

## RATIONAL NUMBERS

### RATIONAL NUMBERS

A number which can be written as  $\frac{p}{q}$ , where  $p, q$ , are integers and  $q \neq 0$ , is called a **rational number**

Thus, an integer divided by a non-zero integer is called rational number.

Ex.  $\frac{2}{3}, \frac{37}{15}, \frac{-17}{19}, -3, 0, 10, 4.33, 7.123123123, \dots$

In rational number  $\frac{p}{q}$ ,  $p$  is called first integer or **numerator** and  $q$  the **second integer** or **denominator**.

(I) **Positive rational numbers** : A rational number is said to be positive, if its numerator and denominator are either both positive or both negative

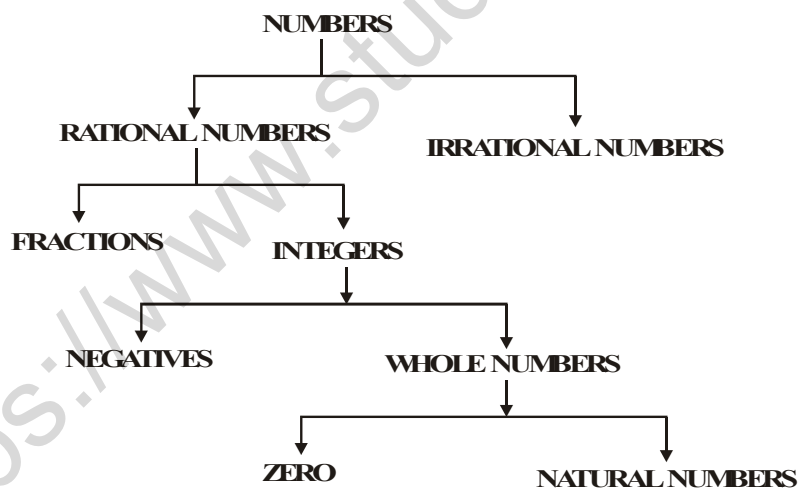
Ex.  $\frac{5}{7}$  and  $\frac{-2}{-3}$  are both positive rational numbers.

(II) **Negative rational numbers** : A rational number is said to be negative, if its numerator and denominator are of opposite sign  $\frac{-4}{9}$  and  $\frac{5}{-12}$  are negative rational numbers,

(III) **Equivalent rational numbers** : If  $\frac{a}{b}$  is a rational number and  $m$  is a nonzero integer then  $\frac{a}{b} = \frac{a \times m}{b \times m}$

Ex.  $-\frac{3}{4} = \frac{-3 \times 2}{4 \times 2} = \frac{-3 \times 3}{4 \times 3} = \dots$

$-\frac{3}{4} = \frac{-6}{8} = \frac{-9}{12} = \dots$  Such rational number are called equivalent rational numbers.



(a) **Natural Numbers (N)** : The counting numbers 1, 2, 3, ..... are known as natural numbers.  
**N = (1, 2, 3, 4, .....)**



- (i) The set  $N$  is infinite i.e. it has unlimited members.
- (ii)  $N$  has the smallest element namely '1'.
- (iii)  $N$  has no largest element. i.e., give me any natural number, we can find the bigger number from the given number.
- (iv)  $N$  does not contain '0' as a member. i.e. '0' is not a member of the set  $N$ .

(b) **Whole Numbers (W)** : The number '0' together with the natural numbers 1, 2, 3, .... are known as whole numbers.

$$W = (0, 1, 2, 3, 4, \dots)$$



- (i) The set of whole number is infinite (unlimited elements).
- (ii) This set has the smallest members as '0'. i.e. '0' the smallest whole number. i.e., set W contain '0' as a member.
- (iii) The set of whole numbers has no largest member.
- (iv) Every natural number is a whole number.
- (v) Non-zero smallest whole number is '1'.

(c) **Integers (I or Z)** : All natural numbers, 0 and negative of natural numbers are called integers.

$$I = \{-\infty, \dots, -3, -2, -1, 0, 1, 2, 3, \dots, \infty\}$$

**Positive integers** : (1, 2, 3, 4, ....) ; **Negative integers** : (...-4, -3, -2, -1)



- (i) This set Z is infinite.
- (ii) It has neither the greatest nor the least element.
- (iii) Every natural and every whole number is an integer.
- (iv) The set of non-negative integer = {0, 1, 2, 3, 4, ....}
- (v) The set of non-positive integer = {...-4, -3, -2, -1, 0}

### NATURAL NUMBERS, WHOLE NUMBERS, INTEGERS AND FRACTION AS RATIONAL NUMBERS

(i) Since a natural number  $n = \frac{n}{1} = \frac{\text{an integer}}{\text{a non-zero integer}}$

every **natural number is a rational number.**

(ii) Now,  $0 = \frac{0}{\text{any non-zero integer}}$ , and is therefore a rational number.

∴ All natural numbers and 0 being rational numbers imply,

**all whole numbers are rational numbers.**

(iii) Any integer (... -3, -2, -1, 0, 1, 2, 3, ....) can be written as  $\frac{p}{q}$ .

where p is the given integer and q = 1 is the non-zero integer.

**Thus, every integer is a rational number.**

(iv) A fraction =  $\frac{x}{y}$ , where x and y are natural numbers i.e., positive integer.



Thus, every fraction =  $\frac{\text{an integer}}{\text{a non zero integer}}$  and is a rational number.

- (i) Every natural number, whole number and integer is a rational number.
- (ii) Every terminating decimal is a rational number.
- (iii) Every non-terminating repeating (recurring) decimal is a rational number.
- (iv) Between any two rational numbers there are an infinite number of rational numbers.  
This property is known as the density of rational numbers.

### PROPERTIES OF RATIONAL NUMBERS

(I) If  $\frac{a}{b}$  and  $\frac{c}{d}$  are two rational numbers then  $\frac{a}{b} + \frac{c}{d} = \frac{ad + bc}{bd}$

(II) If  $\frac{a}{b}$  and  $\frac{c}{d}$  are two rational numbers then  $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$

(III) If  $\frac{a}{b}$  and  $\frac{c}{d}$  ( $\neq 0$ ) are two rational numbers, then  $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

(IV) if  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$  are three rational numbers then  $\frac{a}{b} \times \left( \frac{c}{d} + \frac{e}{f} \right) = \left( \frac{a}{b} \times \frac{c}{d} \right) + \left( \frac{a}{b} \times \frac{e}{f} \right)$  and

$$\frac{a}{b} \times \left( \frac{c}{d} - \frac{e}{f} \right) = \left( \frac{a}{b} \times \frac{c}{d} \right) - \left( \frac{a}{b} \times \frac{e}{f} \right) \text{ (Distributive property of multiplication over addition and subtraction)}$$

(V) If  $\frac{a}{b}$  and  $\frac{c}{d}$  be two rational number then  $\frac{a}{b} = \frac{c}{d} \Rightarrow a \times d = b \times c$

(VI) Absolute value of a rational number  $-\frac{x}{y} = \frac{x}{y}$  and  $\frac{x}{y} = \frac{x}{y}$

### RECIPROCAL OR MULTIPLICATIVE INVERSE AND ADDITIVE INVERSE

(i) **Reciprocal** : Every non-zero rational number  $\frac{a}{b}$  has its multiplicative inverse  $\frac{b}{a}$

Thus  $\left( \frac{a}{b} \times \frac{b}{a} \right) = \left( \frac{b}{a} \times \frac{a}{b} \right) = 1 \Rightarrow \frac{b}{a}$  is called the reciprocal of  $\frac{a}{b}$

(ii) **Multiplicative inverse** : We denote the reciprocal of  $\frac{a}{b}$  by  $\left( \frac{a}{b} \right)^{-1}$  Clearly  $\left( \frac{a}{b} \right)^{-1} = \frac{b}{a}$

(iii) **Additive Inverse** : For every rational number  $\frac{a}{b}$ , there exists a rational number  $\frac{-a}{b}$

such that  $\left( \frac{a}{b} + \frac{-a}{b} \right) = \frac{a + (-a)}{b} = \frac{0}{b} = 0$  and  $\left( -\frac{a}{b} + \frac{a}{b} \right) = 0$

$-\frac{a}{b}$  is called the **additive inverse** of  $\frac{a}{b}$

Ex.  $\left(\frac{4}{7} + \frac{-4}{7}\right) = \frac{\{4 + (-4)\}}{7} = \frac{0}{7} = 0$  and similarly,  $\left(\frac{-4}{7} + \frac{4}{7}\right) = 0$

$$\left(\frac{4}{7} + \frac{-4}{7}\right) = \left(\frac{-4}{7} + \frac{4}{7}\right) = 0$$

Thus,  $\frac{4}{7}$  and  $\frac{-4}{7}$  are additive inverses of each other.

Ex. Find the Reciprocal of  $-3$  and  $\frac{-8}{9}$ , since

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

and Reciprocal of  $\frac{-8}{9}$  is  $\frac{-9}{8}$ , since  $\left(\frac{-8}{9} \times \frac{-9}{8}\right) = \left(\frac{-9}{8} \times \frac{-8}{9}\right) = 1$

Ex. Find the additive inverse of :

(a)  $\frac{5}{9}$

(b)  $\frac{-15}{8}$

(c)  $\frac{-6}{-7}$

Sol. (a) Additive inverse of  $\frac{5}{9}$  is  $\frac{-5}{9}$

(b) Additive inverse of  $\frac{-15}{8}$  is  $\frac{15}{8}$

(c) We may write,  $\frac{-6}{-7} = \frac{(-6) \times (-1)}{(-7) \times (-1)} = \frac{6}{7}$ . Hence, its additive inverse is  $\frac{-6}{7}$

### DO YOUR SELF



Write the additive inverse of (a)  $\frac{-10}{31}$  (b)  $\frac{4}{-15}$  (c)  $\frac{-2}{-7}$  (d)  $\frac{15}{9}$

Find the reciprocal of each of the following : (a) 12 (b)  $-8$  (c)  $\frac{5}{16}$  (d)  $\frac{-14}{17}$  (e)  $\frac{0}{2}$

### ADDITIVE IDENTITY AND MULTIPLICATIVE IDENTITY

(i) **Additive identity** : 0 is a rational number such that the sum of any rational number and 0 is the rational number itself.

$$\text{Thus } \left(\frac{a}{b} + 0\right) = \left(0 + \frac{a}{b}\right) = \frac{a}{b}, \text{ for every rational number } \frac{a}{b}$$

0 is called the **additive identity** for rationals.

