

Mathematics

(Chapter – 1) (Rational Numbers)

(Class – VIII)

Exercise 1.1

Question 1:

Using appropriate properties find:

$$(i) \quad -\frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6}$$

$$(ii) \quad \frac{2}{5} \times \left(\frac{3}{-7} \right) - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{2}{5}$$

Answer 1:

$$(i) \quad -\frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6} = -\frac{2}{3} \times \frac{3}{5} - \frac{3}{5} \times \frac{1}{6} + \frac{5}{2} \quad \text{[Using associative property]}$$

$$= \frac{3}{5} \left(\frac{-2}{3} - \frac{1}{6} \right) + \frac{5}{2} \quad \text{[Using distributive property]}$$

$$= \frac{3}{5} \left(\frac{-4-1}{6} \right) + \frac{5}{2} = \frac{3}{5} \times \frac{-5}{6} + \frac{5}{2}$$

$$= -\frac{1}{2} + \frac{5}{2} = \frac{-1+5}{2} = \frac{4}{2} = 2$$

$$(ii) \quad \frac{2}{5} \times \left(\frac{3}{-7} \right) - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{2}{5}$$

$$= \frac{2}{5} \times \left(\frac{-3}{7} \right) + \frac{1}{14} \times \frac{2}{5} - \frac{1}{6} \times \frac{3}{2} \quad \text{[Using associative property]}$$

$$= \frac{2}{5} \times \left(\frac{-3}{7} + \frac{1}{14} \right) - \frac{1}{4} \quad \text{[Using distributive property]}$$

$$= \frac{2}{5} \times \left(\frac{-6+1}{14} \right) - \frac{1}{4} = \frac{2}{5} \times \frac{-5}{14} - \frac{1}{4}$$

$$= \frac{-1}{7} - \frac{1}{4} = \frac{-4-7}{28} = \frac{-11}{28}$$

Question 2:

Write the additive inverse of each of the following:

(i) $\frac{2}{8}$

(ii) $\frac{-5}{9}$

(iii) $\frac{-6}{-5}$

(iv) $\frac{2}{-9}$

(v) $\frac{19}{-6}$

Answer 2:

We know that additive inverse of a rational number $\frac{a}{b}$ is $\left(\frac{-a}{b}\right)$, such that $\frac{a}{b} + \left(\frac{-a}{b}\right) = 0$.

(i) Additive inverse of $\frac{2}{8}$ is $\frac{-2}{8}$.

(ii) Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$.

(iii) Additive inverse of $\frac{-6}{-5}$ is $\frac{-6}{5}$.

(iv) Additive inverse of $\frac{2}{-9}$ is $\frac{2}{9}$.

(v) Additive inverse of $\frac{19}{-6}$ is $\frac{19}{6}$.

Question 3:

Verify that $-(-x) = x$ for:

(i) $x = \frac{11}{15}$ (ii) $x = -\frac{13}{17}$

Answer 3:

(i) Putting $x = \frac{11}{15}$ in $-(-x) = x$,

$$-\left(-\frac{11}{15}\right) = \frac{11}{15} \Rightarrow \frac{11}{15} = \frac{11}{15}$$

$$\Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, verified.

(ii) Putting $x = \frac{-13}{17}$ in $-(-x) = x$,

$$-\left\{-\left(\frac{-13}{17}\right)\right\} = \frac{-13}{17} \Rightarrow \frac{-13}{17} = \frac{-13}{17}$$

$$\Rightarrow \text{L.H.S.} = \text{R.H.S.}$$

Hence, verified.

Question 4:

Find the multiplicative inverse of the following:

- (i) -13
- (ii) $\frac{-13}{19}$
- (iii) $\frac{1}{5}$
- (iv) $\frac{-5}{8} \times \frac{-3}{7}$
- (v) $-1 \times \frac{-2}{5}$
- (vi) -1

Answer 4:

We know that multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, such that $a \times \frac{1}{a} = 1$.

- (i) Multiplicative inverse of -13 is $\frac{-1}{13}$.
- (ii) Multiplicative inverse of $\frac{-13}{19}$ is $\frac{-19}{13}$.

- (iii) Multiplicative inverse of $\frac{1}{5}$ is 5.
- (iv) Multiplicative inverse of $\frac{-5}{8} \times \frac{-3}{7} = \frac{15}{56}$ is $\frac{56}{15}$.
- (v) Multiplicative inverse of $-1 \times \frac{-2}{5} = \frac{2}{5}$ is $\frac{5}{2}$.
- (vi) Multiplicative inverse of -1 is $\frac{1}{-1}$.

