RATIONAL NUMBERS

REPRESENTATION OF RATIONAL NUMBERS ON THE NUMBER LINE

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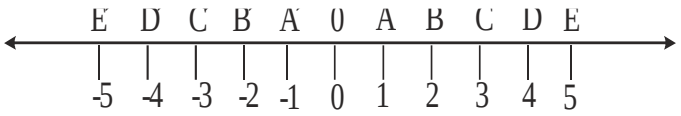
Draw any line. Take a point O on it. Call it 0 (zero) . Set off equal distances on right as well as on the left of 0. Each such distance is of unit length. Clearly points A, B, C, D etc. represents the integers 1, 2, 3, 4 ..... etc. respectively & the points A′, B′, C′, D′ represents the integers –1, –2, –3, –4 respectively.



Ex.1 Represent $\frac{13}{5}$ and $\frac{-13}{5}$ on number line

Sol. Draw a line. Take a point O on it. Let it be represented by 0.

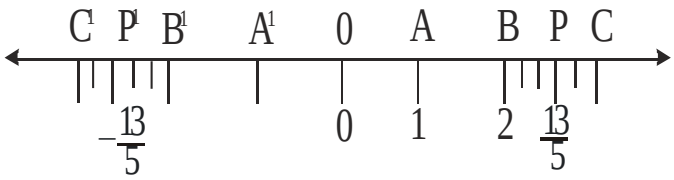
Now

$$\frac{13}{5}=2\frac{3}{5}=2+\frac{3}{5}$$

$$-\frac{13}{5}=-\left[2+\frac{3}{5}\right]$$

From O set off unit distances OA, AB and BC clearly, the points A, B, C represents, 1, 2, 3 respectively. Now take 2 units OA and AB and divide the third unit BC into 5 equal parts. Take 3 parts out of these 5 parts to reach at point P. Then point P represents rational number $\frac{13}{5}$.

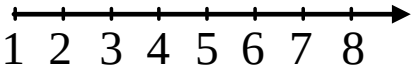
Similarly on left side P′ represents $-\left[2+\frac{3}{5}\right]$



REPRESENTATION OF RATIONAL NUMBERS OF THE NUMBER LINE

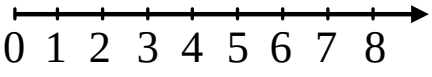
You have learnt to represent natural numbers, whole numbers, integers and rational numbers on a number line. Let us revise them.

Natural Numbers

(i) 

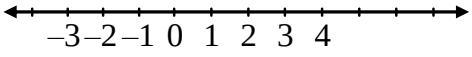
Note: The line extends indefinitely only to the right side of 1.

Whole Numbers

(ii) 

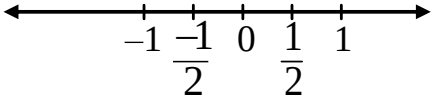
Note: The line extends indefinitely to the right, but from 0. There are no numbers to the left of 0.

Integers

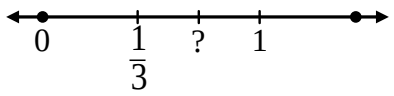
(iii) 

Note : The line extends indefinitely on both sides.

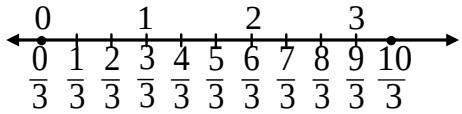
Rational Numbers

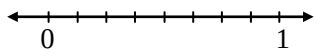
(iv) 

Note : The line extends indefinitely on both sides. You can see numbers between –1, 0; 0, 1 etc.

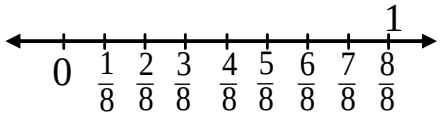
(v) 

The point to be labeled is twice as far from and to the right of 0 as the point labeled $\frac{1}{3}$. So it is two times $\frac{1}{3}$, i.e., $\frac{2}{3}$. The next marking is 1. You can see that 1 is the same as $\frac{3}{3}$. Then comes $\frac{4}{3}$, $\frac{5}{3}$, $\frac{6}{3}$ (or 2), $\frac{7}{3}$ and so on as shown on the number line (vi)

(vi) 

Similarly, to represent $\frac{1}{8}$, the number line may be divided into eight equal parts as shown 

We use the number $\frac{1}{8}$to name the first point of this division. The second point of division will be labeled $\frac{2}{8}$, the third point $\frac{3}{8}$, and so on as shown on number line (vii)

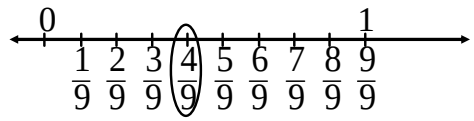
(vii) 

Any rational number can be represented on the number line in this way. In a rational number, the numeral below the bar, i.e., the denominator, tells the number of equal parts into which the first unit has been divided. The numeral above the bar i.e., the numerator, tells 'how many' of these parts are considered. So, a rational number such as $\frac{4}{9}$ means four of nine equal parts on the right of 0 (number line viii) and for $\frac{-7}{4}$, we make 7 marking of

distance $\frac{1}{4}$ each on the left of zero and starting from 0.

The seventh marking is $\frac{-7}{4}$ [number line (ix)].

(viii)



(ix)