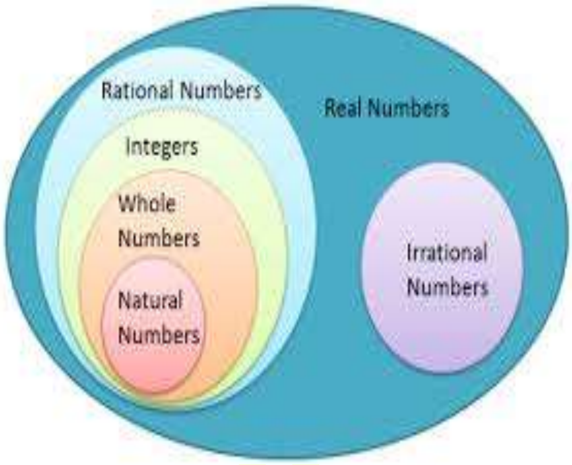
CHAPTER 1: NUMBER SYSTEMS

EXERCISE 1.2

(IRRATIONAL NUMBERS)



Description of exercise 1.2 in easy and the best way:

Natural numbers (N)

Numbers which start from 1 to infinity (No negative numbers and no fractions).

Denoted by N.

Eg: - 1, 2, 3, 4………..

Whole numbers (W)

Numbers which start from 0 to infinity with no fractional part (no decimals).

Denoted by W.

Eg: - 0, 1, 2, 3, 4……

Integers (Z)

Positive and negative numbers with no fractional part (no decimals) are called integers. Denoted by Z.

Eg: - ……… -4, -3, -2, -1, 0, 1, 2, 3, 4……….

Rational Numbers (Q)

A Numbers which can be written in p/q form, where p and q are integer and q≠ 0.

Either terminating or non-terminating recurring type.   .

Denoted by Q.

Eg: - 2/3, 4/5.....

Irrational Numbers

Numbers which cannot be expressed in p/q form, , where p and q are integer and q≠ 0.

Non-terminating and non-repeating type.

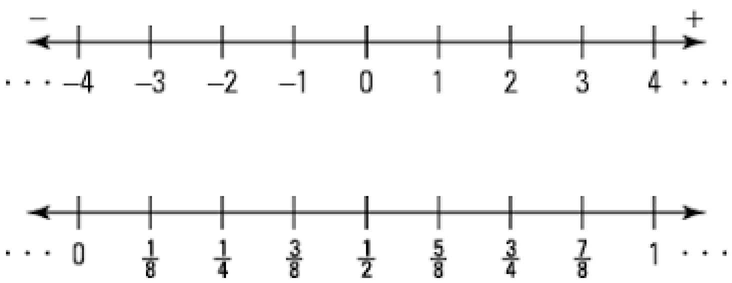
Eg: - √2, √3, π

Real Numbers(R)

All Numbers on number line are real numbers.

Denoted by R.

It contains rational and irrational numbers both.



Question 1.

State whether the following statements are true or false. Justify your answers.

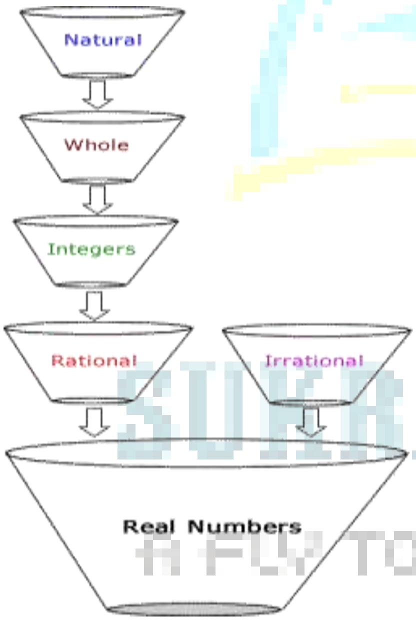
(i) Every irrational number is a real number.

Solution: (i) (irrational numbers: Numbers which cannot be expressed in p/q form, where p and q are integer and q≠ 0. Eg: - √2, √3, π...)

(Real numbers: All Numbers on number line are real numbers.

It contains rational and irrational numbers both)

True, since the collection of real numbers is made up of rational and irrational numbers. So, we can say every irrational number is a real number.



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(ii) Every point on the number line is of the form √m, where m is a natural number.

Solution: False,

Negative number cannot be the square root of any natural number.

When we take the square root of a negative number it becomes a complex number, not a natural number.

E.g. $\sqrt{-3} = 3i.$

Similarly,we know can see this also

$\sqrt{2}$ =1.414... Is not a natural number.

Since, this is false that every point on the number line is of the form $\sqrt{m}$, where m is a natural number.

(iii) Every real number is an irrational number.

Solution: (iii) False,

As real numbers include both rational and irrational numbers. Where, irrational numbers are those which cannot be expressed in p/q form, where p and q are integer and q≠ 0. Eg: - √2, √3, π...)

Therefore, every real number cannot be an irrational number.

You can also in figure given point 1 of this question.

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Question 2

Are the square roots of all positive integers irrational? If not, give an example of the square root of a number that is a rational number.

Solution:

No, the square roots of all positive integers are not irrational. Those numbers make a complete square root are not come in irrational numbers.

For example √4 = 2

$\sqrt{25}$ =5

Question 3

Show how √5 can be represented on the number line.

Solution: Step 1: Let AB be a line of length 2 unit on number line.
Step 2: At B, draw a perpendicular line BC of length 1 unit. Join CA.
Step 3: Now, ABC is a right angled triangle. Applying Pythagoras theorem,
What is Pythagoras Theorem In a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides
Step 4: now apply this on given triangle ABC.

$AB^2 + BC^2 = CA^2$

$\Rightarrow 2^2 + 1^2 = CA^2$

$\Rightarrow CA^2 = 5$

$\Rightarrow CA = \sqrt{5}$

Thus, CA is a line of length √5 unit.
Step 5: Taking CA as a radius and A as a centre draw an arc touching the number line. The point at which number line get intersected by arc is at √5 distance from 0 because it is a radius of the circle whose centre was A.
Thus, √5 is represented on the number line as shown in the figure.