Q1. Additive inverse of −2/−5 is

(a) 2/5

(b) 5/2

(c) 2/−5

(d) 5/−2

Answer:

Additive inverse of $\frac{-2}{-5}$ is $\frac{2}{-5}$. (c)

Q2. Sum of a rational number and its additive inverse is

(a) 1

(b) 0

(c) -1

(d) None of these

Answer:

Sum of a rational number and its additive inverse is 0. (b)

Q3. Rational numbers are not closed under

(a) addition

(b) subtraction

(c) multiplication

(d) division

Answer:

Rational numbers are not closed under division. (d)

Q4. Multiplication of a non-zero rational number and its reciprocal is

(a) 0

(b) 1

(c) -1

(d) None of these

Answer:

Multiplication of a non-zero rational number and its reciprocal is 1. (b)

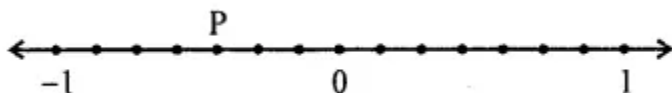**Q5. The sum of the rational number 4/7 and its reciprocal is**

(a) 28/65

(b) 65/28

(c) −28/65

(d) −65/28

Answer:

Sum of rational number $\frac{4}{7}$ and its reciprocal is $\frac{65}{28}$. (b)

Q6. The rational number represented by the point P on the number line is

(a) −5/7

(b) −3/7

(c) −5/8

(d) −4/8

Answer:

Rational number represented by the point P

on the given number line is $\frac{-3}{7}$ (b)

Q7. If a = −11/27, b = 4/9 and c = −5/18, then verify that a + (b + c) = (a + b) + c.

Answer:

$a = \dfrac{-11}{27}, b = \dfrac{4}{9}$ and $c = \dfrac{-5}{18}$

$a + (b + c) = (a + b) + c$

L.H.S. $= a + (b + c)$

$= \dfrac{-11}{27} + \left[\dfrac{4}{9} + \left(\dfrac{-5}{18}\right)\right]$

$= \dfrac{-11}{27} + \left[\dfrac{4}{9} - \dfrac{5}{18}\right]$

$= \dfrac{-11}{27} + \dfrac{8-5}{18} = \dfrac{-11}{27} + \dfrac{3}{18}$

$= \dfrac{-22+9}{54}$ (LCM of 27, 18 = 54)

$= \dfrac{-13}{54}$

R.H.S. $= (a + b) + c$

$= \left(\dfrac{-11}{27} + \dfrac{4}{9}\right) + \left(\dfrac{-5}{18}\right)$

$= \dfrac{-11+12}{27} + \left(\dfrac{-5}{18}\right)$

$= \dfrac{1}{27} + \dfrac{-5}{18}$

$= \dfrac{2-15}{54} = \dfrac{-13}{54}$

L.H.S. = R.H.S.

Q8. If x = 49, y = −712 and z = −23, then verify that x − (y − z) ≠ (x − y) − z

Answer:

$$x = \frac{4}{9}, y = \frac{-7}{12}, z = \frac{-2}{3}$$

$$x - (y - z) \neq (x - y) - z$$

L.H.S. $= x - (y - z)$

$$= \frac{4}{9} - \left[\frac{-7}{12} - \left(\frac{-2}{3}\right)\right]$$

$$= \frac{4}{9} - \left[\frac{-7}{12} + \frac{2}{3}\right]$$

$$= \frac{4}{9} - \left[\frac{-7+8}{12}\right]$$

$$= \frac{4}{9} - \left[\frac{1}{12}\right] = \frac{4}{9} - \frac{1}{12}$$

$$= \frac{16-3}{36} = \frac{13}{36}$$

R.H.S. $= (x - y) - z$

$$\left[\frac{4}{9} - \left(\frac{-7}{12}\right)\right] - \left(\frac{-7}{12}\right)$$