(ii) **Multiplicative Identity** : For any rational number  $\frac{a}{b}$ , we have  $\left(\frac{a}{b} \times 1\right) = \left(1 \times \frac{a}{b}\right) = \frac{a}{b}$

1 is called the multiplicative identity for rationals.

**Ex. (i)**  $\left(\frac{3}{5} + 0\right) = \left(\frac{3}{5} + \frac{0}{5}\right) = \frac{3}{5}$  and similarly,  $\left(0 + \frac{3}{5}\right) = \frac{3}{5}$

$$\vee \left(\frac{3}{5} + 0\right) = \left(0 + \frac{3}{5}\right) = \frac{3}{5}$$

**(ii)**  $\left(\frac{-2}{3} + 0\right) = \left(\frac{-2}{3} + \frac{0}{3}\right) = \frac{(-2+0)}{3} = \frac{-2}{3}$  and similarly,  $\left(0 + \frac{-2}{3}\right) = \frac{-2}{3}$

$$\vee \left(\frac{-2}{3} + 0\right) = \left(0 + \frac{-2}{3}\right) = \frac{-2}{3}$$

**Ex. (i)** Consider the rational number  $\frac{3}{4}$ . Then, we have

$$\left(\frac{3}{4} \times 1\right) = \left(\frac{3}{4} \times \frac{1}{1}\right) = \frac{(3 \times 1)}{(4 \times 1)} = \frac{3}{4} \text{ and } \left(1 \times \frac{3}{4}\right) = \left(\frac{1}{1} \times \frac{3}{4}\right) = \frac{(1 \times 3)}{(1 \times 4)} = \frac{3}{4}.$$

$$\vee \left(\frac{3}{4} \times 1\right) = \left(1 \times \frac{3}{4}\right) = \frac{3}{4}$$

**(ii)** Consider the rational number  $\frac{-9}{13}$ . Then, we have

$$\frac{-9}{13} \times 1 = \left(\frac{-9}{13} \times \frac{1}{1}\right) = \frac{(-9) \times 1}{13 \times 1} = \frac{-9}{13} \text{ and } \left(1 \times \frac{-9}{13}\right) = \left(\frac{1}{1} \times \frac{-9}{13}\right) = \frac{(1) \times (-9)}{1 \times 13} = \frac{-9}{13}$$

$$\vee \left(\frac{-9}{13} \times 1\right) = \left(1 \times \frac{-9}{13}\right) = \frac{-9}{13}$$

#### PROPERTIES OF ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION OF RATIONAL NUMBER

Properties	Addition	Subtraction	Multiplication	Division
<b>Closure property</b>	$(x+y)$ is always a rational number	$(x-y)$ is always a rational number	$x \times y$ is always a rational number	$x \div y$ and $y \neq 0$ then is always a rational number
<b>Commutative property</b>	$x + y = y + x$	$(x - y) \neq (y - x)$	$x \times y = y \times x$	$x \div y \neq y \div x$
<b>Associative property</b>	$x + (y + z) = (x + y) + z$	$x - (y - z) \neq (x - y) - z$	$x \times (y \times z) = (x \times y) \times z$	$x \div (y \div z) \neq (x \div y) \div z$

**Note :**  $x, y$  &  $z$  are rational numbers.

☺ **ADDITION OF RATIONAL NUMBERS :** We define  $\left(\frac{a}{b} + \frac{c}{b}\right) = \frac{a+c}{b}$

**Ex. Find the sum :**

**(i)**  $\frac{7}{9} + \frac{-11}{9}$

**(ii)**  $\frac{8}{-11} + \frac{3}{11}$

**Sol.** We have

$$(i) \quad \frac{7}{9} + \frac{-11}{9} = \frac{7+(-11)}{9} = \frac{-4}{9}.$$

$$(ii) \quad \frac{8}{-11} = \frac{8 \times (-1)}{(-11) \times (-1)} = \frac{-8}{11}.$$

$$\therefore \left( \frac{8}{-11} + \frac{3}{11} \right) = \left( \frac{-8}{11} + \frac{3}{11} \right) = \frac{(-8)+3}{11} = \frac{-5}{11}.$$

### PROPERTIES OF ADDITION OF RATIONAL NUMBERS

(a) **(Closure property)** : The sum of two rational numbers is always a rational number. If  $\frac{a}{b}$  and  $\frac{c}{d}$  are any two rational numbers, then  $\left( \frac{a}{b} + \frac{c}{d} \right)$  is also a rational number.

**Ex.** Consider the rational number  $\frac{1}{3}$  and  $\frac{3}{4}$ . Then

**Sol.**  $\left( \frac{1}{3} + \frac{3}{4} \right) = \left( \frac{4+9}{12} \right) = \frac{13}{12}$ , which is a rational number.

**Ex.** Consider the rational number  $\frac{-2}{3}$  and  $\frac{4}{5}$ . Then,

**Sol.**  $\left( \frac{-2}{3} + \frac{4}{5} \right) = \frac{(-10+12)}{15} = \frac{2}{15}$ , which is a rational number.

(b) **(Commutative law)** : Two rational numbers can be added in any order. Thus for any two rational numbers  $\frac{a}{b}$  and  $\frac{c}{d}$ , we have  $\left( \frac{a}{b} + \frac{c}{d} \right) = \left( \frac{c}{d} + \frac{a}{b} \right)$

**Ex.** (i)  $\left( \frac{1}{2} + \frac{3}{4} \right) = \frac{(2+3)}{4} = \frac{5}{4}$  and  $\left( \frac{3}{4} + \frac{1}{2} \right) = \frac{(3+2)}{4} = \frac{5}{4}$

$$\therefore \left( \frac{1}{2} + \frac{3}{4} \right) = \left( \frac{3}{4} + \frac{1}{2} \right).$$

(ii)  $\frac{-1}{2} + \frac{-2}{3} = \frac{(-3)+(-4)}{6} = \frac{-7}{6}$  and  $\left( \frac{-2}{3} + \frac{-1}{2} \right) = \left\{ \frac{((-4)+(-3))}{6} \right\} = \frac{-7}{6}$

$$\therefore \left( \frac{-1}{2} + \frac{-2}{3} \right) = \left( \frac{-2}{3} + \frac{-1}{2} \right) \Rightarrow \text{LHS} = \text{RHS}$$

(c) **(Associative law)** : While adding three rational numbers, they can be grouped in any order.

thus for any three rational number  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$  we have  $\left( \frac{a}{b} + \frac{c}{d} \right) + \frac{e}{f} = \frac{a}{b} + \left( \frac{c}{d} + \frac{e}{f} \right)$

**Ex.** Consider three rational numbers  $\frac{-2}{3}$ ,  $\frac{5}{7}$  and  $\frac{1}{6}$  then,

**Sol.**  $\left\{ \left( \frac{-2}{3} + \frac{5}{7} \right) + \frac{1}{6} \right\} = \left\{ \frac{(-14+15)}{21} + \frac{1}{6} \right\} = \left( \frac{1}{21} + \frac{1}{6} \right) = \frac{(2+7)}{42} = \frac{9}{42} = \frac{3}{14}$

and  $\left\{ \frac{-2}{3} + \left( \frac{5}{7} + \frac{1}{6} \right) \right\} = \left[ \frac{-2}{3} + \frac{(30+7)}{42} \right] = \left[ \frac{-2}{3} + \frac{37}{42} \right] = \frac{(-28+37)}{42} = \frac{9}{42} = \frac{3}{14}$

$$\backslash \quad \left\{ \left( \frac{-2}{3} + \frac{5}{7} \right) + \frac{1}{6} \right\} = \left\{ \frac{-2}{5} + \left( \frac{5}{7} + \frac{1}{6} \right) \right\} \quad \therefore \text{LHS} = \text{RHS}$$

## 😊 SUBTRACTION OF RATIONAL NUMBERS :

For rational numbers  $\frac{a}{b}$  and  $\frac{c}{d}$ , we define  $\left( \frac{a}{b} - \frac{c}{d} \right) = \frac{a}{b} + \left( \frac{-c}{d} \right) = \frac{a}{b} + \left( \text{additive inverse of } \frac{c}{d} \right)$

**Ex. (i) Subtract  $\frac{3}{4}$  from  $\frac{2}{3}$       (ii) Subtract  $\frac{-5}{7}$  from  $\frac{-2}{5}$**

**Sol. (i)**  $\left( \frac{2}{3} - \frac{3}{4} \right) = \frac{2}{3} + \left( \text{additive inverse of } \frac{3}{4} \right) = \left( \frac{2}{3} + \frac{-3}{4} \right) = \frac{\{8 + (-9)\}}{12} = \frac{-1}{12}$

**(ii)**  $\left\{ \frac{-2}{5} - \left( \frac{-5}{7} \right) \right\} = \frac{-2}{5} + \left( \text{additive inverse of } \frac{-5}{7} \right)$   
 $= \left( \frac{-2}{5} + \frac{5}{7} \right) \left[ \text{Q additive inverse of } \frac{-5}{7} \text{ is } \frac{5}{7} \right]$   
 $= \frac{(-14 + 25)}{35} = \frac{11}{35}$

**Ex. The sum of two rational numbers is  $-5$ . If one of them is  $\frac{-13}{6}$ . Find the other**

**Sol.** Let the other number be  $x$ . Then,

$$x + \left( \frac{-13}{6} \right) = -5$$

$$\therefore x = -5 - \left( \text{additive inverse of } \frac{-13}{6} \right)$$

$$\therefore x = \left( -5 + \frac{13}{6} \right) = \left( \frac{-5}{1} + \frac{13}{6} \right) = \frac{(-30 + 13)}{6}$$

$$\therefore x = \frac{-17}{6} \text{ . Hence, the required number is } \frac{-17}{6}$$

## PROPERTIES OF SUBTRACTION OF RATIONAL NUMBERS

**(a) (Closure property) :** If  $\frac{a}{b}$  and  $\frac{c}{d}$  are any two rational numbers, then  $\frac{a}{b} - \frac{c}{d}$  is a rational number.

