

Unit → 1 -

Number System

Chapter → 1 -

Rational Numbers -

About →

= Rational numbers are numbers which can be expressed as $\frac{p}{q}$, where p and q are integers and $q \neq 0$

= Integers - A set or collection of counting numbers (positive numbers) and negative numbers including zero is called as Integers.

• It is denoted by $\mathbb{Z}$ or $\mathbb{I}$

$\left. \begin{array}{l} \{-4, -3, -2, -1, 0, 1, 2, 3, 4\} \\ \{4, 5, 6, 7, 8, 9\} \\ \{-7, -6, -5, -4, -3, -2, -1\} \end{array} \right\}$



$$1) \frac{18}{-25} \times \frac{5}{3} = \frac{18}{25} \times \frac{1}{5} = -\frac{1}{5} \times 1 = -\frac{1}{5}$$

$$2) 1 + \frac{2}{3} = 1 \times \frac{3}{3} + \frac{2}{3} = \frac{5}{3}$$

$$3) \frac{-3}{12} + \frac{-18}{18} = \frac{-3}{12} \times \frac{-18}{18} = \frac{-1}{4}$$

$$4) \frac{3}{8} + -1 = \frac{3}{8} \times \frac{-1}{1} = -\frac{3}{8}$$

$$5) 0 \div \frac{14}{15} = 0 \times \frac{15}{14} = 0$$

$$6) \frac{18}{21} + \frac{-35}{35} = \frac{18}{21} \times \frac{-35}{35} = \frac{1}{3} \times \frac{-5}{2} = -\frac{5}{6}$$

4. Write in ascending order:

$$-\frac{3}{5}, -\frac{4}{15}, \frac{7}{-10}, \frac{1}{30}$$

$$= \frac{-18}{30}, \frac{-8}{30}, \frac{-21}{30}, \frac{1}{30}$$

Ascending Order $\rightarrow -\frac{21}{30}, -\frac{18}{30}, -\frac{8}{30}, \frac{1}{30}$

$$\text{Pair} \rightarrow \frac{7}{-10}, \frac{-3}{5}, -\frac{4}{15}, \frac{1}{30}$$

Properties of Rational Numbers

Case I $\rightarrow$ Addition

* Closure Property -

Let $\frac{a}{b} + \frac{c}{d}$ are two rational no.

Then, $\frac{a}{b} + \frac{c}{d}$ is also rational no.

* Commutative Property -

Let $\frac{a}{b} + \frac{c}{d}$ are two rational no.

Then, $\frac{a}{b} + \frac{c}{d} = \frac{c}{d} + \frac{a}{b}$

* Associative Property -

Let $\frac{a}{b}, \frac{c}{d}, \frac{e}{f}$ are three rational no.

Then, $(\frac{a}{b} + \frac{c}{d}) + \frac{e}{f} = \frac{a}{b} + (\frac{c}{d} + \frac{e}{f})$

Additive Identity - an identity under addition -

Let $\frac{a}{b}$ be rational no.

Then, $\frac{a}{b} + 0 = 0 + \frac{a}{b} = \frac{a}{b}$

[Zero is additive identity for the given Rational no.]



* Additive inverse or inverse under addition -

Let a be rational no.

$$\text{Then, } a + \left(-\frac{a}{b}\right) = \frac{a}{b} + \left(-\frac{a}{b}\right) = 0$$

Additive inverse of $a = -\frac{a}{b}$

Additive inverse of $-\frac{a}{b} = \frac{a}{b}$

Try this!

Write the additive inverse of the following:

a. $\frac{14}{15} = -\frac{14}{15}$

b. $-\frac{9}{29} = \frac{9}{29}$

c. $-\frac{22}{89} = \frac{22}{89}$

d. $1 = -1$

e. $-3 = 3$

1. $\frac{5}{-33} = \frac{5}{33}$

2. Is there a rational number which is its own additive? If yes, write the rational number.

Yes, 0 has its own additive.

