Exercise 1.1 : Solutions of Questions on Page Number : 14

Q1 :

Using appropriate properties find:

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

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

Answer :

(i)

$$-\dfrac{2}{3} \times \dfrac{3}{5} + \dfrac{5}{2} - \dfrac{3}{5} \times \dfrac{1}{6} = -\dfrac{2}{3} \times \dfrac{3}{5} - \dfrac{3}{5} \times \dfrac{1}{6} + \dfrac{5}{2}$$

(Using commutativity of rational numbers)

$$= \left(-\dfrac{3}{5}\right) \times \left(\dfrac{2}{3} + \dfrac{1}{6}\right) + \dfrac{5}{2} \qquad \text{(Distributivity)}$$

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

$$= \left(-\dfrac{3}{6}\right) + \dfrac{5}{2} = \left(\dfrac{-3 + 5 \times 3}{6}\right) = \left(\dfrac{-3 + 15}{6}\right)$$

$$= \dfrac{12}{6} = 2$$

(ii)

$$\dfrac{2}{5} \times \left(-\dfrac{3}{7}\right) - \dfrac{1}{6} \times \dfrac{3}{2} + \dfrac{1}{14} \times \dfrac{2}{5} = \dfrac{2}{5} \times \left(-\dfrac{3}{7}\right) + \dfrac{1}{14} \times \dfrac{2}{5} - \dfrac{1}{6} \times \dfrac{3}{2}$$ (By commutativity)

$$= \frac{2}{5} \times \left(-\frac{3}{7} + \frac{1}{14} \right) - \frac{1}{4} \qquad \text{(By distributivity)}$$

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

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

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

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

Q2 :

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 :

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

Additive inverse = $-\frac{2}{8}$

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

Additive inverse = $\frac{5}{9}$

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

Additive inverse = $\frac{-6}{5}$

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

$$= \frac{2}{9}$$

Additive inverse

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

Additive inverse $= \frac{19}{6}$

Q3 :

Verify that - (- x) = x for.

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

Answer :

(i) $x = \frac{11}{15}$

The additive inverse of $x = \frac{11}{15}$ is $-x = -\frac{11}{15}$ as $\frac{11}{15} + \left(-\frac{11}{15}\right) = 0$

This equality $\frac{11}{15} + \left(-\frac{11}{15}\right) = 0$ represents that the additive inverse of $-\frac{11}{15}$ is $\frac{11}{15}$ or it can be said

that $-\left(-\frac{11}{15}\right) = \frac{11}{15}$ i.e., - (- x) = x

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

The additive inverse of $x = -\frac{13}{17}$ is $-x = \frac{13}{17}$ as $-\frac{13}{17} + \frac{13}{17} = 0$

This equality $-\frac{13}{17} + \frac{13}{17} = 0$ represents that the additive inverse of $\frac{13}{17}$ is $-\frac{13}{17}$ i.e., - (- x) = x

Q4 :

Find the multiplicative inverse of the following.

(i) -13 (ii) $\dfrac{-13}{19}$ (iii) $\dfrac{1}{5}$

(iv) $\dfrac{-5}{8} \times \dfrac{-3}{7}$ (v) $-1 \times \dfrac{-2}{5}$ (vi) - 1

Answer :

(i) - 13

Multiplicative inverse = - $\dfrac{1}{13}$

(ii) $-\dfrac{13}{19}$

Multiplicative inverse = $-\dfrac{19}{13}$

(iii) $\dfrac{1}{5}$

Multiplicative inverse = 5

(iv) $-\dfrac{5}{8} \times -\dfrac{3}{7} = \dfrac{15}{56}$

Multiplicative inverse $= \dfrac{56}{15}$

(v) $-1 \times -\dfrac{2}{5} = \dfrac{2}{5}$

Multiplicative inverse $= \dfrac{5}{2}$

(vi) - 1

Multiplicative inverse = - 1

Q5 :

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

(i) $\dfrac{-4}{5} \times 1 = 1 \times \dfrac{-4}{5} = -\dfrac{4}{5}$

(ii) $-\dfrac{13}{17} \times \dfrac{-2}{7} = \dfrac{-2}{7} \times \dfrac{-13}{17}$

(iii) $\dfrac{-19}{29} \times \dfrac{29}{-19} = 1$

Answer :

(i) $-\dfrac{4}{5} \times 1 = 1 \times -\dfrac{4}{5} = -\dfrac{4}{5}$

1 is the multiplicative identity.

(ii) Commutativity   (iii)

Multiplicative   inverse

Q6 :

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

Answer :

$\dfrac{6}{13} \times \left(\text{Reciprocal of } -\dfrac{7}{16} \right) = \dfrac{6}{13} \times -\dfrac{16}{7} = -\dfrac{96}{91}$

Q7 :

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

Answer :

Associativity

Q8 :

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

Answer :

If it is the multiplicative inverse, then the product should be 1.

