Mathematics

Exercise 1.1

Question 1:
Using appropriate properties find:

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

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

Answer 1:

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

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

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

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

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

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

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

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

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

Question 2:
Write the additive inverse of each of the following:

(i) $\quad \dfrac{2}{8}$

(ii) $\quad \dfrac{-5}{9}$

(iii) $\quad \dfrac{-6}{-5}$

(iv) $\quad \dfrac{2}{-9}$

(v) $\quad \dfrac{19}{-6}$

Answer 2:

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

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

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

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

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

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

Question 3:

Verify that $-(-x) = x$ for: (i) $x = \dfrac{11}{15}$ (ii) $x = -\dfrac{13}{17}$

Answer 3:

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

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

$\Rightarrow$ L.H.S. = R.H.S.
Hence, verified.

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

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

$\Rightarrow$ L.H.S. = R.H.S.
Hence, verified.

Question 4:

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 4:

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

(i)   Multiplicative inverse of -13 is $\dfrac{-1}{13}$.

(ii)   Multiplicative inverse of $\dfrac{-13}{19}$ is $\dfrac{-19}{13}$.

(iii)   Multiplicative inverse of $\dfrac{1}{5}$ is 5.

(iv)   Multiplicative inverse of $\dfrac{-5}{8} \times \dfrac{-3}{7} = \dfrac{15}{56}$ is $\dfrac{56}{15}$.

(v)   Multiplicative inverse of $-1 \times \dfrac{-2}{5} = \dfrac{2}{5}$ is $\dfrac{5}{2}$.

(vi)   Multiplicative inverse of -1 is $\dfrac{1}{-1}$.

Question 5:
Name the property under multiplication used in each of the following:

(i) $\dfrac{-4}{5} \times 1 = 1 \times \dfrac{-4}{5}$ (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 5:
(i)   1 is the multiplicative identity.
(ii)   Commutative property.
(iii)   Multiplicative Inverse property.

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

Answer 6:
The reciprocal of $\dfrac{-7}{16}$ is $\dfrac{-16}{7}$.
According to the question,

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

Question 7:
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 7:
By using associative property of multiplication, $a \times (b \times c) = (a \times b) \times c$.

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

Answer 8:
Since multiplicative inverse of a rational number a is $\left(\dfrac{1}{a} \right)$, if $a \times \dfrac{1}{a} = 1$.

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

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