RD SHARMA

Solutions

Class 8 Maths

Chapter 1

Ex *1.6*

Q-1. Verify the property $x \times y = y \times x$ **by taking:**

(i) $x = \frac{-1}{3}, y = \frac{2}{7}$

(ii) $x = \frac{-3}{5}, y = \frac{-11}{13}$

(iii) $x = 2, y = \frac{7}{-8}$

(iv) $x = 0, y = \frac{-15}{8}$

Solution. We have to verify that, $x \times y = y \times x$

(i) $x = \frac{-1}{3}, y = \frac{2}{7}$

$x \times y = \frac{-1}{3} \times \frac{2}{7} = \frac{-2}{21}$ $y \times x = \frac{2}{7} \times \frac{-1}{3} = \frac{-2}{21}$

$\therefore \frac{-1}{3} \times \frac{2}{7} = \frac{2}{7} \times \frac{-1}{3}$
Hence, verified.

(ii) $x = \frac{-3}{5}, y = \frac{-11}{13}$

$x \times y = \frac{-3}{5} \times \frac{-11}{13} = \frac{33}{65}$ $y \times x = \frac{-11}{13} \times \frac{-3}{5} = \frac{33}{65}$

$\therefore \frac{-3}{5} \times \frac{-11}{13} = \frac{-11}{13} \times \frac{-3}{5}$
Hence, verified.

(iii) $x = 2, y = \frac{7}{-8}$

$x \times y = 2 \times \frac{7}{-8} = \frac{7}{-4}$ $y \times x = \frac{7}{-8} \times 2 = \frac{7}{-4}$

$\therefore 2 \times \frac{7}{-8} = \frac{7}{-8} \times 2$
Hence, verified.

(iv) $x = 0, y = \frac{-15}{8}$

$x \times y = 0 \times \frac{-15}{8} = 0$ $y \times x = \frac{-15}{8} \times 0 = 0$

$\therefore 0 \times \frac{-15}{8} = \frac{-15}{8} \times 0 = 0$
Hence, verified.

Q-2. Verify the property: $x \times (y \times z) = (x \times y) \times z$

(i) $x = \frac{-7}{3}, y = \frac{12}{5}, z = \frac{4}{9}$

(ii) $x = 0, y = \frac{-3}{5}, z = \frac{-9}{4}$

(iii) $x = \frac{1}{2}, y = \frac{5}{-4}, z = \frac{-7}{5}$

(iv) $x = \frac{5}{7}, y = \frac{-12}{13}, z = \frac{-7}{18}$

Solution: We have to verify that, $x \times (y \times z) = (x \times y) \times z$

(i) $x = \frac{-7}{3}, y = \frac{12}{5}, z = \frac{4}{9}$

$\Rightarrow x \times (y \times z) = \frac{-7}{3} \times (\frac{12}{5} \times \frac{4}{9}) = \frac{-7}{3} \times \frac{16}{15} = \frac{-112}{45} \Rightarrow (x \times y) \times z = (\frac{-7}{3} \times \frac{12}{5}) \times \frac{4}{9} = \frac{-28}{5} \times \frac{4}{9} = \frac{-112}{45}$

$\therefore \frac{-7}{8} \times (\frac{15}{5} \times \frac{4}{9}) = (\frac{-7}{8} \times \frac{15}{5}) \times \frac{4}{9}$

(ii) $x = 0, y = \frac{-3}{5}, z = \frac{-9}{4}$

$\Rightarrow x \times (y \times z) = 0 \times (\frac{-3}{5} \times \frac{-9}{4}) = 0 \times \frac{27}{20} = 0 \Rightarrow (x \times y) \times z = (0 \times \frac{-3}{5}) \times \frac{-9}{4} = 0 \times \frac{-9}{4} = 0$

$\therefore 0 \times (\frac{-3}{5} \times \frac{-9}{4}) = (0 \times \frac{-3}{5}) \times \frac{-9}{4}$