**Ex. Consider the rational number  $\frac{2}{3}$  and  $\frac{1}{5}$**

**Sol.**  $\frac{2}{3} - \frac{1}{5} = \frac{10 - 3}{15} = \frac{7}{15}$

**(b) (Commutative law) :** The subtraction of rational numbers is not always commutative. That is for any

two rational number  $\frac{a}{b}$  and  $\frac{c}{d}$ . We have  $\frac{a}{b} - \frac{c}{d} \neq \frac{c}{d} - \frac{a}{b}$

**Ex.**  $\frac{2}{3} - \frac{1}{4} \neq \frac{1}{4} - \frac{2}{3}$

**Sol.**  $\frac{2}{3} - \frac{1}{4} = \frac{8-3}{12} = \frac{5}{12}$      $\nabla$      $\frac{1}{4} - \frac{2}{3} = \frac{3-8}{12} = \frac{-5}{12}$      $\nabla$      $\frac{2}{3} - \frac{1}{4} \neq \frac{1}{4} - \frac{2}{3}$

$\nabla$   $\frac{5}{12} \neq -\frac{5}{12}$  (Subtraction is not commutative for rational numbers.) LHS  $\neq$  RHS

**Ex.**  $\frac{2}{5} - \frac{3}{4} \neq \frac{3}{4} - \frac{2}{5}$      $\nabla$      $\frac{2}{5} - \frac{3}{4} = \frac{8-15}{20} = \frac{-7}{20}$      $\nabla$      $\frac{3}{4} - \frac{2}{5} = \frac{15-8}{20} = \frac{7}{20}$

$\frac{2}{5} - \frac{3}{4} \neq \frac{3}{4} - \frac{2}{5}$      $\nabla$      $-\frac{7}{20} \neq \frac{7}{20}$  (Subtraction is not commutative for rational numbers.)

(c) **(Associative law)** : The subtraction of rational number is not associative i.e. for any three rational numbers  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$  we have  $\left(\frac{a}{b} - \frac{c}{d}\right) - \frac{e}{f} \neq \frac{a}{b} - \left(\frac{c}{d} - \frac{e}{f}\right)$

**Ex.**  $\left(\frac{2}{3} - \frac{4}{5}\right) - \frac{1}{2} = \left(\frac{10-12}{15}\right) - \frac{1}{2} \nabla \frac{-2}{15} - \frac{1}{2} = \frac{-4-15}{30} = \frac{-19}{30}$

$\frac{2}{3} - \left(\frac{4}{5} - \frac{1}{2}\right) = \frac{2}{3} - \left(\frac{8-5}{10}\right) \nabla \frac{2}{3} - \frac{3}{10} = \frac{20-9}{30} = \frac{11}{30}$

$\nabla$   $\left(\frac{2}{3} - \frac{4}{5}\right) - \frac{1}{2} \neq \frac{2}{3} - \left(\frac{4}{5} - \frac{1}{2}\right)$  (Subtraction is not associative for rational numbers.)

(d) **(Existence of right Identity)** : The rational number 0 is the right identity. That is, for any rational number

$\frac{a}{b}$ , we have  $\frac{a}{b} - 0 = \frac{a}{b}$

**Ex.**  $\frac{3}{5} - 0 = \frac{3}{5}$



### MULTIPLICATION OF RATIONAL NUMBER :

For any two rational numbers  $\frac{a}{b}$  and  $\frac{c}{d}$ , we define :  $\left(\frac{a}{b} \times \frac{c}{d}\right) = \left(\frac{a \times c}{b \times d}\right)$

**Ex.** (i)  $\frac{2}{3} \times \frac{-5}{7}$     (ii)  $\frac{-7}{8} \times \frac{3}{5}$

**Sol.** We have :

(i)  $\frac{2}{3} \times \frac{-5}{7} = \frac{2 \times (-5)}{3 \times 7} = \frac{-10}{21}$

(ii)  $\frac{-7}{8} \times \frac{3}{5} = \frac{(-7) \times 3}{8 \times 5} = \frac{-21}{40}$

**Ex.** (i)  $\frac{-3}{7} \times \frac{14}{5}$     (ii)  $\frac{13}{6} \times \frac{-18}{91}$

**Sol.** We have :



$$(i) \quad \frac{-3}{7} \times \frac{14}{5} = \frac{(-3) \times 14}{7 \times 5} = \frac{-6}{5}$$

$$(ii) \quad \frac{13}{6} \times \frac{-18}{91} = \frac{13 \times (-18)}{6 \times 91} = \frac{-3}{7}$$

### PROPERTIES OF MULTIPLICATION OF RATIONAL NUMBERS

(a) **(Closure Property)** : The product of two rational numbers is always a rational number.

If  $\frac{a}{b}$  and  $\frac{c}{d}$  are any two rational numbers then  $\left(\frac{a}{b} \times \frac{c}{d}\right)$  is also a rational number.

Ex. (i) Consider the rational numbers  $\frac{1}{2}$  and  $\frac{5}{7}$ . Then,

$$\left(\frac{1}{2} \times \frac{5}{7}\right) = \frac{(1 \times 5)}{(2 \times 7)} = \frac{5}{14}, \text{ which is a rational number.}$$

(ii) Consider the rational numbers  $\frac{-3}{7}$  and  $\frac{5}{14}$ . Then,

$$\left(\frac{-3}{7} \times \frac{5}{14}\right) = \frac{(-3) \times 5}{7 \times 14} = \frac{-15}{98}, \text{ which is a rational number.}$$

(b) **(Commutative law)** : Two rational numbers can be multiplied in any order. Thus, for any rational number

$\frac{a}{b}$  and  $\frac{c}{d}$ . We have  $\left(\frac{a}{b} \times \frac{c}{d}\right) = \left(\frac{c}{d} \times \frac{a}{b}\right)$

Ex. (i) Let us consider the rational numbers  $\frac{3}{4}$  and  $\frac{5}{7}$ . Then,

$$\left(\frac{3}{4} \times \frac{5}{7}\right) = \frac{(3 \times 5)}{(4 \times 7)} = \frac{15}{28} \quad \text{and} \quad \left(\frac{5}{7} \times \frac{3}{4}\right) = \frac{(5 \times 3)}{(7 \times 4)} = \frac{15}{28}$$

$$\therefore \left(\frac{3}{4} \times \frac{5}{7}\right) = \left(\frac{5}{7} \times \frac{3}{4}\right) \Rightarrow \text{LHS} = \text{RHS}$$

(ii) Let us consider the rational numbers  $\frac{-2}{5}$  and  $\frac{6}{7}$ . Then,

$$\left(\frac{-2}{5} \times \frac{6}{7}\right) = \frac{(-2) \times (6)}{5 \times 7} = \frac{-12}{35} \quad \text{and} \quad \left(\frac{6}{7} \times \frac{-2}{5}\right) = \frac{6 \times (-2)}{7 \times 5} = \frac{-12}{35}$$

$$\therefore \left(\frac{-2}{5} \times \frac{6}{7}\right) = \left(\frac{6}{7} \times \frac{-2}{5}\right) \Rightarrow \text{LHS} = \text{RHS}$$

(c) **(Associative law)** : While multiplying three or more rational numbers, they can be grouped in any order.

Thus, for any rational numbers  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$ , we have  $\left(\frac{a}{b} \times \frac{c}{d}\right) \times \frac{e}{f} = \frac{a}{b} \times \left(\frac{c}{d} \times \frac{e}{f}\right)$

Ex. Consider the rational numbers  $\frac{-5}{2}$ ,  $\frac{-7}{4}$  and  $\frac{1}{3}$ . We have

$$\text{Sol. } \left(\frac{-5}{2} \times \frac{-7}{4}\right) \times \frac{1}{3} = \left\{\frac{(-5) \times (-7)}{2 \times 4} \times \frac{1}{3}\right\} = \left(\frac{35}{8} \times \frac{1}{3}\right) = \frac{(35 \times 1)}{(8 \times 3)} = \frac{35}{24}$$

$$\text{and } \frac{-5}{2} \times \left(\frac{-7}{4} \times \frac{1}{3}\right) = \frac{-5}{2} \times \frac{(-7) \times 1}{4 \times 3} = \left(\frac{-5}{2} \times \frac{-7}{12}\right) = \frac{(-5) \times (-7)}{(2 \times 12)} = \frac{35}{24}.$$

$$\therefore \frac{35}{24} = \frac{35}{24} \quad \therefore \text{LHS} = \text{RHS}$$

(f) **(Distributive law of multiplication over addition) :**

For any three rational numbers  $\frac{a}{b}$ ,  $\frac{c}{d}$  and  $\frac{e}{f}$ ,

$$\text{we have } \frac{a}{b} \times \left(\frac{c}{d} + \frac{e}{f}\right) = \left(\frac{a}{b} \times \frac{c}{d}\right) + \left(\frac{a}{b} \times \frac{e}{f}\right)$$

