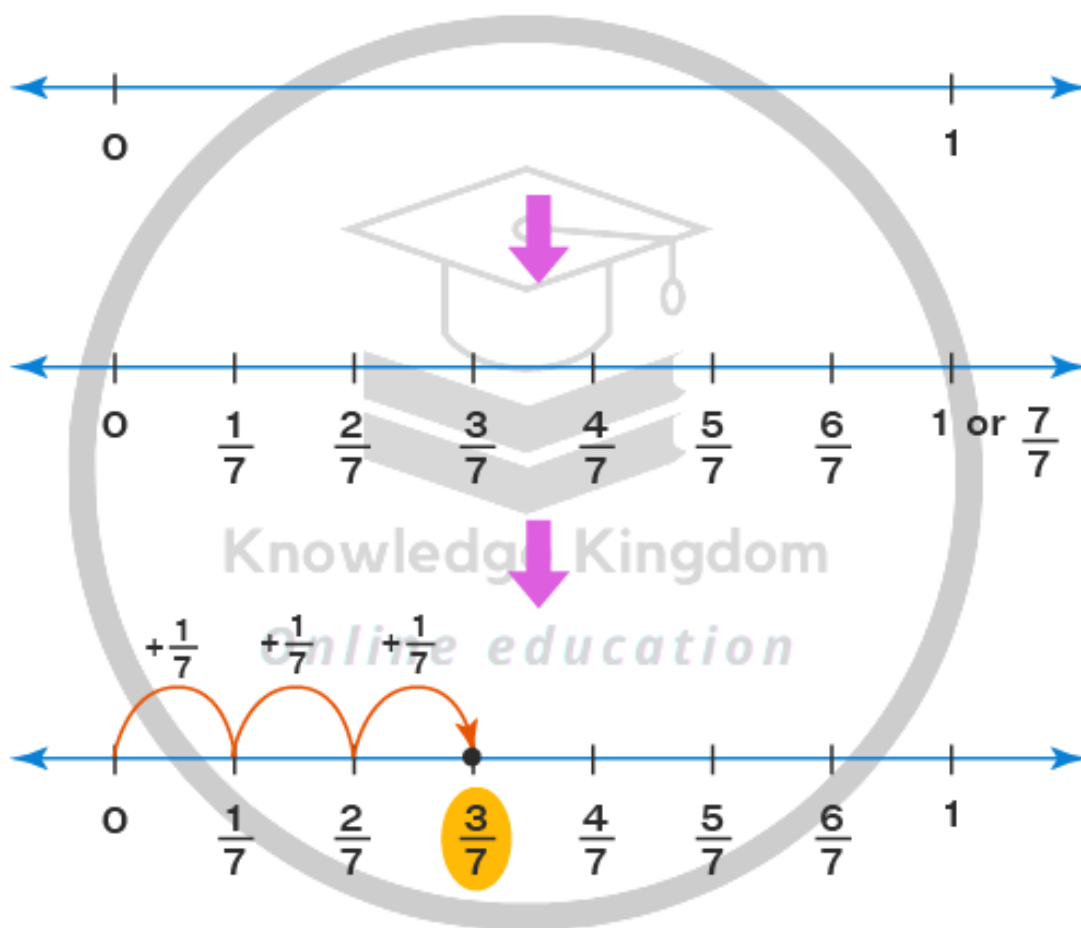
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ii. $\sqrt{3}$

iii. $4\frac{1}{3}$



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Important for Short

Q.3 Express the following as a rational number $\frac{p}{q}$ where p and q are the integers and $q \neq 0$:

i) $0.\overline{4}$

SOL:

Let $X = 0.\overline{4}$

$$X = 0.4444.... \quad \text{EQ (1)}$$

Multiplying 10 on B.S

$$10x = 4.444..... \quad \text{EQ(2)}$$

$$\text{EQ(2)} - \text{EQ(1)}$$

$$10x - x = 4.444..... - 0.444....$$

$$9x = 4$$

$$X = \frac{4}{9}$$

ii. $0.\overline{37}$

SOL:

$$\text{Let } X = 0.373737..... \quad \text{EQ(1)}$$

Multiplying 10 on B.S

$$100x = 37.3737..... \quad \text{EQ(2)}$$

$$\text{EQ(2)} - \text{EQ(1)}$$

$$100x - x = 37.3737..... - 0.37373737....$$

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$$99x=37$$

$$X=\frac{37}{99}$$

iii. $0.\overline{21}$

Let $X=0.212121\ldots$

Multiplying 10 on B.S

$$100x=21.212121\ldots \quad \text{EQ(2)}$$

$$\text{EQ(2)} - \text{EQ(1)}$$

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

$$99x=21$$

$$X=\frac{21}{99}$$

Q.4 Name the property used in the following.

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

Associative property w.r.t addition

ii. $\sqrt{2} + \sqrt{3} = \sqrt{3} + \sqrt{2}$

Commutative property

iii. $x - x = 0$ $x + (-x) = 0$

Additive Inverse

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

Left distribution property

v. $16+0=16$

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Additive Identity

vi. $100 * 1 = 100$

Multiplicative Identity

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

Assosiative Property W.R.T multiply

viii) $ab = ba$

Commutative property W.R.T multiply

Q.5 Name the property used in the following.

i. $-3 < -1$

$0 < 2$

Additive property

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

Reciprocal Property

iii. If $a < b$ then $a + c < b + c$

Additive property

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

Cancellation Property

v. If $ac < bc$ and $c < 0$ then $a > b$

Multiplicative property

vi. Either $a > b$ or $a = b$ or $a < b$

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trichotomy

Q.6 Insert two rational Numbers between:

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

Firstly

$$\frac{1}{3} + \frac{1}{4}$$

$$= \frac{4+3}{12}$$

$$= \frac{7}{12} \times \frac{1}{2} = \frac{7}{24}$$

Now add next two points

$$\frac{7}{24} + \frac{1}{4}$$

$$= \frac{7+6}{24} = \frac{13}{24}$$

$$= \frac{13}{24} \times \frac{1}{2}$$

$$= \frac{13}{48}$$

ii. 3 and 4

$$3+4=7$$

$$= 7 \times \frac{1}{2}$$

$$= \frac{7}{2} + 4 = \frac{7+8}{2} = \frac{15}{2}$$

$$\frac{15}{2} \times \frac{1}{2} = \frac{15}{4}$$

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

$$\frac{3}{5} + \frac{4}{5} = \frac{7}{5}$$

$$= \frac{7}{5} \times \frac{1}{2}$$

$$= \frac{7}{10}$$

$$= \frac{15}{10}$$

$$\frac{7}{10} + \frac{4}{5} = \frac{7+8}{10}$$

$$\frac{15}{10} \times \frac{1}{2} = \frac{15}{20}$$

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