However, here, the product is not 1 as

$$\dfrac{8}{9} \times \left(-1\dfrac{1}{8}\right) = \dfrac{8}{9} \times \left(-\dfrac{9}{8}\right) = -1 \neq 1$$

Q9 :

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

Answer :

$$3\dfrac{1}{3} = \dfrac{10}{3}$$

$$0.3 \times 3\dfrac{1}{3} = 0.3 \times \dfrac{10}{3} = \dfrac{3}{10} \times \dfrac{10}{3} = 1$$

Here, the product is 1. Hence, 0.3 is the multiplicative inverse of $3\dfrac{1}{3}$.

Q10 :

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 :

(i) 0 is a rational number but its reciprocal is not defined.

(ii) 1 and -1 are the rational numbers that are equal to their reciprocals.

(iii) 0 is the rational number that is equal to its negative.

Q11 :

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 $\dfrac{1}{x}$, 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 :

(i) No

(ii) 1, - 1

(iii) $-\dfrac{1}{5}$

(iv) x

(v) Rational number

(vi) Positive rational number

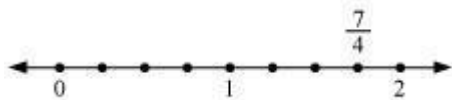Exercise 1.2 : Solutions of Questions on Page Number : 20
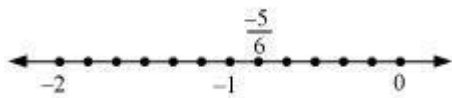
Q1 :

Represent these numbers on the number line.

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

Answer :

(i) $\dfrac{7}{4}$ can be represented on the number line as follows.

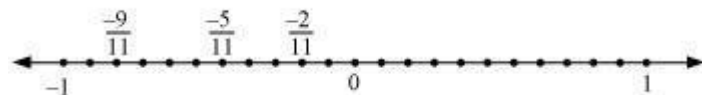(ii) $\dfrac{-5}{6}$ can be represented on the number line as follows.

Q2 :

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

Answer :

$\dfrac{-2}{11}, \dfrac{-5}{11}, \dfrac{-9}{11}$ can be represented on the number line as follows.

Q3 :

Write five rational numbers which are smaller than 2.

Answer :

2 can be represented as $\dfrac{14}{7}$.

Therefore, five rational numbers smaller than 2 are

$$\dfrac{13}{7}, \dfrac{12}{7}, \dfrac{11}{7}, \dfrac{10}{7}, \dfrac{9}{7}$$

Q4 :

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

Answer :

$\dfrac{-2}{5}$ and $\dfrac{1}{2}$ can be represented as $-\dfrac{8}{20}$ and $\dfrac{10}{20}$ respectively.

Therefore, ten rational numbers between $\dfrac{-2}{5}$ and $\dfrac{1}{2}$ are

$$-\dfrac{7}{20}, -\dfrac{6}{20}, -\dfrac{5}{20}, -\dfrac{4}{20}, -\dfrac{3}{20}, -\dfrac{2}{20}, -\dfrac{1}{20}, 0, \dfrac{1}{20}, \dfrac{2}{20}$$

Q5 :

Find five rational numbers between

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

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

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

Answer :

(i) $\dfrac{2}{3}$ and $\dfrac{4}{5}$ can be represented as $\dfrac{30}{45}$ and $\dfrac{36}{45}$ respectively.

Therefore, five rational numbers between $\dfrac{2}{3}$ and $\dfrac{4}{5}$ are

$\dfrac{31}{45}, \dfrac{32}{45}, \dfrac{33}{45}, \dfrac{34}{45}, \dfrac{35}{45}$

(ii) $-\dfrac{3}{2}$ and $\dfrac{5}{3}$ can be represented as $-\dfrac{9}{6}$ and $\dfrac{10}{6}$ respectively.

Therefore, five rational numbers between $-\dfrac{3}{2}$ and $\dfrac{5}{3}$ are

$-\dfrac{8}{6}, -\dfrac{7}{6}, -1, -\dfrac{5}{6}, -\dfrac{4}{6}$

(iii) $\dfrac{1}{4}$ and $\dfrac{1}{2}$ can be represented as $\dfrac{8}{32}$ and $\dfrac{16}{32}$ respectively.

Therefore, five rational numbers between $\dfrac{1}{4}$ and $\dfrac{1}{2}$ are

$\dfrac{9}{32}, \dfrac{10}{32}, \dfrac{11}{32}, \dfrac{12}{32}, \dfrac{13}{32}$

Q6 :

Write five rational numbers greater than - 2.

Answer :

- 2 can be represented as - $\dfrac{14}{7}$.

Therefore, five rational numbers greater than - 2 are

$-\dfrac{13}{7}, -\dfrac{12}{7}, -\dfrac{11}{7}, -\dfrac{10}{7}, -\dfrac{9}{7}$

Q7 :

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

Answer :

$\dfrac{3}{5}$ and $\dfrac{3}{4}$ can be represented as $\dfrac{48}{80}$ and $\dfrac{60}{80}$ respectively.

Therefore, ten rational numbers between $\dfrac{3}{5}$ and $\dfrac{3}{4}$ are

$$\dfrac{49}{80}, \dfrac{50}{80}, \dfrac{51}{80}, \dfrac{52}{80}, \dfrac{53}{80}, \dfrac{54}{80}, \dfrac{55}{80}, \dfrac{56}{80}, \dfrac{57}{80}, \dfrac{58}{80}$$