PUBLIC SCHOOL DARBHANGA

SESSION (2020-21)
CLASS-VIII
MATHEMATICS
Topic : Rational numbers

1. Using appropriate properties find.

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

Solution:

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

$$=-\frac{2}{3}\times\frac{3}{5}-\frac{3}{5}\times\frac{1}{6}+\frac{5}{2} \quad \text{(by commutativity)}$$

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

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

$$=\frac{3}{5}(\frac{-5}{6})+\frac{5}{2} \quad \text{(by distributivity)}$$

$$=\frac{-15}{30}+\frac{5}{2}$$

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

$$=\frac{4}{2}$$

$$=2$$

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

Solution:

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

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

$$=\frac{2}{5}\times(-\frac{3}{7})+\frac{1}{14}\times\frac{2}{5}-(\frac{1}{6}\times\frac{3)}{2} \quad \text{(by commutativity)}$$

$$= \frac{2}{5} \times \left(-\frac{3}{7} + \frac{1}{14}\right) - \frac{3}{12}$$

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

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

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

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

$$= \left(\frac{-10}{70}\right) - \frac{1}{4}$$

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

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

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

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

Solution:

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

Additive inverse of $\frac{2}{8}$ is $\frac{-2}{8}$

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

Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$

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

Additive inverse of $\frac{6}{5}$ is $\frac{-6}{5}$

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

Additive inverse of $\frac{-2}{9}$ is $\frac{2}{9}$

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

Additive inverse of $\frac{-19}{6}$ is $\frac{19}{6}$

3. **Verify that : -(-x) = x for.**

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

Solution:

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

We have, $x = \frac{11}{15}$

The additive inverse of x is –x (as x+(-x)=0)

Then, the additive inverse of $\frac{11}{15}$ is $\frac{-11}{15}$ (as $\frac{11}{15} + (\frac{-11}{15}) = 0$

The same equality $\frac{11}{15} + (\frac{-11}{15}) = 0$, shows that the additive inverse of $\frac{-11}{15}$ is $\frac{11}{15}$.

Or, $-(\frac{-11}{15}) = \frac{11}{15}$,

i.e., -(-x)=x.

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

We have, $x = \frac{-13}{17}$

The additive inverse of x is –x (as x+(-x)=0)

Then, the additive inverse of $\frac{-13}{17}$ is $\frac{13}{17}$ (as $(\frac{-13}{17} + \frac{13}{17}) = 0$

The same equality $(\frac{-13}{17} + \frac{13}{17}) = 0$, shows that the additive inverse of $\frac{13}{17}$ is $\frac{-13}{17}$.

Or, $-(\frac{13}{17}) = \frac{-13}{17}$,

i.e., -(-x)=x

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

Solution:

(i) -13

Multiplicative inverse of -13 is $\frac{-1}{13}$

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

Multiplicative inverse of $\frac{-13}{19}$ is $\frac{-19}{13}$

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

Multiplicative inverse of $\frac{1}{5}$ is 5

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

Multiplicative inverse of $\frac{15}{56}$ is $\frac{56}{15}$

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

Multiplicative inverse of $\frac{2}{5}$ is $\frac{5}{2}$

(vi) -1

Multiplicative inverse of -1 is -1

5. Name the property under multiplication used in each of the following.

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

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

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

Solution:

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

Here 1 is the multiplicative identity.

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

The property of commutativity is used in the equation.

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

Multiplicative inverse is the property used in this equation.

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

Solution:

Reciprocal of $\frac{-7}{16} = \frac{16}{-7} = \frac{-16}{7}$

According to the question,

$\frac{6}{13} \times$ (Reciprocal of $\frac{-7}{16}$)

$\Rightarrow \frac{6}{13} \times \frac{-16}{7} = \frac{-96}{91}$

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

Solution:

$\frac{1}{3} \times (6 \times \frac{4}{3}) = (\frac{1}{3} \times 6) \times \frac{4}{3}$

Here, the way in which factors are grouped in a multiplication problem, supposedly, does not change the product. Hence, the Associativity Property is used here.

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

Solution:

$-1\frac{1}{8} = \frac{-7}{8}$

[Multiplicative inverse $\Rightarrow$ product should be 1]

According to the question,

$\Rightarrow \quad \frac{8}{9} \times \frac{-7}{8} = \frac{-7}{9} \neq 1$

$\therefore$, $\frac{8}{9}$ is **not** the multiplicative inverse of $-1\frac{1}{8}$

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

Solution:

$0.3 = \frac{3}{10}$

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

[Multiplicative inverse $\Rightarrow$ product should be 1]

According to the question,

$\Rightarrow \quad \frac{3}{10} \times \frac{10}{3} = 1$

$\therefore$, 0.3 is the multiplicative inverse of $3\frac{1}{3}$

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.

Solution:

(i) The rational number that does not have a reciprocal is **0**.

Reason:

$0 = \frac{0}{1}$

Reciprocal of $0 = \frac{1}{0}$, which is not defined.

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

Reason:

$1 = \frac{1}{1}$

Reciprocal of $1 = \frac{1}{1} = 1$ Similarly, Reciprocal of -1= -1

(iii) The rational number that is equal to its negative is **0**.
Reason:
Negative of 0=-0=0

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 ≠ 0 is _____.

(v) The product of two rational numbers is always a_____.

(vi) The reciprocal of a positive rational number is_____.

Solution:

(i) Zero has **no** reciprocal.

(ii) The numbers **1** and **-1** are their own reciprocals

(iii) The reciprocal of -5 is $\frac{-1}{5}$.

(iv) Reciprocal of $\frac{1}{x}$, where x ≠ 0 is **x**.

(v) The product of two rational numbers is always a **rational numbers**.

(vi) The reciprocal of a positive rational number is **positive**.