3. Verify the commutative property for the given pairs of rational numbers.

a. $\frac{4}{5}$ and $\frac{3}{8}$

$$\Rightarrow \frac{4}{5} + \frac{3}{8} = \frac{3}{8} + \frac{4}{5}$$

$$= \frac{32 + 15}{40} = \frac{15 + 32}{40}$$

$$= \frac{47}{40} = \frac{47}{40}$$

LHS = RHS

b. $\frac{2}{9}$ and $-\frac{6}{11}$

$$\Rightarrow \frac{2}{9} + -\frac{6}{11} = -\frac{6}{11} + \frac{2}{9}$$

$$= \frac{22 + (-54)}{99} = \frac{-32 + 22}{99}$$

$$= \frac{-32}{99} = \frac{-32}{99}$$

LHS = RHS



4. Verify the associative property of addition for the given rational number.

a. $\frac{3}{5}, \frac{4}{7}, \frac{5}{9}$

$$\Rightarrow \frac{3}{5} + \left(\frac{4}{7} + \frac{5}{9} \right) = \left(\frac{3}{5} + \frac{4}{7} \right) + \frac{5}{9}$$

$$= \frac{3}{5} + \left(\frac{36+53}{63} \right) = \left(\frac{27+30}{35} \right) + \frac{5}{9}$$

$$= \frac{3}{5} + \frac{101}{63} = \frac{11}{35} + \frac{5}{9}$$

$$= \frac{63+355}{315} = \frac{369+175}{315}$$

$$= \frac{544}{315}$$

b. $\frac{4}{9}, \left(\frac{-5}{11} \right), \frac{7}{3}$

$$\Rightarrow \frac{4}{9} + \left(\frac{-5}{11} + \frac{7}{3} \right) = \left(\frac{4}{9} + \frac{-5}{11} \right) + \frac{7}{3}$$

$$= \frac{4}{9} + \left(\frac{-15+77}{33} \right) = \left(\frac{44+(-45)}{99} \right) + \frac{7}{3}$$

$$= \frac{4}{9} + \frac{52}{33} = \frac{-1}{99} + \frac{7}{3}$$

$$= \frac{132+468}{297} = \frac{-1+693}{297}$$

$$= \frac{692}{297}$$

5. Name the properties of addition in each of following case.

a. $\frac{4}{8} + \frac{4}{7} = \frac{4}{7} + \frac{4}{8}$ (Commutative property)

b. $\left[\frac{-3}{5} + \frac{-21}{8} \right] + \frac{3}{16} = \frac{-3}{5} + \left[\frac{-21}{8} + \frac{3}{16} \right]$
Associative property

c. $\frac{9}{22} + 0 = \frac{9}{22} = 0 + \frac{9}{22}$ Additive Identity

d. $\frac{2}{7} + \left(\frac{4}{21} + \frac{9}{8} \right) = \left(\frac{1}{7} + \frac{4}{21} \right) + \frac{9}{8}$

Associative property

e. $\frac{5}{3} + \left(\frac{-5}{3} \right) = \left(\frac{-5}{3} \right) + \frac{5}{3} = 0$ Additive Inverse

6. Ruma had a piece of ribbon. She cut it into 4 equal parts. She gave 1 part to her friend. Find the length of the ribbon.

Length of the ribbon =

$$\frac{16}{3} + \frac{9}{4} + \frac{28}{6} + \frac{32}{8}$$

$$134 + 514 + 112 + 114$$

$$\frac{134}{24} + \frac{514}{24} + \frac{112}{24} + \frac{114}{24}$$

So, the length of Ribbon is = 17 cm

Case II - Subtraction

* Closure property -

Let $\frac{a}{b}$ & $\frac{c}{d}$ are the Rational no.
Then, $\frac{a}{b} - \frac{c}{d}$ is also Rational no.

