PUBLIC SCHOOL DARBHANGA

SESSION (2020-21)
CLASS-IX
MATHEMATICS
Topic : Number Systems (Answer key)

Worksheet No.1

Solution 1.

Yes, zero is a rational number it can be written in the form $\frac{p}{q}$.

$0 = \frac{0}{1} = \frac{0}{2} = \frac{0}{3}$ etc. denominator q can also be taken as negative integer.

Solution 2.

Let q_j be the rational number between 3 and 4, where j = 1 to 6.

∴ Six rational numbers are as follows:

$$q_1 = \frac{3+4}{2} = \frac{7}{2};\ 3 < \frac{7}{2} < 4$$

$$q_2 = \frac{3+\frac{7}{2}}{2} = \frac{\frac{13}{2}}{2} = \frac{13}{4};\ 3 < \frac{13}{4} < \frac{7}{2} < 4$$

$$q_3 = \frac{4+\frac{7}{2}}{2} = \frac{\frac{15}{2}}{2} = \frac{15}{4};\ 3 < \frac{13}{4} < \frac{7}{2} < \frac{15}{4} < 4$$

$$q_4 = \frac{\frac{7}{2}+\frac{13}{4}}{2} = \frac{\frac{14+13}{4}}{2} = \frac{\frac{27}{4}}{2} = \frac{27}{8};$$

$$3 < \frac{13}{4} < \frac{27}{8} < \frac{7}{2} < \frac{15}{4} < 4$$

$$q_6 = \frac{1}{2}\left(\frac{13}{4}+\frac{27}{8}\right) = \frac{1}{2}\left(\frac{26+27}{8}\right) = \frac{53}{16};$$

$$3 < \frac{13}{4} < \frac{53}{16} < \frac{27}{8} < \frac{7}{2} < \frac{29}{8} < \frac{15}{4} < 4$$

Thus, the six rational numbers between 3 and 4 are

$$\frac{7}{2}, \frac{13}{4}, \frac{15}{4}, \frac{27}{8}, \frac{29}{8} \text{ and } \frac{53}{16}.$$

Solution : 3

Since, we need to find five rational numbers, therefore, multiply numerator and denominator by 6.

$$\therefore \frac{3}{5} = \frac{3\times6}{5\times6} = \frac{18}{30} \text{ and } \frac{4}{5} = \frac{4\times6}{5\times6} = \frac{24}{30}$$

$\therefore$ **Five rational numbers between** $\frac{3}{5}$ **and** $\frac{4}{5}$ **are** $\frac{19}{30}, \frac{20}{30}, \frac{21}{30}, \frac{22}{30}, \frac{23}{30}$.

Solution :4

(i) True

∵ The collection of all natural numbers and 0 is called whole numbers.

(ii) False

∵ Negative integers are not whole numbers.

(iii) False

∵ Rational numbers are of the form p/q, q ≠ 0 and q does not divide p completely that are not whole numbers.

Solution :5

(i) True

Because all rational numbers and all irrational numbers form the group (collection) of real numbers.

(ii) False

Because negative numbers cannot be the square root of any natural number.

(iii) False

Because rational numbers are also a part of real numbers.

Solution :6

No, if we take a positive integer, say 9, its square root is 3, which is a rational number.

Solution :7

Draw a number line and take point O and A on it such that OA = 1 unit. Draw BA ⊥ OA as BA = 1 unit. Join OB = $\sqrt{2}$ units.

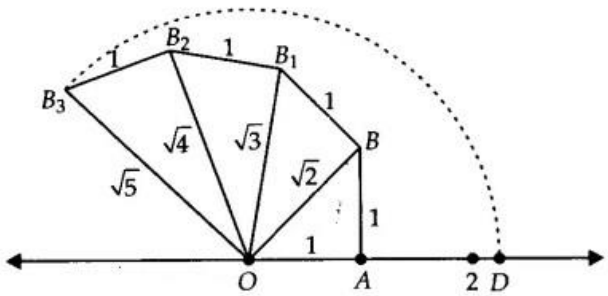
Now draw $BB_1 \perp OB$ such that BB_1 =1 unit. Join $OB_1 = \sqrt{3}$ units.

Next, draw $B_1B_2 \perp OB_1$ such that B_1B_2 = 1 unit.

Join OB_2 = units.

Again draw $B_2B_3 \perp OB_2$ such that B_2B_3 = 1 unit.

Join $OB_3 = \sqrt{5}$ units.



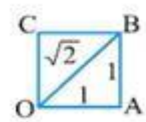
Take O as centre and OB_3 as radius, draw an arc which cuts the number line at D.

Point D

represents $\sqrt{5}$ on the number line.

Solution :8

It is easy to see how the Greeks might have discovered $\sqrt{2}$. Consider a unit square OABC, with each side 1 unit in length (see Fig. 1.6). Then you can see by the Pythagoras theorem that $OB = \sqrt{1^2 + 1^2} = \sqrt{2}$. How do we represent $\sqrt{2}$ on the number line?



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This is easy. Transfer Fig. 1 onto the number line making sure that the vertex O coincides with zero (Fig. 2).

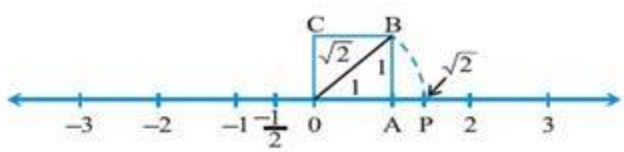

fig.2

We have just seen that OB = $\sqrt{2}$. Using a compass with centre O and radius OB, draw an arc intersecting the number line at the point P. Then P corresponds to $\sqrt{2}$ on the number line.