(iii) $x = \frac{1}{2}, y = \frac{5}{-4}, z = \frac{-7}{5}$

$\Rightarrow x \times (y \times z) = \frac{1}{2} \times (\frac{5}{-4} \times \frac{-7}{4}) = \frac{-1}{2} \times \frac{35}{16} = \frac{35}{32} \Rightarrow (x \times y) \times z = (\frac{1}{2} \times \frac{5}{-4}) \times \frac{-7}{4} = \frac{-5}{-8} \times \frac{-7}{4} = \frac{35}{32}$

$\therefore \frac{1}{2} \times (\frac{5}{-4} \times \frac{-7}{4}) = (\frac{1}{2} \times \frac{5}{-4}) \times \frac{-7}{4}$

(iv) $x = \frac{5}{7}, y = \frac{-12}{13}, z = \frac{-7}{18}$

$\Rightarrow x \times (y \times z) = \frac{5}{7} \times (\frac{-12}{13} \times \frac{-7}{18}) = \frac{5}{7} \times \frac{14}{39} = \frac{10}{39} \Rightarrow (x \times y) \times z = (\frac{5}{7} \times \frac{-12}{13}) \times \frac{-7}{18} = \frac{-60}{91} \times \frac{-7}{18} = \frac{10}{39}$

$\therefore \frac{5}{7} \times (\frac{-12}{13} \times \frac{-7}{18}) = (\frac{5}{7} \times \frac{-12}{13}) \times \frac{-7}{18}$

Q-3. Verify the property: $x \times (y \times z) = x \times y + x \times z$**:**

(i) $x = \frac{-3}{7}, y = \frac{12}{13}, z = \frac{-5}{6}$

(ii) $x = \frac{-12}{5}, y = \frac{-15}{4}, z = \frac{8}{3}$

(iii) $x = \frac{-8}{3}, y = \frac{5}{6}, z = \frac{-13}{12}$

(iv) $x = \frac{-3}{4}, y = \frac{-5}{2}, z = \frac{7}{6}$

Solution: We have to verify that, $x \times (y \times z) = x \times y + x \times z$

(i) $x = \frac{-3}{7}, y = \frac{12}{13}, z = \frac{-5}{6}$

$x \times (y + z) = \frac{-3}{7} \times (\frac{12}{13} + \frac{-5}{6}) = \frac{-3}{7} \times \frac{72-65}{78} = \frac{-3}{7} \times \frac{7}{78} = \frac{-1}{26} x \times y + x \times z = \frac{-3}{7} \times \frac{12}{13} + \frac{-3}{7} \times \frac{-5}{6} = \frac{-36}{91} + \frac{5}{14} = \frac{-36 \times 2 + 5 \times 13}{182} = \frac{-1}{26}$

$\therefore \frac{-3}{7} \times (\frac{12}{13} + \frac{-5}{6}) = \frac{-3}{7} \times \frac{12}{13} + \frac{-3}{7} \times \frac{-5}{6}$

Hence, verified.

(ii) $x = \frac{-12}{5}, y = \frac{-15}{4}, z = \frac{8}{3}$

$x \times (y + z) = \frac{-12}{5} \times (\frac{-15}{4} + \frac{8}{3}) = \frac{-12}{5} \times \frac{-45+32}{12} = \frac{-12}{5} \times \frac{-13}{12} = \frac{13}{5} x \times y + x \times z = \frac{-12}{5} \times \frac{-15}{4} + \frac{-12}{5} \times \frac{8}{3} = \frac{9}{1} + \frac{-32}{5} = \frac{45-32}{5} = \frac{13}{5}$

$\therefore \frac{-12}{5} \times (\frac{-15}{4} + \frac{8}{3}) = \frac{-12}{5} \times \frac{-15}{4} + \frac{-12}{5} \times \frac{8}{3}$

Hence, verified.

(iii) $x = \frac{-8}{3}, y = \frac{5}{6}, z = \frac{-13}{12}$

$x \times (y + z) = \frac{-8}{3} \times (\frac{5}{6} + \frac{-13}{12}) = \frac{-8}{3} \times \frac{10-13}{12} = \frac{-8}{3} \times \frac{-3}{12} = \frac{2}{3} x \times y + x \times z = \frac{-8}{3} \times \frac{5}{6} + \frac{-8}{3} \times \frac{-13}{12} = \frac{-20}{9} + \frac{26}{9} = \frac{-20+26}{9} = \frac{6}{9} = \frac{2}{3}$

$\therefore \frac{-8}{3} \times (\frac{5}{6} + \frac{-13}{12}) = \frac{-8}{3} \times \frac{5}{6} + \frac{-8}{3} \times \frac{-13}{12}$
Hence, verified.