* Commutative property -

Let $\frac{a}{b}$ & $\frac{c}{d}$ are two Rational no.

$$\text{Then, } \frac{a}{b} - \frac{c}{d} \neq \frac{c}{d} - \frac{a}{b}$$

* Associative property -

Let $\frac{a}{b}$, $\frac{c}{d}$ & $\frac{e}{f}$ are three R.no.

$$\text{Then, } \left(\frac{a}{b} - \frac{c}{d} \right) - \frac{e}{f} \neq \frac{e}{f} - \left(\frac{c}{d} - \frac{a}{b} \right)$$

Hence, this property is not applicable.

Note :

Identity and Inverse and Subtraction is not applicable.

Try this!

at Evaluate

$$a. \frac{2}{5} + \left(-\frac{3}{8}\right) + \frac{4}{5} + \frac{7}{8} - \frac{2}{3} - \frac{2}{1}$$

$$= \frac{48 + (-45) + 96 + 15 - 80 - 240}{120}$$

$$= \frac{240 - 360}{120}$$

$$= \frac{-120}{120}$$

$$= -1$$

$$b. \frac{1}{21} - \frac{5}{7} + \frac{2}{4} + \frac{11}{6} - 3$$

$$= \frac{16 - 60 + 180 + 154 - 752}{84}$$

$$= \frac{-60 + 359 - 252}{84}$$

$$= \frac{-312 + 359}{84}$$

$$= \frac{47}{84}$$

$$= \frac{47}{84}$$

2. What number should be added to $\left(-\frac{3}{7}\right)$ to get $\frac{9}{7}$?

$$\text{Let } m = x$$

$$A.T.G -$$

$$-\frac{3}{7} + x = \frac{9}{7}$$

$$x = \frac{3}{7} + \frac{9}{7} = \frac{12}{7}$$

$$x = 1$$

3. What should be subtracted from $\frac{5}{7}$ to get $\frac{3}{11}$?

$$\text{Let } m = x$$

$$A.T.G -$$

$$\frac{5}{7} - x = \frac{3}{11}$$

$$-x = \frac{3}{11} - \frac{5}{7}$$

$$-x = \frac{21 - 55}{77}$$

$$-x = \frac{-34}{77}$$

$$x = \frac{34}{77}$$

4. If the sum of two rational is $\frac{47}{7}$, and one of the rational numbers is $\frac{2}{7}$, find the other rational number.

$$\text{Let } m = x$$

$$A.T.G -$$



$$\frac{8}{5} + x = \frac{47}{9}$$

$$x = \frac{47}{9} - \frac{8}{5}$$

$$x = \frac{235 - 72}{45}$$

$$x = \frac{163}{45}$$

5. Verify the closure property for subtraction using any two rational numbers.

$$\Rightarrow \text{let numbers} = \frac{42}{2} \text{ \& } \frac{58}{4}$$

Closure property $\rightarrow$

$$= \frac{42}{2} - \frac{58}{4}$$

$$= \frac{84 - 58}{4}$$

$$= \frac{26}{4}$$

By taking any suitable examples, check whether the commutative and associative property are there for subtraction for R.no.

$$\text{let numbers} = \frac{7}{9} \text{ \& } \frac{3}{11} \text{ \& } \frac{4}{9}$$

Commutative property -

$$\Rightarrow \frac{7}{9} - \frac{(-3)}{11} \neq \frac{(-3)}{11} - \frac{7}{9}$$

$$-\frac{77}{99} + \frac{27}{99} \neq -\frac{27}{99} - \frac{77}{99}$$

$$\frac{104}{99} \neq -\frac{104}{99}$$

Associative property -

$$\Rightarrow \frac{7}{9} - \left[\frac{(-3)}{11} - \frac{4}{9} \right] \neq \left[\frac{7}{9} - \frac{(-3)}{11} \right] - \frac{4}{9}$$

$$\frac{7}{9} - \left[\frac{-27 - 44}{99} \right] \neq \left[\frac{77 + 27}{99} \right] - \frac{4}{9}$$

$$\frac{7}{9} + \frac{71}{99} \neq \frac{104}{99} - \frac{4}{9}$$

$$\frac{77}{99} + \frac{71}{99} \neq \frac{104 - 4}{99}$$

$$\frac{148}{99} \neq \frac{60}{99}$$

7. Ajay is leaving from his residence in Dehradun to visit his friend Kapil, who lives in Delhi. Kapil's residence is 244 km away from Ajay's residence. If Ajay has covered 165 km, how much more does he have to travel?