Question 5:

Name the property under multiplication used in each of the following:

- (i) $\frac{-4}{5} \times 1 = 1 \times \frac{-4}{5}$
- (ii) $-\frac{13}{17} \times \frac{-2}{7} = \frac{-2}{7} \times \frac{-13}{17}$
- (iii) $\frac{-19}{29} \times \frac{29}{-19} = 1$

Answer 5:

- (i) 1 is the multiplicative identity.
- (ii) Commutative property.
- (iii) Multiplicative Inverse property.

Question 6:

Multiply $\frac{6}{13}$ by the reciprocal of $\frac{-7}{16}$.

Answer 6:

The reciprocal of $\frac{-7}{16}$ is $\frac{-16}{7}$.

According to the question,

$$\frac{6}{13} \times \left(\frac{-16}{7} \right) = \frac{-96}{91}$$



Question 7:

Tell what property allows you to compute $\frac{1}{3} \times \left(6 \times \frac{4}{3}\right)$ as $\left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$.

Answer 7:

By using associative property of multiplication, $a \times (b \times c) = (a \times b) \times c$.

Question 8:

Is $\frac{8}{9}$ the multiplicative inverse of $-1\frac{1}{8}$? Why or why not?

Answer 8:

Since multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, if $a \times \frac{1}{a} = 1$.

Therefore, $\frac{8}{9} \times \left(-1\frac{1}{8}\right) = \frac{8}{9} \times \frac{-9}{8} = -1$

But its product must be positive 1.

Therefore, $\frac{8}{9}$ is not the multiplicative inverse of $\left(-1\frac{1}{8}\right)$.

Question 9:

Is 0.3 the multiplicative inverse of $3\frac{1}{3}$? Why or why not?

Answer 9:

Since multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, if $a \times \frac{1}{a} = 1$.

Therefore, $0.3 \times 3\frac{1}{3} = \frac{3}{10} \times \frac{10}{3} = 1$

Therefore, Yes 0.3 is the multiplicative inverse of $3\frac{1}{3}$.

Question 10:

Write:

- (i) The rational number that does not have a reciprocal.
- (ii) The rational numbers that are equal to their reciprocals.
- (iii) The rational number that is equal to its negative.

Answer 10:

- (i) 0
- (ii) 1 and -1
- (iii) 0

Question 11:

Fill in the blanks:

- (i) Zero has _____ reciprocal.
- (ii) The numbers _____ and _____ are their own reciprocals.
- (iii) The reciprocal of -5 is _____.
- (iv) Reciprocal of $\frac{1}{x}$, where $x \neq 0$ is _____.
- (v) The product of two rational numbers is always a _____.
- (vi) The reciprocal of a positive rational number is _____

Answer 11:

- (i) No
- (ii) 1, -1
- (iii) $\frac{-1}{5}$
- (iv) x
- (v) Rational Number
- (vi) Positive

Exercise 1.2

Question 1:

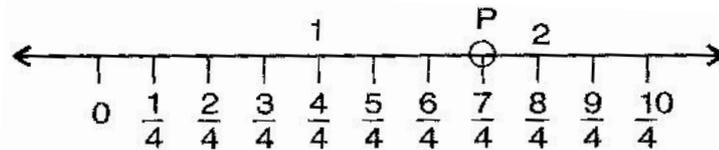
Represent these numbers on the number line:

(i) $\frac{7}{4}$

(ii) $\frac{-5}{6}$

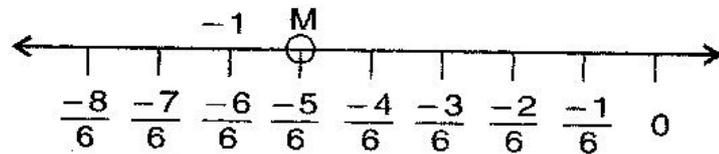
Answer 1:

(i) $\frac{7}{4} = 1\frac{3}{4}$



Here, P is $1\frac{3}{4} = \frac{7}{4}$

(ii) $\frac{-5}{6}$



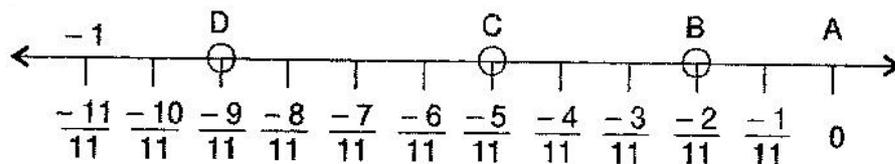
Here, M is $\frac{-5}{6}$

Question 2:

Represent $\frac{-2}{11}$, $\frac{-5}{11}$, $\frac{-9}{11}$ on the number line.