$$= \left[\frac{4}{9} + \frac{7}{12}\right] + \frac{7}{12}$$

$$= \frac{16+21}{36} + \frac{7}{12} = \frac{37}{36} + \frac{7}{12}$$

$$= \frac{37+21}{36} = \frac{58}{36}$$

$$\therefore \ x - (y - z) \neq (x - y) - z$$

Q9.If p = −8/27, q = 3/4 and r = −12/15, then verify that

(i) p × (q × r) = (p × q) × r

(ii) p × (q − r) = p × q − p × r

Answer:

$$p = \frac{-8}{27}, q = \frac{3}{4} \text{ and } r = \frac{-12}{15}$$

(i) $p \times (q \times r) = (p \times q) \times r$

$$\text{L.H.S.} = p \times (q \times r) = \frac{-8}{27} \times \left(\frac{3}{4} \times \frac{-12}{15}\right)$$

$$= \frac{-8}{27} \times \frac{-3}{5}$$

$$= \frac{(-8) \times (-3)}{27 \times 5} = \frac{24}{27 \times 5} = \frac{8}{45}$$

$$\text{R.H.S.} = (p \times q) \times r = \left(\frac{-8}{27} \times \frac{3}{4}\right) \times \frac{-12}{15}$$

$$= \frac{-2}{9} \times \frac{-12}{15} = \frac{8}{45}$$

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

(ii) $p \times (q - r) = p \times q - p \times r$

$$\text{L.H.S.} = p \times (q - r) = \frac{-8}{27} \times \left(\frac{3}{4} - \frac{-12}{15}\right)$$

$$= \frac{-8}{27} \times \left(\frac{45 + 48}{60}\right)$$

$$= \frac{-8}{27} \times \frac{93}{60} = \frac{-62}{135}$$

$$\text{R.H.S.} = p \times q - p \times r$$

$$= \frac{-8}{27} \times \frac{3}{4} - \left(\frac{8}{27} \times \frac{-12}{15}\right)$$

$$= \frac{-2}{9} - \frac{32}{135}$$

$$= \frac{-30 - 32}{135} = \frac{-62}{135}$$

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

Q10. If p = –3/2, q = 4/5 and r = –7/12, then verify that (p ÷ q) ÷ r ≠ p ÷ (q ÷ r).

Answer:

If $p = \dfrac{-3}{2}$, $q = \dfrac{4}{5}$ and $r = \dfrac{-7}{12}$

$(p \div q) \div r \neq p \div (q \div r)$

LHS $= (p \div q) \div r$

$$= \left(\dfrac{-3}{2} \div \dfrac{4}{5}\right) \div \left(\dfrac{-7}{12}\right)$$

$$= \left(\dfrac{-3}{2} \times \dfrac{5}{4}\right) \div \dfrac{-7}{12}$$

$$= \dfrac{-15}{8} \div \dfrac{-7}{12} = \dfrac{-15}{8} \times \dfrac{12}{-7}$$

$$= \dfrac{-45}{-14} = \dfrac{-45 \times (-1)}{-14 \times (-1)} = \dfrac{45}{14}$$

RHS $= p \div (q \div r) = \dfrac{-3}{2} \div \left(\dfrac{4}{5} \div \dfrac{-7}{12}\right)$

$$= \dfrac{-3}{2} \div \left(\dfrac{4}{5} \times \dfrac{12}{-7}\right)$$

$$= \dfrac{-3}{2} \div \dfrac{48}{-35} = \dfrac{-3}{2} \times \dfrac{-35}{48} = \dfrac{35}{32}$$

$\therefore$ LHS $\neq$ RHS

Q11. Write five rational numbers which are smaller than -4.

Answer:

5 rational numbers which are smaller than -4.

These can be infinite numbers of rational numbers smaller than -4.

We shall take only 5 rational numbers such as

$$\dfrac{-9}{2}, -5, \dfrac{-11}{2}, -6, \dfrac{-13}{2}, \text{ etc.}$$

Q12. Find three rational numbers between -2 and -1.