(iv) $x = \frac{-3}{4}, y = \frac{-5}{2}, z = \frac{7}{6}$

$x \times (y + z) = \frac{-3}{4} \times (\frac{-5}{2} + \frac{7}{6}) = \frac{-3}{4} \times \frac{-15+7}{6} = \frac{-3}{4} \times \frac{-8}{6} = 1 x \times y + x \times z = \frac{-3}{4} \times \frac{-5}{2} + \frac{-3}{4} \times \frac{7}{6} = \frac{15}{8} + \frac{-7}{8} = \frac{15-7}{8} = 1$

$\therefore \frac{-3}{4} \times (\frac{-5}{2} + \frac{7}{6}) = \frac{-3}{4} \times \frac{-5}{2} + \frac{-3}{4} \times \frac{7}{6}$
Hence, verified.

Q-4. Use the distributivity of multiplication of rational numbers over their addition to simplify:

(i) $\frac{3}{5} \times (\frac{35}{24} + \frac{10}{1})$

(ii) $\frac{-5}{4} \times (\frac{8}{5} + \frac{16}{5})$

(iii) $\frac{2}{7} \times (\frac{7}{16} - \frac{21}{4})$

(iv) $\frac{3}{4} \times (\frac{8}{9} - 40)$

Solution:

(i) $\frac{3}{5} \times (\frac{35}{24} + \frac{10}{1}) = \frac{3}{5} \times \frac{35}{24} + \frac{3}{5} \times \frac{10}{1} = \frac{7+48}{8} = \frac{55}{8}$

(ii) $\frac{-5}{4} \times (\frac{8}{5} + \frac{16}{5}) = \frac{-5}{4} \times \frac{8}{5} + \frac{-5}{4} \times \frac{16}{5} = \frac{-2}{2} \times \frac{-4}{1} = -6$

(iii) $\frac{2}{7} \times (\frac{7}{16} - \frac{21}{4}) = \frac{2}{7} \times \frac{7}{16} - \frac{2}{7} \times \frac{21}{4} = \frac{1}{8} - \frac{3}{2} = \frac{1-12}{8} = \frac{-11}{8}$

(iv) $\frac{3}{4} \times (\frac{8}{9} - 40) = \frac{3}{4} \times \frac{8}{9} - \frac{3}{4} \times 40 = \frac{2}{3} - 30 = \frac{2-90}{3} = \frac{-88}{3}$

Q-5. Find the multiplicative inverse (reciprocal) of each of the following rational numbers:

(i) 9

(ii) -7

(iii) $\frac{12}{5}$

(iv) $\frac{-7}{9}$

(v) $\frac{-3}{-5}$

(vi) $\frac{2}{3} \times \frac{9}{4}$

(vii) $\frac{-5}{16} 15 \times \frac{-3}{5}$

(viii) $-2 \times \frac{-3}{5}$

(ix) -1

(x) $\frac{0}{3}$

(xi) 1

Solution:

(i) Multiplicative inverse (reciprocal) of $9 = \frac{1}{9}$.

(ii) Multiplicative inverse (reciprocal) of $-7 = \frac{1}{-7}$

(iii) Multiplicative inverse (reciprocal) of $\frac{12}{5} = \frac{5}{12}$

(iv) Multiplicative inverse (reciprocal) of $\frac{-7}{9} = \frac{-9}{7}$

(v) Multiplicative inverse (reciprocal) of $\frac{-3}{-5} = \frac{-5}{-3}$ or $\frac{5}{3}$

(vi) Multiplicative inverse (reciprocal) of $\frac{2}{3} \times \frac{9}{4} = \frac{3}{2} \times \frac{4}{9} = \frac{2}{3}$

(vii) Multiplicative inverse (reciprocal) of $\frac{-5}{8} \times \frac{16}{15} = \frac{8}{-5} \times \frac{15}{16} = \frac{-3}{2}$