**Ex. Consider the rational numbers  $\frac{-3}{4}$ ,  $\frac{2}{3}$  and  $\frac{-5}{6}$ . We have**

$$\text{Sol. } \left(\frac{-3}{4}\right) \times \left\{\frac{2}{3} + \frac{-5}{6}\right\} = \left(\frac{-3}{4}\right) \times \left\{\frac{4+(-5)}{6}\right\} = \left(\frac{-3}{4}\right) \times \left(\frac{-1}{6}\right) = \frac{(-3) \times (-1)}{4 \times 6} = \frac{3}{24} = \frac{1}{8}$$

$$\text{Again, } \left(\frac{-3}{4}\right) \times \frac{2}{3} = \frac{(-3) \times 2}{4 \times 3} = \frac{-6}{12} = \frac{-1}{2} \quad \text{and} \quad \left(\frac{-3}{4}\right) \times \left(\frac{-5}{6}\right) = \frac{(-3) \times (-5)}{4 \times 6} = \frac{15}{24} = \frac{5}{8}$$

$$\therefore \left(\frac{-1}{2} + \frac{5}{8}\right) = \frac{(-4+5)}{8} = \frac{1}{8}$$

$$\text{Hence, } \left(\frac{-3}{4}\right) \times \left\{\frac{2}{3} + \frac{-5}{6}\right\} = \left\{\left(\frac{-3}{4}\right) \times \frac{2}{3}\right\} + \left\{\left(\frac{-3}{4}\right) \times \left(\frac{-5}{6}\right)\right\}$$

(g) **(Multiplicative property of 0) :** For any rational number  $\frac{a}{b}$ ,

$$\text{we have } \left(\frac{a}{b} \times 0\right) = \left(0 \times \frac{a}{b}\right) = 0$$

$$\text{Ex. (i) } \left(\frac{5}{18} \times 0\right) = \left(\frac{5}{18} \times \frac{0}{1}\right) = \frac{(5 \times 0)}{(18 \times 1)} = \frac{0}{18} = 0. \text{ Similarly, } \left(0 \times \frac{5}{18}\right) = 0$$

$$\text{(ii) } \left(\frac{-12}{17} \times 0\right) = \left(\frac{-12}{17} \times \frac{0}{1}\right) = \frac{(-12) \times 0}{17 \times 1} = \frac{0}{17} = 0. \text{ Similarly, } \left(0 \times \frac{-12}{17}\right) = 0$$

### DO YOUR SELF



Verify the following statements : (a)  $\left(\frac{7}{9} - \frac{11}{12}\right) + \frac{2}{3} = \frac{7}{9} - \left(\frac{11}{12} + \frac{2}{3}\right)$  (b)  $\frac{3}{4} \left(\frac{2}{3} - \frac{1}{4}\right) = \frac{3}{4} \times \frac{2}{3} - \frac{3}{4} \times \frac{1}{4}$

(c)  $\left(\frac{2}{3} \div \frac{3}{-5}\right) \div \frac{1}{2} = \frac{2}{3} \div \left(\frac{3}{-5} \div \frac{1}{2}\right)$  (d) Find  $\frac{2}{5} \times \frac{-3}{7} - \frac{1}{14} - \frac{3}{7} \times \frac{3}{5}$



## DIVISION OF RATIONAL NUMBERS :

If  $\frac{a}{b}$  and  $\frac{c}{d}$  are two rational numbers such that  $\frac{c}{d} \neq 0$ ,

we define  $\left(\frac{a}{b} \div \frac{c}{d}\right) = \left(\frac{a}{b} \times \frac{d}{c}\right)$  when  $\frac{a}{b}$  is divided by  $\frac{c}{d}$ , then  $\frac{a}{b}$  is called the **dividend**;  $\frac{c}{d}$  is called the **divisor** and the result is known as **quotient**.

**Ex. Divide,**

(i)  $\frac{9}{16}$  by  $\frac{5}{8}$

(ii)  $\frac{-6}{25}$  by  $\frac{3}{5}$

(iii)  $\frac{11}{24}$  by  $\frac{-5}{8}$

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

**Sol.** (i)  $\frac{9}{16} \div \frac{5}{8} = \frac{9}{16} \times \frac{8}{5} = \frac{9 \times 8}{16 \times 5} = \frac{72}{80} = \frac{9}{10}$

(ii)  $\frac{-6}{25} \div \frac{3}{5} = \frac{-6}{25} \times \frac{5}{3} = \frac{(-6) \times 5}{25 \times 3} = \frac{-30}{75} = \frac{-2}{5}$

(iii)  $\frac{11}{24} \div \frac{-5}{8} = \frac{11}{24} \times \frac{8}{-5} = \frac{11 \times 8}{24 \times (-5)} = \frac{88}{-120} = \frac{-11}{15}$

(iv)  $\frac{-9}{40} \div \frac{-3}{8} = \frac{-9}{40} \times \frac{8}{-3} = \frac{(-9) \times 8}{40 \times (-3)} = \frac{-72}{-120} = \frac{3}{5}$

**Ex. The product of two numbers is  $\frac{-28}{27}$ . If one of the numbers is  $\frac{-4}{9}$ . Find the other.**

**Sol.** Let the other number be x. Then,

$$x \times \frac{-4}{9} = \frac{-28}{27}$$

$$\Rightarrow x = \frac{-28}{27} \div \frac{-4}{9} = \frac{-28}{27} \times \frac{9}{-4}$$

$$\Rightarrow \frac{(-28) \times 9}{27 \times (-4)} = \frac{-(28 \times 9)}{-(27 \times 4)}$$

$$\Rightarrow x = \frac{28 \times 9}{27 \times 4} = \frac{7}{3}$$

Hence, the other number is  $\frac{7}{3}$ .

**Ex.3 Fill in the blanks :**  $\frac{27}{16} \div (\dots) = \frac{-15}{8}$

**Sol.** Let  $\frac{27}{16} \div \left(\frac{a}{b}\right) = \frac{-15}{8}$ . Then,

$$\frac{27}{16} \times \frac{b}{a} = \frac{-15}{8} \Rightarrow \frac{b}{a} = \frac{-15}{8} \times \frac{16}{27} = \frac{-10}{9} \Rightarrow \frac{a}{b} = \frac{9}{-10}$$

Hence, the missing number is  $\frac{-9}{10}$

## PROPERTIES OF DIVISION OF RATIONAL NUMBERS

**Closure property :** If  $\frac{a}{b}$  and  $\frac{c}{d}$  are any two rational numbers such that  $\frac{c}{d} \neq 0$  then  $\frac{a}{b} \div \frac{c}{d}$  is also a rational numbers.

Ex.  $\frac{-6}{9} \div \frac{15}{-18}$

<p>Sol. We have <math>\frac{-6}{9} \div \frac{15}{-18}</math></p> <p><math>\frac{-6}{9} \times \frac{-18}{15} = \frac{4}{5}</math>. (The quotient is also a rational number.)</p> <p>But <math>\frac{6}{9} \div 0 = ?</math></p>	
The answer is not defined, so rational numbers are not closed under division.	

(A) For any rational number  $\frac{a}{b}$ , we have

(B) For every non-zero rational number  $\frac{a}{b}$ , We have

$$\frac{a}{b} \div 1 = \frac{a}{b} \text{ and } \frac{a}{b} \div (-1) = \frac{-a}{b}$$

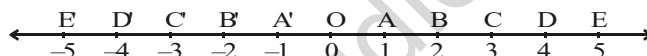
$$(i) \frac{a}{b} \div \frac{a}{b} = \frac{a}{b} \times \frac{b}{a} = 1 \quad (ii) \frac{a}{b} \div \left(\frac{-a}{b}\right) = \frac{a}{b} \times \frac{b}{-a} = -1$$

**Remark :** The division of rational number is neither commutative nor associative.

### REPRESENTATION OF RATIONAL NUMBERS ON THE NUMBER LINE

We have learnt how to represent integers on the number line.

Draw any line. Take a point O on it. Call it 0 (zero). Set off equal distances on the right as well as on the left of O. Such a distance is known as a unit length. Clearly, the points A, B, C, D represent the integers 1, 2, 3, 4 respectively and the point A', B', C', D' represent the integers -1, -2, -3, -4 respectively



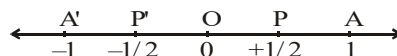
Thus, we may represent any integer by a point on the number line. Clearly, every positive integer lies to the right of O and every negative integer lies to the left of O.

Similarly we can represent rational numbers.

Ex. Represent  $\frac{1}{2}$  and  $-\frac{1}{2}$  on the number line.

Sol. Draw a line. Take a point O on it. Let it represent 0. Set off unit length OA and OA' to the right as well as to the left of O.

The, A represents the integer 1 and A' represents the integer -1.



Now, divide OA into two equal parts. Let OP be the first part out of these two parts.

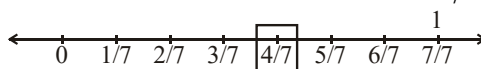
Then, the point P represents the rational number  $\frac{1}{2}$ .

Again, divide OA' into two equal parts. Let OP' be the first part out of these 2 parts. Then the point P'

represents the rational number  $-\frac{1}{2}$

Ex. Represent  $\frac{4}{7}$  on number line.

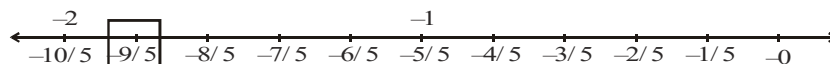
Sol. Divide the line segment between 0 and 1 into 7 equal parts (because  $\frac{4}{7}$  lies between 0 and 1)



Ex. Represent  $-\frac{9}{5}$  on number line.

