Mathematics

(Chapter – 1) (Rational Numbers)

(Class – VIII)

Exercise 1.1

Question 1:

Using appropriate properties find:

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

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

Answer 1:

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

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

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

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

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

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

$= \frac{2}{5}\times\left(\frac{-3}{7}+\frac{1}{14}\right)-\frac{1}{4}$ [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 $-(-x)=x$,

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

$\Rightarrow$ L.H.S. = R.H.S.

Hence, verified.

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

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

$\Rightarrow$ L.H.S. = 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

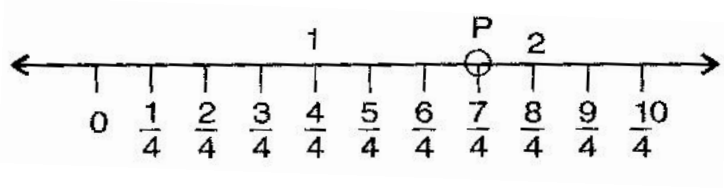
Question 1:

Represent these numbers on the number line:

(i) $\frac{7}{4}$ (ii) $\frac{-5}{6}$

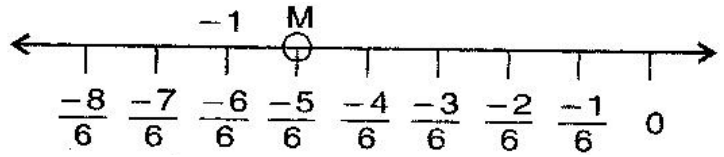
Answer 1:

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



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

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



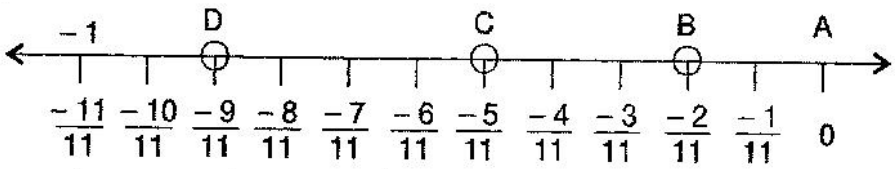
Here, M is $\frac{-5}{6}$

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.

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

Again, $\frac{-4}{10} \times \frac{2}{2} = \frac{-8}{20}$ 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.

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

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

$\therefore \quad$ 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.

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

$\therefore \quad$ 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.

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

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

$\therefore \quad$ 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.

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

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

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

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