(viii) Multiplicative inverse (reciprocal) of $-2 \times \frac{-3}{5} = \frac{1}{-2} \times \frac{5}{-3} = \frac{5}{6}$

(ix) Multiplicative inverse (reciprocal) of $-1 = \frac{1}{-1} = -1$

(x) Multiplicative inverse (reciprocal) of $\frac{0}{3} = \frac{3}{0}$ Undefined

(xi) Multiplicative inverse (reciprocal) of $1 = \frac{1}{1} = 1$

Q-6. Name the property of multiplication of rational numbers illustrated by the following statements:

(i) $\frac{-5}{16} \times \frac{8}{15} = \frac{8}{15} \times \frac{-5}{16}$

(ii) $\frac{-17}{5} \times 9 = 9 \times \frac{-17}{5}$

(iii) $\frac{7}{4} \times (\frac{-8}{3} + \frac{-13}{12}) = \frac{7}{4} \times \frac{-8}{3} + \frac{7}{4} \times \frac{-13}{12}$

(iv) $\frac{-5}{9} \times (\frac{4}{15} + \frac{-9}{8}) = (\frac{-5}{9} \times \frac{4}{15}) \times \frac{-9}{8}$

(v) $\frac{13}{-17} \times 1 = \frac{13}{-17} = 1 \times \frac{13}{-17}$

(vi) $\frac{-11}{16} \times \frac{16}{-11} = 1$

(vii) $\frac{2}{13} \times 0 = 0 = 0 \times \frac{2}{13}$

(viii) $\frac{3}{-2} \times \frac{5}{4} + \frac{-3}{2} \times \frac{-7}{6} = \frac{-3}{2} \times (\frac{5}{4} + \frac{-7}{6})$

Solution:

(i) Commutative property

(ii) Commutative Property

(iii) Distributivity of multiplication over addition

(iv) Associativity of multiplication.

(v) The existence of identity for multiplication.

(vi) Existence of multiplicative inverse

(vii) Multiplication by 0

(viii) Distributive property

Q-7. Fill in the blanks:

(i) The product of two positive rational numbers is always …….

(ii) The product of a positive rational number and a negative rational number is always ……

(iii) The product of two negative rational numbers is always ……

(iv) The reciprocal of a positive rational number is …….

(v) The reciprocal of a negative rational number is …….

(vi) Zero has …… reciprocal.

(vii) The product of a rational number and its reciprocal is …….

(viii) The numbers ……. and …….. are their own reciprocals.

(ix) If a is reciprocal of b, then the reciprocal of b is ……

(x) The number 0 is …… The reciprocal of any number.

(xi) Reciprocal of $\frac{1}{a}, a \neq 0$ **is ……**

(xii) $(17 \times 12)^{-1} = (17)^{-1} \times \ldots \ldots \ldots$

Solution:

(i) Positive

(ii) Negative

(iii) Positive

(iv) Positive

(v) Negative

(vi) No

(vii) 1

(viii) -1 and 1

(ix) a

(x) not

(xi) a

(xii) 12^{-1}

Q-8. Fill in the blanks:

(i) $-4 \times \frac{7}{9} = \frac{7}{9} \times \ldots\ldots\ldots$

(ii) $\frac{5}{11} \times \frac{-3}{8} = \frac{-3}{8} \times \ldots\ldots\ldots$

(iii) $\frac{1}{2} \times (\frac{3}{4} + \frac{-5}{12}) = \frac{1}{2} \times \ldots\ldots\ldots + \ldots\ldots\ldots \times \frac{-5}{12}$

(iv) $\frac{-4}{5} \times (\frac{5}{7} + \frac{-8}{9}) = (\frac{-4}{5} \times \ldots\ldots) + \frac{-4}{5} \times \frac{-8}{9}$

Solution:

(i) As, $x \times y = y \times x$ that is commutativity

So, -4

(ii) As, $x \times y = y \times x$ that is commutativity

So, $\frac{5}{11}$

(iii) As, $x \times (y + z) = x \times y + x \times z$ that is distributivity of multiplication over addition

So, $\frac{3}{4}, \frac{1}{2}$

(iv) As, $x \times (y \times z) = (x \times y) \times z$ that is associativity of multiplication

So, $\frac{5}{7}$