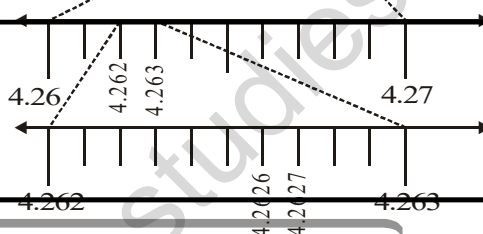
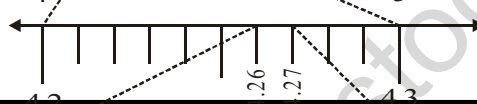
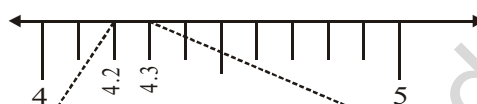
Sol.  $\frac{-9}{5} = -1\frac{4}{5}$

Divide the line segment between  $-1$  and  $-2$  (because  $-1\frac{4}{5}$  lies between  $-1$  and  $-2$ ) into 5 equal parts



### COMPETITION WINDOW

- (i) **Terminating decimals :** 2.4
- 
- (ii) **Non terminating & repeating decimals :** Visualize  $4.\overline{26}$  on the number line, up to 4 decimal places.  
 $4.\overline{26} = 4.262626\ldots$



### DO YOUR SELF



Represent each of the following numbers on the number line :

(i)  $-\frac{1}{3}$

(ii)  $-\frac{3}{4}$

(iii)  $-1\frac{2}{3}$

(iv)  $\frac{17}{6}$

(v)  $-3$

(vi)  $\frac{23}{5}$

### FINDING RATIONAL NUMBER BETWEEN TWO NUMBERS

- (A) **1<sup>st</sup> method :** Find a rational number between  $x$  and  $y$  then,  $\frac{x+y}{2}$  is a rational number lying between  $x$  and  $y$ .
- (B) **2<sup>nd</sup> method :** Find  $n$  rational number between  $x$  and  $y$  (**when  $x$  and  $y$  is non fraction number**) then we use formula.

$$\frac{x(n+1)}{n+1}, \frac{y(n+1)}{n+1}$$

- (C) **3<sup>rd</sup> method :** Find  $n$  rational number between  $x$  and  $y$  (**when  $x$  and  $y$  is fraction Number**) then we use formula

$$d = \frac{(y-x)}{n+1}$$

then  $n$  rational number lying between  $x$  and  $y$  are  $(x+d)$ ,  $(x+2d)$ ,  $(x+3d)$  .....  $(x+nd)$

**Remark :**  $x =$  First Rational Number,  $y =$  Second Rational Number,  $n =$  No. of Rational Number

**Ex.** Find one rational number between  $\frac{1}{3}$  and  $\frac{1}{2}$

**Sol.**  $x = \frac{1}{3}$  ;  $y = \frac{1}{2}$   $\therefore \frac{x+y}{2} = \frac{\frac{1}{3} + \frac{1}{2}}{2} = \frac{2+3}{6 \times 2} = \frac{5}{12}$

**Ex** Find 4 rational numbers between 4 and 5.

**Sol.**  $x = 4$ ,  $y = 5$ ,  $n = 4$

$$\frac{x \times (n+1)}{n+1} = \frac{4 \times (4+1)}{4+1} = \frac{4 \times 5}{5} = \frac{20}{5}$$

$$\frac{y \times (n+1)}{n+1} = \frac{5 \times (4+1)}{4+1} = \frac{5 \times 5}{5} = \frac{25}{5}$$

$$\frac{20}{5}, \left[ \frac{21}{5}, \frac{22}{5}, \frac{23}{5}, \frac{24}{5} \right], \frac{25}{5}$$

**Ex** Find 3 rational number between  $\frac{6}{5}$ ,  $\frac{7}{5}$

**Sol.**  $x = \frac{6}{5}$ ,  $y = \frac{7}{5}$ ,  $n = 3$

$$d = \left( \frac{y-x}{n+1} \right) = \frac{\frac{7}{5} - \frac{6}{5}}{3+1} = \left( \frac{\frac{7-6}{5}}{4} \right) = \left( \frac{1}{20} \right)$$

$$x + d = \frac{6}{5} + \frac{1}{20} = \frac{24+1}{20} = \frac{25}{20}$$

$$x + 2d = \frac{6}{5} + 2 \times \frac{1}{20} = \frac{24+2}{20} = \frac{26}{20}$$

$$x + 3d = \frac{6}{5} + \frac{3}{20} = \frac{24+3}{20} = \frac{27}{20}$$

$$\frac{24}{20}, \left[ \frac{25}{20}, \frac{26}{20}, \frac{27}{20} \right], \frac{28}{20}$$

### DO YOUR SELF

(i) Find a rational number between  $-2$  and  $6$ .

(ii) Find 29 rational numbers between  $-\frac{2}{5}$  and  $\frac{1}{5}$

(iii) Insert 5 rational numbers between  $-\frac{1}{3}$  and  $\frac{1}{2}$

(iv) Find two rational numbers between  $-3$  and  $-2$ .





අනිශ්චිතඝාතකයින් පිළිගත් විට ඒවා නිශ්චයකර ගත හැකි වන අතර ඒවායේ අගය නිශ්චය වේ. එවිට ඒවායේ අගය නිශ්චය වේ. p  
q

උදාහරණයක් ලෙස  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

- (ආ)  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

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ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

අනිශ්චිතඝාතකයින් පිළිගත් විට ඒවා නිශ්චයකර ගත හැකි වන අතර ඒවායේ අගය නිශ්චය වේ. එවිට ඒවායේ අගය නිශ්චය වේ.

$$\left(\frac{p}{q}\right)_{\text{form}} = \frac{(\text{Complete numbers}) - (\text{number formed by Non-repeating digit})}{\text{No. of 9 as no. of repeating digits after that write no. of 0 as no. of non-repeating digits.}}$$

ආ. (ආ)  $0.\overline{35} = \frac{35 - 0}{99} = \frac{35}{99}$  (ආ)  $0.4\overline{35} = \frac{435 - 4}{990} = \frac{431}{990}$  (ආ)  $23.\overline{43} = \frac{2343 - 23}{99} = \frac{2320}{99}$

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

$$\Rightarrow \frac{p}{q} = 23.434343 \dots \dots (i)$$

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

$$100 \frac{p}{q} = 2343.4343 \dots \dots (ii)$$

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

$$100 \frac{p}{q} - \frac{p}{q} = (2343.4343 \dots) - (23.4343 \dots)$$

$$\Rightarrow 99 \frac{p}{q} = 2320$$

$$\Rightarrow \frac{p}{q} = \frac{2320}{99}$$

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

$$23.\overline{43} = 23 + 0.\overline{43}$$

$$\Rightarrow 23.\overline{43} = 23 + \frac{43}{99} \quad \left[ \text{ආ. අගය නිශ්චය කිරීම සඳහා } 0.\overline{43} = \frac{43}{99} \right]$$

$$\Rightarrow 23.\overline{43} = \frac{23 \times 99 + 43}{99}$$

$$= \frac{2277 + 43}{99} = \frac{2320}{99}$$

ආ.  $\frac{1}{7} = 0.142857$ ,  $\frac{2}{7} = 0.285714$ ,  $\frac{3}{7} = 0.428571$ ,  $\frac{4}{7} = 0.571428$ , and  $\frac{5}{7} = 0.714285$  වන අතර ඒවායේ අගය නිශ්චය වේ. එවිට ඒවායේ අගය නිශ්චය වේ.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

ආ.  $0.\overline{35}$  හි අගය නිශ්චය කිරීම සඳහා  $0.\overline{35} = \frac{p}{q}$  ලෙස සලකා බැලිය හැක.

$$\frac{2}{7} = 2 \div 7 = 0.285714 \quad ; \quad \frac{3}{7} = 3 \div 7 = 0.428571$$

$$\frac{4}{7} = 4 \div 7 = 0.571428 \quad ; \quad \frac{5}{7} = 5 \div 7 = 0.714285$$



ဒါ့မျှ



# SOLVED EXAMPLES

ಇ. 1. ಈ ಕೆಳಗೆ ನೀಡಲಾದ ಸಮೀಕರಣಗಳನ್ನು ಪರಿಹರಿಸಿ :

$$(i) \frac{x}{4}, \frac{16}{12}$$

$$(ii) \frac{-4}{5}, \frac{x}{10}$$

ಉ. 1.

$$(i) \frac{x}{4} = \frac{16}{12}$$

(ಎರಡು)

$$\Rightarrow \frac{x}{4} \times 12 = \frac{16}{12} \times 12$$

(ಎರಡು ಭಾಗಗಳಿಂದ ಎರಡು ಭಾಗಗಳಿಂದ)

$$\Rightarrow \frac{x}{4} = \frac{16}{3}$$

$$(ii) \frac{-4}{5} = \frac{x}{10}$$

$$\Rightarrow \frac{-4}{5} \times 10 = \frac{x}{10} \times 10 \Rightarrow x = \frac{-4 \times 10}{5} = -8$$

ಇ. 2.  $\frac{7}{9}$  ಮತ್ತು  $\frac{-12}{9}$  ನ ಸರಾಸರಿ

ಉ. 2.

ಉ. 2.

$$\frac{7}{9} + \frac{-12}{9} = \frac{7+(-12)}{9} = \frac{-5}{9}$$

$$[ \rightarrow 7 + (-12) = -5 ]$$

ಇ. 3.  $\frac{3}{-4}$  ಮತ್ತು  $\frac{-5}{6}$  ನ ಸರಾಸರಿ

ಉ. 3.

ಉ. 3.