Answer:

3 rational numbers between -2 and -1

First rational number $= \frac{1}{2}(-1-2) = \frac{-3}{2}$

Second rational number between -2 and $\frac{-3}{2}$

$$= \frac{1}{2}\left(-2-\frac{3}{2}\right) = \frac{1}{2}\left(\frac{-7}{2}\right) = \frac{-7}{4}$$

Third rational number between $\frac{-3}{2}$ and -1

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

Hence three numbers are $\frac{-7}{4}, \frac{-3}{2}, \frac{-5}{4}$

Q13.If the product of two rational numbers is 25/42 and one of them $-2\frac{6}{7}$, find the other.

Answer:

Product of two numbers $= \dfrac{25}{42}$

One number $= -2\dfrac{6}{7} = \dfrac{-20}{7}$

Then second number $= \dfrac{25}{42} \div \left(\dfrac{-20}{7}\right)$

$$= \frac{25}{42} \times \frac{7}{-20} = \frac{5}{-24}$$

$$= \frac{5 \times (-1)}{-24 \times (-1)} = \frac{-5}{24}$$

Q14. The population of the city is 6,63,432. If 1/2 of the population are adult males and 1/3 of the population are adult females, then find the number of children in the city.

Answer:

Population of a city = 6,63,432

Number of adult males = $\frac{1}{2}$ of 6,63,432 = 3,31,716

Number of adult females = $\frac{1}{3}$ of 6,63,432 = 2,21,144

Remaining population = 6,63,432 − (3,31,716 + 2,21,144)

= 6,63,432 − 5,52,860

= 1,10,572

Number of children = 1,10,572

Q15. Using the appropriate properties of operations of rational numbers, evaluate the following:

(i) $\dfrac{2}{5} \times \dfrac{-3}{7} - \dfrac{1}{14} - \dfrac{3}{7} \times \dfrac{3}{5}$

(ii) $\dfrac{8}{9} \times \dfrac{4}{5} + \dfrac{5}{6} - \dfrac{9}{5} \times \dfrac{8}{9}$

(iii) $\dfrac{-3}{7} \times \dfrac{14}{15} \times \dfrac{7}{12} \times \left(\dfrac{-30}{35}\right)$

Answer:

(i) $\dfrac{2}{5} \times \dfrac{-3}{7} - \dfrac{1}{14} - \dfrac{3}{7} \times \dfrac{3}{5}$

$= \dfrac{2}{5} \times \dfrac{-3}{7} - \dfrac{3}{7} \times \dfrac{3}{5} - \dfrac{1}{14}$

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

$= \dfrac{-3}{7} \times \dfrac{2+3}{5} - \dfrac{1}{14} = \dfrac{-3}{7} \times 1 - \dfrac{1}{14}$

$= \dfrac{-3}{7} - \dfrac{1}{14}$

$= \dfrac{-6-1}{14} = \dfrac{-7}{14} = \dfrac{-7 \div 7}{14 \div 7} = \dfrac{-1}{2}$

(ii) $\dfrac{8}{9} \times \dfrac{4}{5} + \dfrac{5}{6} - \dfrac{9}{5} \times \dfrac{8}{9}$

$= \dfrac{8}{9} \times \dfrac{4}{5} - \dfrac{9}{5} \times \dfrac{8}{9} + \dfrac{5}{6}$

$= \dfrac{8}{9}\left(\dfrac{4}{5} - \dfrac{9}{5}\right) + \dfrac{5}{6}$

$= \dfrac{8}{9}\left(\dfrac{4-9}{5}\right) + \dfrac{5}{6}$

$= \dfrac{8}{9} \times \dfrac{-5}{5} + \dfrac{5}{6}$

$= \dfrac{8}{9} \times (-1) + \dfrac{5}{6}$

$= \dfrac{-8}{9} + \dfrac{5}{6} = \dfrac{-16+15}{18} = \dfrac{-1}{18}$

(iii) $\dfrac{-3}{7} \times \dfrac{14}{15} \times \dfrac{7}{12} \times \left(\dfrac{-30}{35}\right)$

$= \left(\dfrac{-3}{7} \times \dfrac{14}{15}\right) \times \left(\dfrac{7}{12} \times \dfrac{-30}{35}\right)$

$= \dfrac{-2}{5} \times \dfrac{-1}{2} = \dfrac{1}{5}$