

Characteristics

of Irrational numbers :-

(i) Negative of an irrational number is an irrational number.

For example :- $-\sqrt{3}$, $-\sqrt{17}$ etc

(ii) The sum of a rational number and an irrational number is an irrational number.

For example: $2 + \sqrt{3}$, $\sqrt{6} + 4$ etc.

(iii) The product of a non zero rational number and an irrational number is an irrational number.

For example. $2\sqrt{7}$, $-6\sqrt{5}$ etc

(iv) The sum, difference, product and quotient of two irrational numbers need not be an irrational numbers for example.

(i) $\sqrt{5}$ and $-\sqrt{5}$ is 0 (Rational)

$\sqrt{2} + \sqrt{3}$ is an irrational.

(ii) $(2 + \sqrt{2}) - (\sqrt{2} - 2) = 4$ (Rational)

(iii) $\sqrt{8} \times \sqrt{2} = \sqrt{16} = 4$ is a rational number.

(iv) $\sqrt{8} \div \sqrt{2} = \sqrt{16} = 4$, which is a rational number.

To rationalise the real numbers of the type

$\frac{1}{a + b\sqrt{x}}$ and $\frac{1}{\sqrt{x} + \sqrt{y}}$

Step-1 If the expression is in the form of $\frac{1}{\sqrt{x} + \sqrt{y}}$ then multiply both denominator and numerator by $\sqrt{x} - \sqrt{y}$

Step II :- If the expression is in the form of (2)

$\frac{1}{a+b\sqrt{x}}$ then multiply both numerator and denominator by $a-b\sqrt{x}$

Some identities relating to square roots and other

(i) $(\sqrt{a})^2 = a$ (ii) $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ (iii) $\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$

(iv) $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b}) = a - b$ (v) $(a + \sqrt{b})(a - \sqrt{b}) = a^2 - b$

Ex 1.5

Q1 (i) $2 - \sqrt{5}$ is an irrational number

∴ Difference between rational and irrational is an irrational.

(ii) $(3 + \sqrt{23}) - \sqrt{23} = 3 - \sqrt{23} + \sqrt{23} = 3$ (rational number)

Q.2

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

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

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

Q.5

(i) $\frac{1}{\sqrt{7}} = \frac{1 \times \sqrt{7}}{\sqrt{7} \times \sqrt{7}} = \frac{\sqrt{7}}{\sqrt{49}} = \frac{\sqrt{7}}{7}$ Ans

(on multiplying Nr and Dr by $\sqrt{7}$)

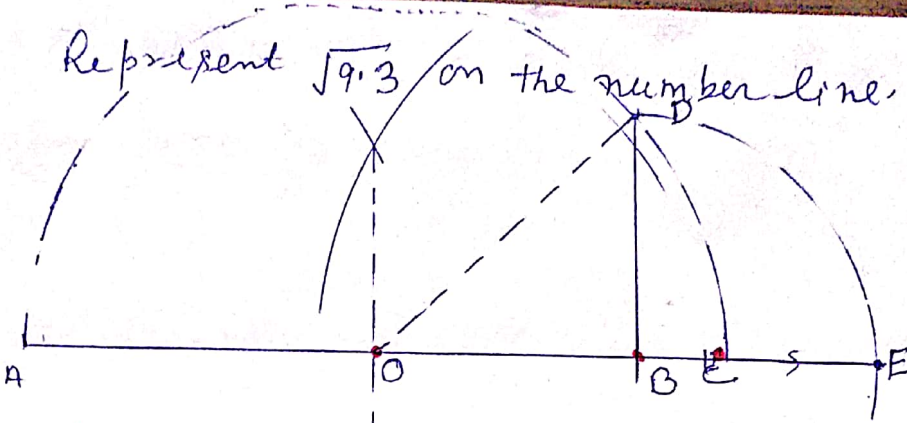
(ii) $\frac{1}{\sqrt{7} - \sqrt{6}} = \frac{1 \times (\sqrt{7} + \sqrt{6})}{(\sqrt{7} - \sqrt{6}) \times (\sqrt{7} + \sqrt{6})} = \frac{\sqrt{7} + \sqrt{6}}{(\sqrt{7})^2 - (\sqrt{6})^2}$

$\Rightarrow \frac{\sqrt{7} + \sqrt{6}}{7 - 6} = \frac{\sqrt{7} + \sqrt{6}}{1} = \sqrt{7} + \sqrt{6}$ Ans

Q.4

Represent $\sqrt{9.3}$ on the number line.

(3)



Construction:

- (i) Draw a line and make a point A on it.
- (ii) Mark a point B on the line drawn in step 1 such that $AB = 9.3 \text{ cm}$.
- (iii) Mark a point C on AB produced such that $BC = 1 \text{ cm}$.
- (iv) Find the mid point of AC. Let the mid point be O.
- (v) Taking O as centre and $OC = OA$ as radius draw a semicircle. Draw a line passing through B \perp to OB. It cut the semicircle at D.
- (vi) Taking B as centre and BD as radius draw an arc cutting OC produced at E. Point E so obtained represent $\sqrt{9.3}$.

Home work:-

Solve the following questions in your notebook

Ex 1.5 Q1 (iii) (iv) (v)

Q.2 (i) (ii) (iv)

Q.3, Q.5 (iii) (iv)

Assignment:-

Q1 Rationalise

(i) $\frac{2}{\sqrt{5}}$ (ii) $\frac{3}{\sqrt{7} + 2\sqrt{5}}$ (iii) $\frac{1}{6 - 3\sqrt{5}}$ (iv) $\frac{2}{\sqrt{8} - 2\sqrt{2}}$

Q.2 Represent $\sqrt{7.4}$ and $\sqrt{8.6}$ on number line.

Q.3 Classify the following numbers as rational or irrational

- (i) * (ii) $3 + 2\sqrt{5}$ (iii) $\sqrt{36}$ (iv) $5\sqrt{2} \times 3\sqrt{2}$ (v) $\frac{5\sqrt{14}}{\sqrt{2}}$