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

$$\frac{-5}{6} = \frac{-5 \times 2}{6 \times 2} = \frac{-10}{12}$$

$$\frac{3}{-4} = \frac{-3}{4}$$

$$\therefore \frac{3}{-4} = \frac{-3}{4} \times \frac{3}{3} = \frac{-9}{12} \quad \frac{-5}{6} = \frac{-5 \times 2}{6 \times 2} = \frac{-10}{12}$$

$$\frac{-9}{12} > \frac{-10}{12} \quad \frac{3}{-4} > \frac{-5}{6}$$

ಇ. 4.  $\frac{-8}{-15} + \frac{4}{-3}$

ಉ. 4.

ಉ. 4.

$$\frac{8}{15} + \frac{4}{-3} = \frac{8}{15} - \frac{4}{3}$$

$$\left[ Q \frac{8}{-15} = \frac{8 \times (-1)}{(-15) \times (-1)} = \frac{-8}{15} \text{ and } \frac{4}{-3} = \frac{4 \times (-1)}{(-3) \times (-1)} = \frac{-4}{3} \right]$$

$$\frac{8}{15} - \frac{4}{3} = \frac{8}{15} - \frac{20}{15}$$

$$\frac{8}{15} - \frac{20}{15} = \frac{8-20}{15} = \frac{-12}{15}$$

$$\frac{-12}{15} = \frac{-4 \times 3}{5 \times 3} = \frac{-4}{5}$$

$$\therefore \frac{-8}{15} + \frac{4}{-3} = \frac{-8}{15} - \frac{4}{3}$$

$$= \frac{-8}{15} - \frac{20}{15}$$

$$\left[ Q \frac{-4}{3} = \frac{-20}{15} \right]$$

$$= \frac{(-8)+(-20)}{15} = \frac{-28}{15}$$

ಇ. 5. ಗಣಿತ :  $\left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right)$  ಮತ್ತು  $\frac{a}{b} = \frac{-2}{3}$ ,  $\frac{c}{d} = \frac{5}{7}$  ಮತ್ತು  $\frac{e}{f} = \frac{-1}{6}$

ಉ. : ಘಟಕ 1

$$\left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \left(\frac{-2}{3} + \frac{5}{7}\right) + \frac{-1}{6} \Rightarrow \frac{(-2) \times 7 + 3 \times 5}{21} + \frac{-1}{6} = \frac{(-14) + 15}{21} + \frac{-1}{6}$$

$$\Rightarrow \frac{1}{21} + \frac{(-1)}{6} = \frac{1 \times 2 + (-1) \times 7}{42} = \frac{2 + (-7)}{42} = \frac{(-5)}{42} = \frac{-5}{42}$$

$$\text{ಮ. : } \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right) = \frac{-2}{3} + \left(\frac{5}{7} + \frac{-1}{6}\right) \Rightarrow \frac{-2}{3} + \frac{5 \times 6 + 7 \times (-1)}{42} = \frac{-2}{3} + \frac{30 + (-7)}{42}$$

$$\Rightarrow \frac{(-2)}{3} + \frac{23}{42} = \frac{(-2) \times 14 + 23 \times 1}{42} = \frac{(-28) + (23)}{42} = \frac{(-5)}{42} = \frac{-5}{42}$$

$$\therefore \left(\frac{a}{b} + \frac{c}{d}\right) + \frac{e}{f} = \frac{a}{b} + \left(\frac{c}{d} + \frac{e}{f}\right)$$

ಇ. 6. ಸಾಧಾರಣೀಕರಣ  $\frac{-3}{8}$  ಮತ್ತು  $\frac{-5}{7}$

ಉ. : ಉಪರೇಖಿತ ಸಂಖ್ಯೆಗಳಿಗೆ  $\frac{-3}{8}$  ಮತ್ತು  $\frac{3}{8}$   $\left[Q - \left(\frac{-3}{8}\right) = \frac{3}{8}\right]$

$$\therefore \frac{-5}{7} \square \left(\frac{-3}{8}\right) = \frac{-5}{7} + \frac{3}{8} = \frac{(-5) \times 8 + 3 \times 7}{56} = \frac{-40 + 21}{56} = \square \frac{19}{56}$$

ಇ. 7. ಸಾಧಾರಣೀಕರಣ ಸಂಖ್ಯೆಗಳಿಗೆ  $\frac{-5}{8}$  ಮತ್ತು  $\frac{5}{9}$  ?

ಉ. : ಉಪರೇಖಿತ ಸಂಖ್ಯೆಗಳಿಗೆ  $\frac{-5}{8}$  ಮತ್ತು  $\frac{5}{9}$  ಸಂಖ್ಯೆ,  $\frac{5}{9}$  ಸಂಖ್ಯೆ.

$$\frac{-5}{8} + \varphi = \frac{5}{9} \Rightarrow \varphi = \frac{5}{9} \square \left(\frac{-5}{8}\right) \quad \left[\text{Transposing } \frac{-5}{8} \text{ to RHS}\right]$$

$$\Rightarrow \varphi = \frac{5}{9} + \frac{5}{8} \Rightarrow \varphi = \frac{5 \times 8 + 5 \times 9}{72} = \frac{40 + 45}{72} = \frac{85}{72}$$

ಇ. 8. ಸಾಧಾರಣೀಕರಣ ಸಂಖ್ಯೆಗಳಿಗೆ  $\frac{-3}{4}$  ಮತ್ತು  $\frac{5}{6}$  ?

ಉ. : ಉಪರೇಖಿತ ಸಂಖ್ಯೆಗಳಿಗೆ  $\frac{-3}{4}$  ಮತ್ತು  $\frac{5}{6}$  ಸಂಖ್ಯೆ,  $\frac{5}{6}$  ಸಂಖ್ಯೆ.

$$\frac{-3}{4} \square \varphi = \frac{5}{6} \Rightarrow \frac{-3}{4} \square \frac{5}{6} = \varphi \quad \left[\text{Transposing } x \text{ to RHS and } \frac{5}{6} \text{ to LHS}\right]$$

$$\Rightarrow \varphi = \frac{-3}{4} \square \frac{5}{6} \Rightarrow \varphi = \frac{-3}{4} + \frac{-5}{6} \quad \left[Q - \frac{5}{6} = \frac{-5}{6}\right]$$

$$\Rightarrow \varphi = \frac{(-3) \times 3 + (-5) \times 2}{12}$$

$$\Rightarrow \varphi = \frac{(-9) + (-10)}{12} = \frac{-19}{12} \quad [\rightarrow \text{ಉ. : } 4 \text{ ಮತ್ತು } 6 \text{ ಗಳು } 12]$$

ಇ. 9 ಇತರಿಸುಣಿಣ:  $\frac{6}{7} \square 2 + \frac{-7}{9} + \frac{19}{21}$

ಉ. ಫಣಿ ಲಿಣಿಣ:  $\frac{6}{7} \square 2 + \frac{-7}{9} + \frac{19}{21}$

$$= \frac{6}{7} + \frac{(-2)}{1} + \frac{(-7)}{9} + \frac{19}{21}$$

$$= \frac{6 \times 9 + (-2) \times 63 + (-7) \times 7 + 19 \times 3}{63}$$

$$= \frac{54 + (-126) + (-49) + 57}{63} = \frac{111 + (-175)}{63} = \frac{-64}{63}$$

$$\begin{array}{r|rrrr} 7 & 7 & 1 & 9 & 21 \\ 3 & 1 & 1 & 9 & 3 \\ \hline & 1 & 1 & 3 & 1 \end{array}$$

$$\therefore \text{ಫಣಿ} = 7 \circ 3 \circ 3 = 63$$

ಇ. 10 ಫಣಿಣಿಣಿಣ : (ಅ)  $\frac{-2}{3} + \frac{5}{9} \square \frac{-7}{6}$  (ಃ)  $\frac{5}{12} + \frac{-5}{18} \square \frac{7}{24}$

ಉ. (ಅ) ಫಣಿ ಲಿಣಿಣ:

$$\frac{-2}{3} + \frac{5}{9} \square \frac{-7}{6} = \frac{-2}{3} + \frac{5}{9} \square \frac{7}{6}$$

$$= \frac{(-2) \times 6 + 5 \times 2 + 7 \times 3}{18}$$

$$= \frac{-12 + 10 + 21}{18} = \frac{-12 + 31}{18} = \frac{19}{18}$$

$$\left[ Q - \left( \frac{-7}{6} \right) = \frac{7}{6} \right]$$

$$[\rightarrow \text{ಫಣಿ ಫಣಿ 3, 9, ಫಣಿ 6 ಪ 18}]$$

(ಃ) ಫಣಿ ಲಿಣಿಣ:

$$\frac{5}{12} + \frac{-5}{18} \square \frac{7}{24} = \frac{5}{12} + \frac{-5}{18} + \frac{-7}{24}$$

$$= \frac{5 \times 6 + (-5) \times 4 + (-7) \times 3}{72}$$

$$= \frac{30 + (-20) + (-21)}{72} = \frac{30 + (-41)}{72} = \frac{-11}{72}$$

$$\left[ Q - \frac{7}{24} = \frac{-7}{24} \right]$$

$$[\rightarrow \text{ಫಣಿ ಫಣಿ 12, 18 ಫಣಿ 24 ಪ 72}]$$

ಇ. 11  $12\frac{1}{4}$  ಫಣಿ ಫಣಿಣಿಣ ಫಣಿಣಿಣ ಫಣಿ.  $212\frac{1}{3}$  ಫಣಿಣಿಣ ಫಣಿಣಿಣ ಫಣಿಣಿಣ ಫಣಿ 1 ಫಣಿ ಫಣಿಣಿಣ :

