

DELHI PUBLIC SCHOOL JAMMU

Session 2020 - 2021

Foundation worksheet

Class : VIII

Subject : Mathematics

Topic :- Rational Number

❖ Rational number: -

A number which can be expressed in form if $\frac{P}{Q}$, where P and Q are integers and Q is not equal to 0 is known as rational number

$$\therefore \text{Rational number} = \frac{\text{numerator}}{\text{Denominator}} = \frac{P}{Q}$$

• Positive rational number: -

A Rational number is said to be a positive rational number if numerator and denominator have both same Signs.

Example: - $-\frac{4}{5}$ and $\frac{2}{3}$ are positive rational numbers.

Negative rational number: -

A rational number is said to be a negative rational number if numerator and denominator have different sign.

Example: -

$\frac{-4}{3}$ and $\frac{-2}{8}$ are negative rational numbers.

Properties of rational numbers: -

- I. Closure properties
- II. Commutative property
- III. Associative property
- IV. Additive identity
- V. Additive inverse

• Closure property:

If a and b are rational number then $a + b$ is also rational.

Example: - $a = \frac{2}{3}$, $b = \frac{3}{4}$

$$a + b = \frac{2}{3} + \frac{3}{4}$$

$$a + b = \frac{8+9}{12}$$

$$12$$

$$a + b = \frac{17}{12}$$

$$a + b = \text{rational number.}$$

Thus, rational numbers are closure under additional.

- Commutative property: -

If a and b are two rational number then $a + b = b + a$.

Example: let $a = 1/3$ and $b = 1/2$

$a + b = 1/3 + 1/2$ $a + b = \frac{2+3}{6}$ $a + b = 5/6$	$b + a = 1/2 + 1/3$ $b + a = \frac{1+2}{3}$ $b + a = 5/6$
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Here $a + b = b + a$

Thus, rational number are commutative under additional

- Associative property: -

If a, b and c are three rational number, then $a + (b+c) = (a+b) + c$

Example:

Let $a = 1/2$, $b = 3/4$, $c = 5/6$

$$a + (b + c) = \frac{1}{2} + \left(\frac{3}{4} + \frac{5}{6} \right)$$

$$= \frac{1}{2} + \left(\frac{9+10}{12} \right)$$

$$= \frac{1}{2} + \frac{19}{12}$$

$$= \frac{6+19}{12}$$

$$= \frac{25}{12}$$

$$\text{also } (a + b) + c = \left(\frac{1}{2} + \frac{3}{4} \right) + \frac{5}{6}$$

$$= \left(\frac{2+3}{4} \right) + \frac{5}{6}$$

$$= \frac{5}{4} + \frac{5}{6}$$

$$= \frac{15+10}{12}$$

$$= \frac{25}{12}$$

Thus, rational numbers are associative under addition.

Additive identity: -

Let a be a rational number then

$$a + 0 = a = 0 + a$$

Example: let $a = 5/6$

$$a + 0 = 5/6 + 0 = 5/6 = a$$

$$0 + a = 0 + 5/6 = 5/6 = a$$

Here $a + 0 = a = 0 + a$

- Additive inverse: -

Let a be rational number then $a + (-a) = 0$

Let $a = \frac{5}{11}$

$$a + (-a) = \frac{5}{11} + (-\frac{5}{11})$$

$$a + (-a) = \frac{5}{11} - \frac{5}{11}$$

$$a + (-a) = 0$$

• Distributive property: -

If a , b and c are three rational numbers then $a*(b+c) = a*b + a*c$

Example: Let $a = \frac{1}{2}$ $b = \frac{1}{3}$ $c = \frac{1}{5}$

$$a*(b+c) = \frac{1}{2} * (\frac{1}{3} + \frac{1}{5})$$

$$a*(b+c) = \frac{1}{2} * (\frac{5+3}{15})$$

$$a*(b+c) = \frac{1}{2} * \frac{8}{15} \quad a*b + a*c = \frac{5+3}{15}$$

$$a*(b+c) = \frac{4}{15}$$

$$a*b + a*c = \frac{1}{2} * \frac{1}{3} + \frac{1}{2} * \frac{1}{5}$$

$$a*b + a*c = \frac{1}{6} + \frac{1}{10}$$

$$a*b + a*c = \frac{30}{30} + \frac{8}{30}$$

$$a*b + a*c = \frac{4}{15}$$

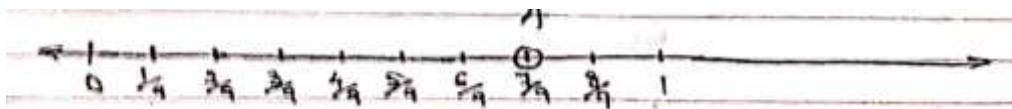
Here $a*(b+c) = a*b + a*c$

Thus, rational number are distributive under addition.