Answer 2:

Here, B = $\frac{-2}{11}$, C = $\frac{-5}{11}$ and D = $\frac{-9}{11}$



Question 3:

Write five rational numbers which are smaller than 2.

Answer 3:

$\frac{1}{3}, \frac{1}{4}, \frac{1}{2}, \frac{-1}{2}, \frac{-1}{5}$ and so on.

Question 4:

Find ten rational numbers between $\frac{-2}{5}$ and $\frac{1}{2}$.

Answer 4:

Given rational numbers $\frac{-2}{5}$ and $\frac{1}{2}$

Here, L.C.M. of 5 and 2 is 10.

$$\therefore \frac{-2}{5} \times \frac{2}{2} = \frac{-4}{10} \text{ and } \frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$$

$$\text{Again, } \frac{-4}{10} \times \frac{2}{2} = \frac{-8}{20} \text{ and } \frac{5}{10} \times \frac{2}{2} = \frac{10}{20}$$

\therefore Ten rational number between $\frac{-2}{5}$ and $\frac{1}{2}$ are $\frac{-7}{20}, \frac{-6}{20}, \frac{-5}{20}, \frac{-4}{20}, \frac{-3}{20}, \frac{-2}{20}, \frac{-1}{20}, 0, \frac{1}{20}, \frac{2}{20}$.

Question 5:

Find five rational numbers between:

(i) $\frac{2}{3}$ and $\frac{4}{5}$

(ii) $\frac{-3}{2}$ and $\frac{5}{3}$

(iii) $\frac{1}{4}$ and $\frac{1}{2}$

Answer 5:

(i) $\frac{2}{3}$ and $\frac{4}{5}$

L.C.M. of 3 and 5 is 15.

$$\therefore \frac{2}{3} \times \frac{5}{5} = \frac{10}{15} \text{ and } \frac{4}{5} \times \frac{3}{3} = \frac{12}{15}$$

$$\text{Again } \frac{10}{15} \times \frac{4}{4} = \frac{40}{60} \text{ and } \frac{12}{15} \times \frac{4}{4} = \frac{48}{60}$$

\therefore Five rational numbers between $\frac{2}{3}$ and $\frac{4}{5}$ are $\frac{41}{60}, \frac{42}{60}, \frac{43}{60}, \frac{44}{60}, \frac{45}{60}$.

(ii) $\frac{-3}{2}$ and $\frac{5}{3}$

L.C.M. of 2 and 3 is 6.

$$\therefore \frac{-3}{2} \times \frac{3}{3} = \frac{-9}{6} \text{ and } \frac{5}{3} \times \frac{2}{2} = \frac{10}{6}$$

\therefore Five rational numbers between $\frac{-3}{2}$ and $\frac{5}{3}$ are $\frac{-8}{6}, \frac{-7}{6}, 0, \frac{1}{6}, \frac{2}{6}$.

(iii) $\frac{1}{4}$ and $\frac{1}{2}$

L.C.M. of 4 and 2 is 4.

$$\therefore \frac{1}{4} \times \frac{1}{1} = \frac{1}{4} \text{ and } \frac{1}{2} \times \frac{2}{2} = \frac{2}{4}$$

$$\text{Again } \frac{1}{4} \times \frac{8}{8} = \frac{8}{32} \text{ and } \frac{2}{4} \times \frac{8}{8} = \frac{16}{32}$$

\therefore Five rational numbers between $\frac{1}{4}$ and $\frac{1}{2}$ are $\frac{9}{32}, \frac{10}{32}, \frac{11}{32}, \frac{12}{32}, \frac{13}{32}$.

Question 6:

Write 5 rational numbers greater than -2 .

Answer 6:

Five rational numbers greater than -2 are:

$$\frac{-3}{2}, -1, \frac{-1}{2}, 0, \frac{1}{2}$$

[Other rational numbers may also be possible]

Question 7:

Find ten rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$.

Answer 7:

The given rational numbers $\frac{3}{5}$ and $\frac{3}{4}$

L.C.M. of 5 and 4 is 20.

$$\therefore \frac{3}{5} \times \frac{4}{4} = \frac{12}{20} \text{ and } \frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$$

$$\text{Again } \frac{12}{20} \times \frac{8}{8} = \frac{96}{160} \text{ and } \frac{15}{20} \times \frac{8}{8} = \frac{120}{160}$$

\therefore Five rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$ are:

$$\frac{97}{160}, \frac{98}{160}, \frac{99}{160}, \frac{100}{160}, \frac{101}{160}, \frac{102}{160}, \frac{103}{160}, \frac{104}{160}, \frac{105}{160}, \frac{106}{160}$$