ಉ. ಫಣಿ.  $212\frac{1}{3} = \frac{637}{3}$

$$\text{ಫಣಿಣಿಣ ಫಣಿ 1 ಫಣಿ ಫಣಿಣಿಣ} = \frac{637}{3} \div \frac{49}{4} = \frac{637}{3} \circ \frac{4}{49} = \frac{52}{3} = \text{ಫಣಿ. } 17\frac{1}{3}$$

ಇ. 12 ಫಣಿಣಿಣಿಣಿಣ  $\left( \frac{-7}{18} \times \frac{15}{-7} \right) \square \left( 1 \times \frac{1}{4} \right) + \left( \frac{1}{2} \times \frac{1}{4} \right)$

ಉ.  $\left( \frac{-7}{18} \times \frac{15}{-7} \right) \square \left( 1 \times \frac{1}{4} \right) + \left( \frac{1}{2} \times \frac{1}{4} \right) = \left( \frac{-7}{18} \times \frac{15}{-7} \right) \square \left( \frac{1}{1} \times \frac{1}{4} \right) + \left( \frac{1}{2} \times \frac{1}{4} \right)$

$$= \frac{-7 \times 15}{18 \times -7} \square \frac{1 \times 1}{1 \times 4} + \frac{1 \times 1}{2 \times 4} = \frac{1 \times 5}{6 \times 1} \square \frac{1 \times 1}{1 \times 4} + \frac{1 \times 1}{2 \times 4}$$

$$= \frac{5}{6} \square \frac{1}{4} + \frac{1}{8} = \frac{5}{6} + \frac{-1}{4} + \frac{1}{8}$$

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

$$= \frac{5 \times 4 + (-1) \times 6 + 1 \times 3}{24} = \frac{20 + (-6) + 3}{24} = \frac{17}{24}$$

ಇ. 13 ಖಾಲಿ ಜಾಗ :  $\frac{-3}{5} \circ \left(-\frac{10}{9}\right) \circ \left(\frac{21}{-4}\right) \circ (\square 6)$

ಉ. : ಘಟಕ : 1

$$\frac{-3}{5} \circ \left(-\frac{10}{9}\right) \circ \left(\frac{21}{-4}\right) \circ (\square 6) = \frac{-3}{5} \circ \frac{-10}{9} \circ \frac{21}{-4} \circ \frac{-6}{1}$$

$$\Rightarrow \frac{(-3) \times (-10) \times 21 \times (-6)}{5 \times 9 \times (-4) \times 1} = \frac{-(3 \times 10 \times 21 \times 6)}{-(5 \times 9 \times 4 \times 1)} = \frac{3 \times 10 \times 21 \times 6}{5 \times 9 \times 4}$$

$$\Rightarrow \frac{1 \times 5 \times 21 \times 6}{5 \times 3 \times 2} = \frac{1 \times 1 \times 7 \times 3}{1 \times 1 \times 1} = 21$$

ಇ. 14 ಖಾಲಿ ಜಾಗ : (a)  $\frac{2}{5}$  (b)  $\frac{-7}{15}$

ಉ. : (a) ಖಾಲಿ ಜಾಗ :  $\frac{2}{5} \circ \frac{5}{2}$  , ಉ. :  $\left(\frac{2}{5}\right)^{-1} = \frac{5}{2}$  (b) ಖಾಲಿ ಜಾಗ :  $\frac{-7}{15} \circ \frac{15}{-7}$  , ಉ. :  $\left(\frac{-7}{15}\right)^{-1} = \frac{15}{-7}$

ಇ. 15 ಖಾಲಿ ಜಾಗ : (a)  $\frac{3}{5}$  (b)  $\frac{4}{25}$  (c)  $\frac{-8}{9}$  (d)  $\frac{4}{3}$

ಉ. : (a)  $\frac{3}{5} \div \frac{4}{25} = \frac{3}{5} \circ \frac{25}{4} = \frac{3 \times 25}{5 \times 4} = \frac{3 \times 5}{1 \times 4} = \frac{15}{4}$

(b)  $\frac{-8}{9} \div \frac{4}{3} = \frac{-8}{9} \circ \frac{3}{4} = \frac{-8 \times 3}{9 \times 4} = \frac{-2 \times 1}{3 \times 1} = \frac{-2}{3}$

ಇ. 16 ಖಾಲಿ ಜಾಗ : (a)  $\frac{-28}{81}$  (b)  $\frac{14}{27}$  (c)  $\frac{-2}{3}$  (d)  $\frac{14}{27}$

ಉ. : ಘಟಕ : 1

ಖಾಲಿ ಜಾಗ :  $\frac{-28}{81}$  , ಉ. :  $\frac{14}{27}$

(a)  $\frac{14}{27} = \frac{28}{54}$

(b)  $\frac{-28 \times 27}{81 \times 14} = \frac{-(2 \times 1)}{3 \times 1} = \frac{-2}{3}$

ಇ. 17 ಖಾಲಿ ಜಾಗ : (a)  $\frac{3}{-14}$  (b)  $\frac{5}{12}$  (c)  $\frac{-5}{12}$  (d)  $\frac{3}{-14}$

ಉ. : ಘಟಕ : 1

ಖಾಲಿ ಜಾಗ :  $\frac{5}{12}$  , ಉ. :  $\frac{3}{-14}$

(a)  $\frac{3}{-14} \circ \frac{5}{12} = \frac{3 \times 5}{-14 \times 12} = \frac{-15}{168} = \frac{-5}{56}$

(b)  $\frac{-5 \times 14}{12 \times 3} = \frac{-(5 \times 7)}{6 \times 3} = \frac{-35}{18}$

දී: බලාමඩිව්ගින    ඩිකුන    ජිකුනඩිව්දිද්ද

මහනුවර මහලයාගේ මහලයාගේ මහලයාගේ මහලයා

1.  $\frac{5}{16}$  ಚೆಲಿ  $\frac{7}{12}$  :-  
 (a)  $\frac{7}{48}$  (b)  $\frac{1}{24}$  (c)  $\frac{13}{48}$  (d)  $\frac{1}{3}$
2.  $\frac{7}{12}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ  $\frac{4}{15}$  ?  
 (a)  $\frac{19}{60}$  (b)  $\frac{-11}{30}$  (c)  $\frac{51}{60}$  (d)  $\frac{1}{20}$
3.  $\frac{-11}{28}, \frac{-5}{7}, \frac{9}{-14}, \frac{29}{-42}$  ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ?  
 (a)  $\frac{-11}{28}$  (b)  $\frac{-5}{7}$  (c)  $\frac{9}{-14}$  (d)  $\frac{29}{-42}$
4.  $\frac{3}{5}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ  $\frac{2}{5}$  ?  
 (a)  $\frac{7}{5}$  (b)  $\frac{13}{5}$  (c)  $\frac{13}{5}$  (d)  $\frac{7}{5}$
5.  $\frac{-12}{26}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ  $\frac{-49}{91}$  ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ?  
 (a)  $\frac{-12}{26}$  (b)  $\frac{-49}{91}$  (c)  $\frac{-9}{16}$  (d)  $\frac{28}{-105}$
6.  $\frac{10}{3}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ  $\frac{13}{3}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ? :-  
 (a)  $\frac{-13}{3}$  (b)  $\frac{-19}{3}$  (c)  $\frac{1}{3}$  (d)  $\frac{13}{3}$
7.  $\left(-\frac{9}{16} \times \frac{8}{15}\right)$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ? :-  
 (a)  $\frac{3}{10}$  (b)  $\frac{4}{15}$  (c)  $\frac{9}{25}$  (d)  $\frac{9}{25}$
8.  $\frac{-5}{9} \div \frac{2}{3}$  ರೂರ ಡಿಬರೂಟೆಬೆಟೆ ಟೆಸುಡುಡಿ ? :-  
 (a)  $\frac{5}{2}$  (b)  $\frac{5}{6}$  (c)  $\frac{10}{27}$  (d)  $\frac{6}{5}$
9.  $\frac{4}{9} \div (\dots) = \frac{8}{15}$   
 (a)  $\frac{32}{45}$  (b)  $\frac{8}{5}$  (c)  $\frac{9}{10}$  (d)  $\frac{5}{6}$

සායනික අංක 10 වන පිටුව

ගණිත විභාගයේ 05 වන පිටුව

1. දක්වා ඇති ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{2}{3} \times \frac{3}{5} + \frac{5}{2} - \frac{3}{5} \times \frac{1}{6} \quad (b) \frac{2}{5} \times \left(-\frac{3}{7}\right) - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{2}{5}$$

2. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{2}{8} \quad (b) \frac{-5}{9} \quad (c) \frac{-6}{-5} \quad (d) \frac{2}{-9} \quad (e) \frac{19}{-6}$$

3. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) x = \frac{11}{15} \quad (b) x = \frac{13}{17}$$

4. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) x = 13 \quad (b) \frac{-13}{19} \quad (c) \frac{1}{5} \quad (d) \frac{-5}{8} \times \frac{-3}{7} \quad (e) x = 1 \quad (f) x = 1$$

5. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{-4}{5} = 1 = 1 \quad (b) \frac{-4}{5} = x \quad (c) \frac{13}{17} \times \frac{-2}{7} = \frac{-2}{7} \times \frac{-13}{17} \quad (d) \frac{-19}{29} \times \frac{29}{-19} = 1$$

6. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{2}{5} \text{ from } \frac{1}{15} \quad (b) \frac{-3}{7} \text{ from } \frac{12}{14} \quad (c) \frac{-7}{12} \text{ from } \frac{-5}{18}$$

7. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{7}{42} - \frac{8}{21} \quad (b) \frac{2}{15} - \frac{-4}{5} \quad (c) \frac{-7}{12} - \frac{-8}{15} \quad (d) \frac{5}{24} - \frac{-17}{-36} \quad (e) \frac{-8}{15} - \frac{5}{18} \quad (f) \frac{2}{9} - \frac{-5}{12}$$

8. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{2}{3} + \frac{5}{6} - \frac{7}{12} \quad (b) \frac{-4}{9} - \frac{-2}{3} + \frac{5}{12} \quad (c) \frac{7}{18} + \frac{-5}{16} - \frac{2}{9}$$

9. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \text{ 0 වන ස්ථානයේ පිහිටි සංඛ්‍යාව } (b) \text{ 0 වන ස්ථානයේ පිහිටි සංඛ්‍යාව } (c) \text{ 0 වන ස්ථානයේ පිහිටි සංඛ්‍යාව } (d) \text{ 0 වන ස්ථානයේ පිහිටි සංඛ්‍යාව }$$

10. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{5}{16} - \left(-\frac{2}{3}\right) = \frac{5}{16} + \dots \quad (b) x = \frac{2}{15} - \left(-\frac{7}{12}\right) = \dots + \frac{7}{12}$$

11. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{-3}{5} \times \frac{15}{8} \quad (b) \frac{-2}{7} \times \frac{-14}{11} \quad (c) \frac{8}{-11} \times \frac{33}{-32} \quad (d) \frac{17}{3} \times \frac{-15}{34}$$

12. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \left(\frac{2}{3} \times \frac{15}{-16}\right) \square \left(\frac{7}{12} \times \frac{-24}{35}\right) \quad (b) \left(\frac{5}{7} \times \frac{-14}{15}\right) + \left(\frac{-8}{15} \times \frac{3}{-16}\right) \square \left(\frac{2}{9} \times \frac{-27}{16}\right)$$

13. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{2}{3} \times \frac{5}{6} = \frac{5}{6} \times \frac{2}{3} \quad (b) \frac{-34}{48} \times \frac{16}{17} = \frac{16}{17} \times \frac{-34}{48} \quad (c) \frac{-9}{20} \times \frac{35}{-27} = \frac{35}{-27} \times \frac{-9}{20}$$

14. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{-3}{7} \dots \frac{6}{-13} \quad (b) \frac{5}{-13} \dots \frac{-35}{91} \quad (c) x \dots \frac{-13}{5}$$

15. පහත සඳහන් ප්‍රකාශනය සරල කරන්න.

$$(a) \frac{-14}{49} \quad (b) \frac{-36}{-63} \quad (c) \frac{24}{-64}$$



විමුක්තිය සහිත ඔබ සඳහා වන විවිධ ජීවිත සහිත ස්වදේශික

- විසිදු භා    ටිකුණු    වී තුන    ජිතවර්ධන

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19.  $\frac{-3}{10} + \frac{7}{15} + \frac{3}{-20} - \frac{9}{10} + \frac{13}{15} + \frac{13}{-20}$
20.  $\frac{-7}{2}$  ඡායා රූපය ඇති කර ගන්න.
21.  $\frac{-8}{5}$  ඡායා රූපය ඇති කර ගන්න.
22.  $4\frac{3}{4}$  ඡායා රූපය ඇති කර ගන්න.
23.  $80$  ඡායා රූපය ඇති කර ගන්න.
24.  $100$  ඡායා රූපය ඇති කර ගන්න.
25.  $3\frac{1}{2}$  ඡායා රූපය ඇති කර ගන්න.
26.  $\frac{-3}{4}$  ඡායා රූපය ඇති කර ගන්න.
27.  $17\frac{1}{2}$  ඡායා රූපය ඇති කර ගන්න.
28.  $\frac{-3}{4}$  ඡායා රූපය ඇති කර ගන්න.
29.  $2\frac{1}{4}$  ඡායා රූපය ඇති කර ගන්න.
30.  $21$  ඡායා රූපය ඇති කර ගන්න.
31.  $17\frac{1}{2}$  ඡායා රූපය ඇති කර ගන්න.
32.  $145\frac{5}{6}$  ඡායා රූපය ඇති කර ගන්න.
33.  $3\frac{1}{2}$  ඡායා රූපය ඇති කර ගන්න.
34.  $2\frac{1}{4}$  ඡායා රූපය ඇති කර ගන්න.
35.  $\frac{1}{4}$  and  $\frac{5}{3}$  ඡායා රූපය ඇති කර ගන්න.
36.  $\frac{-7}{4}$  ඡායා රූපය ඇති කර ගන්න.
37.  $\frac{-1}{2}$  and  $\frac{5}{4}$  ඡායා රූපය ඇති කර ගන්න.
38.  $\frac{-5}{9}$  ඡායා රූපය ඇති කර ගන්න.
39.  $1$  ඡායා රූපය ඇති කර ගන්න.
40.  $12$  ඡායා රූපය ඇති කර ගන්න.
41.  $\frac{-16}{9}$  ඡායා රූපය ඇති කර ගන්න.



- ಇಫಿ ಇಐಎಲ್‌ಐ-3**

ಇ ಜಿ

සම මග පෙන්වීම

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1. 21000   2. 140   3. 8. 6400   4. 8. 150   5. 180   6. 400   7.  $1\frac{1}{55}$    8. 12   9.  $\frac{11}{4}$    10.  $\frac{33}{2}$    11. 4250   12. 8. 1636  $\frac{1}{4}$    13.  $72\frac{1}{4}\text{m}^2$    14. 610   15. 303   16.  $124\frac{19}{20}$    17.  $36\frac{1}{2}$    18.  $8\frac{1}{18}\text{kg}$    19.  $26\frac{5}{11}\text{kg}$    20.  $5\frac{1}{10}\text{m}$

**පි:බඳමඩ්ඩිගු    ඩිකුතු    ජිතාසනිවර්දිය    පිජා    සංඝිවර්දියංච    දැන:අසස**

ಅಗಾಧಿಪತಿಯ ವಿಶೇಷ ಅಧಿಕಾರವೆಂಬುದು

- [illegible]



20. ඩවුස ඡේද්‍යයක් සඳහා  $\left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \times \left(\frac{x^c}{x^a}\right)^{\frac{1}{ca}} \times \left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}}$  ප්‍රතිඵලය :
- (අ) 0 (ආ)  $\frac{1}{x}$  (ඇ)  $\square 1$  (ඈ) 1
21. ඩවුස ඡේද්‍යයක් සඳහා  $\frac{1}{1+x^{a-b}+x^{a-c}} + \frac{1}{1+x^{b-c}+x^{b-a}} + \frac{1}{1+x^{c-a}+x^{c-b}}$  ප්‍රතිඵලය :
- (අ) 0 (ආ)  $\frac{1}{x^{a+b+c}}$  (ඇ)  $\frac{1}{x^{a+b+c}}$  (ඈ) 1
22.  $\left(\frac{a^{-1}b^{-1}}{a^{-1}+b^{-1}} - \frac{a^{-1}b^{-1}}{a^{-1}-b^{-1}}\right)$  ප්‍රතිඵලය :
- (අ)  $\frac{2b}{b^2-a^2}$  (ආ)  $\frac{2b}{a^2-b^2}$  (ඇ)  $\frac{2a}{b^2-a^2}$  (ඈ)  $\frac{2a}{a^2-b^2}$
23. ඩවුස ඡේද්‍යයක් සඳහා  $\frac{27}{400}$  ප්‍රතිඵලය :
- (අ) ඩවුස ඡේද්‍යයක් සඳහා  $\frac{27}{400}$  ප්‍රතිඵලය (ආ)  $\frac{27}{400}$  ප්‍රතිඵලය (ඇ)  $\frac{27}{400}$  ප්‍රතිඵලය (ඈ)  $\frac{27}{400}$  ප්‍රතිඵලය
24.  $2.2\overline{34} =$
- (අ)  $\frac{1101}{495}$  (ආ)  $\frac{1103}{495}$  (ඇ)  $\frac{1106}{495}$  (ඈ)  $\frac{1105}{495}$
25. ඩවුස ඡේද්‍යයක් සඳහා  $\sqrt{19}$  ප්‍රතිඵලය :
- (අ)  $\sqrt{19}$  (ආ)  $\sqrt{16}$  (ඇ)  $\sqrt{17}$  (ඈ)  $\sqrt{18}$
26. ඩවුස ඡේද්‍යයක් සඳහා  $2.74\overline{35}$  ප්‍රතිඵලය :
- (අ)  $\frac{27161}{9999}$  (ආ)  $\frac{27}{99}$  (ඇ)  $\frac{27161}{9900}$  (ඈ)  $\frac{27161}{9000}$
27. ඩවුස ඡේද්‍යයක් සඳහා  $0.42\overline{3}$  ප්‍රතිඵලය :
- (අ)  $\frac{423}{1000}$  (ආ)  $\frac{419}{1000}$  (ඇ)  $\frac{423}{9000}$  (ඈ)  $\frac{419}{990}$
28.  $3 + \sqrt{8}$  හි ප්‍රතිඵලය  $3 + \sqrt{8}$  හි ප්‍රතිඵලය  $\frac{1}{x^2} + \frac{1}{y^2} =$
- (අ)  $\square 34$  (ආ) 34 (ඇ)  $12\sqrt{8}$  (ඈ)  $\square 12\sqrt{8}$
29.  $1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{3}}}$  ප්‍රතිඵලය  $\square$
- (අ)  $\frac{1}{3}$  (ආ)  $\frac{11}{7}$  (ඇ) 3 (ඈ)  $1\frac{1}{3}$
30.  $\frac{(x^{a+b})^2 (x^{b+c})^2 (x^{c+a})^2}{(x^a \times x^b \times x^c)^4} = ?$
- (අ)  $\square 1$  (ආ) 0 (ඇ) 1 (ඈ)  $\frac{1}{x^{a+b+c}}$

ප්‍රශ්න						පිළිතුරු				පිළිතුරු					
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	C	B	A	A	D	C	B	C	D	A	D	D	B	A
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	D	A	C	B	D	D	D	A	C	B	C	D	B	B	C

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