Question- Represent the following rational number on number line.

- a) $\frac{7}{9}$
- b) $\frac{2}{7}$
- c) $-\frac{4}{6}$

1) $\frac{7}{9}$



Point A represents $\frac{7}{9}$ on number line

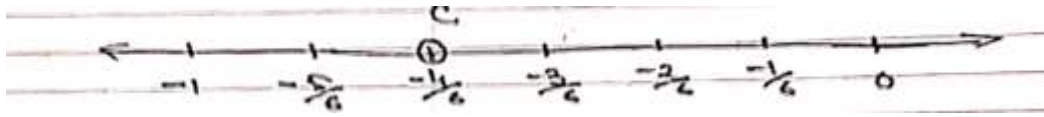
2) $\frac{2}{7}$



3)

Point B represents $\frac{2}{7}$ on number line.

4) $\frac{-4}{6}$



Point c represent $-4/7$ on number line.

Simplify

$$1/4 + 2/3 - 1/6 \times 4/5$$

$$1/4 + 2/3 - 2/15$$

$$= \frac{15+40-8}{60}$$

$$= \frac{55-8}{60}$$

$$= \frac{47}{60}$$

Question- Find 7 rational number between 0 and 1

Solution: -

$$0 = 0 \times \frac{8}{8} = \frac{0}{8}$$

$$1 = 1 \times \frac{8}{8} = \frac{8}{8}$$

7 rational numbers between 0 and 1 are: -

$$\therefore 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, 7/8$$

Question- Find 4 rational numbers between $\frac{1}{2}$ and $\frac{8}{5}$

Solution: -

$$\frac{1}{2} = \frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$$

$$\frac{8}{5} = \frac{8}{5} \times \frac{2}{2} = \frac{16}{10}$$

\therefore 4 rational numbers between $1/2$ and $8/5$ are
 $6/10, 7/10, 11/10$ and $13/10$

Question- Find rational number between 7 and 8 by mean method.

Let $a = 7$ and $b = 8$

$$\begin{aligned}\therefore \text{ Rational number} &= \frac{1}{2} (a + b) \\ &= \frac{1}{2} (7+8) \\ &= \frac{1}{2} (15)\end{aligned}$$

Question for self-practice

Question- Represent, $\frac{3}{8}$, $\frac{-1}{8}$ and $\frac{5}{8}$ on number line.

Question- Arrange the following rational number in ascending order.

$$\frac{-8}{15}, \frac{-3}{10}, \frac{-13}{20}, \frac{-17}{30}$$

Question- Arrange the following rational number in descending order.

$$\frac{-5}{12}, \frac{-7}{6}, \frac{-3}{8}, \frac{11}{7}$$

Question- Write five rational number which are greater than $-\frac{3}{2}$

Question- Simplify:

$$\text{a) } \frac{5}{6} - \frac{3}{8} + \frac{17}{12} \quad \text{b) } \frac{11}{-18} - \frac{5}{16} + \frac{4}{9}$$

Question- Find the additive inverse of

$$\text{a) } \frac{-3}{7} \quad \text{b) } \frac{16}{-3}$$

Question- Find three rational number between

$$\text{a) } \frac{2}{3} \text{ and } 3 \quad \text{b) } \frac{-1}{3} \text{ and } \frac{1}{2}$$

b)

Question- Simplify:

$$\text{a) } \frac{4}{7} \div \left(\frac{2}{9} \div \frac{14}{27} \right) \quad \text{b) } \left(\frac{1}{5} \div 3 \right) \div \frac{1}{6}$$

Question- The product of two rational number is $\frac{28}{121}$. If one of the numbers is $\frac{2}{3}$
Find the other.

Question- The sum of two rational number is $-\frac{5}{3}$. If one of the numbers is $-\frac{12}{3}$
Find the other number.

Question- Divide the sum of $\frac{78}{12}$ and $\frac{8}{3}$ by their difference.

Question- By what number should $-\frac{44}{7}$ be divided to get $\frac{-11}{3}$?

Question- Divided the sum of $\frac{-9}{7}$ and $\frac{7}{3}$ by the difference of $\frac{3}{5}$ and $\frac{2}{7}$.

Question- Simplify:

$$\frac{8}{14} * \frac{5}{4} * \left(\frac{-49}{15}\right) + \frac{8}{5} * \frac{15}{7}$$

Question- Use distributive property to evaluate:

$$\frac{9}{13} * \frac{16}{5} - \frac{7}{3} * \frac{9}{13}$$

Question- If $x = \frac{5}{4}$ and $y = \frac{-1}{3}$, Find the value of $(x+y) \div (x-y)$