let distance travel by him = x

D1.9 →

$$\frac{1223}{5} - x = \frac{497}{3}$$

$$-x = \frac{497}{3} - \frac{1223}{5}$$

$$-x = \frac{2485 - 3669}{15}$$

$$x = \frac{1184}{15}$$

$$x = \frac{1184}{15}$$

$$x = 78 \frac{14}{15}$$

✓ 10 marks
✓ 10 marks
✓ 10 marks
✓ 10 marks
✓ 10 marks
✓ 10 marks
✓ 10 marks
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✓ 10 marks

Case III - Multiplication

*

Closure property -
Let $\frac{a}{b} \times \frac{c}{d}$ are two R.no

Then, $\frac{a}{b} \times \frac{c}{d}$ is also R.no.

*

Commutative property -
Let $\frac{a}{b} \times \frac{c}{d}$ one two R.no

$$\text{Then, } \frac{a}{b} \times \frac{c}{d} = \frac{c}{d} \times \frac{a}{b}$$

*

Associative property -
Let $\frac{a}{b} \times \frac{c}{d}$ are three R.no

$$\text{Then, } \frac{a}{b} \times \left(\frac{c}{d} \times \frac{e}{f} \right) = \left(\frac{a}{b} \times \frac{c}{d} \right) \times \frac{e}{f}$$

*

Multiplicative Identity -
Let a is a Rational number

$$\text{Then, } \frac{a}{b} \times 1 = 1 \times \frac{a}{b}$$

$$\frac{a}{b} = \frac{a}{b}$$

Hence, 1 is multiplicative identity of
give Rational number.

* Multiplicative Inverse -

Let a be a R.N.

Then, $a \times \frac{1}{a} = 1$

Hence, multiplicative inverse of $a \rightarrow \frac{1}{a}$

Multiplicative inverse of given rational no is also the reciprocal of the given rational number.

Try this !

1. Write the multiplicative inverse of the following.

a. $\frac{1}{17} = \frac{17}{1} = 17$

b. $\frac{-5}{14} = \frac{-14}{5}$

c. $\frac{-5}{-18} = \frac{+18}{75} = \frac{18}{5}$

d. $1 = \frac{1}{1}$

e. $-1 = \frac{1}{-1}$

f. $-5 = \frac{1}{-5}$

g. $0 = \frac{1}{0} = (\infty)$ not defined (infinity)

2. Fill in the blank.

a. $\frac{5}{9} \times \frac{3}{8} = \frac{3}{8} \times \frac{5}{9}$



$$6. \frac{14}{23} \times \left(\frac{11}{9} \times \frac{13}{19} \right) = \left(\frac{14}{23} \times \frac{11}{9} \right) \times \frac{13}{19}$$

$$c. \frac{5}{22} \times \frac{16}{3} = \frac{16}{3} \times \frac{5}{22}$$

$$d. \left(\frac{21}{9} \times \frac{4}{33} \right) \times \frac{5}{12} = \frac{21}{9} \times \left(\frac{4}{33} \times \frac{5}{12} \right)$$

3. State the properties neglected in the given statement.

$$a. \frac{13}{12} \times \left(\frac{29}{26} \times \frac{13}{14} \right) = \left(\frac{13}{12} \times \frac{29}{26} \right) \times \frac{13}{14}$$

Associative property

$$b. \frac{7}{5} \times \frac{5}{7} = \frac{5}{7} \times \frac{7}{5} = 1$$

Multiplicative inverse

$$c. \frac{22}{25} \times 1 = 1 \times \frac{22}{25} = \frac{22}{25}$$

Multiplicative identity

$$d. \frac{35}{43} \times \frac{25}{23} = \frac{25}{23} \times \frac{35}{43}$$

Commutative property

4.

Meena bought $7\frac{1}{4}$ kg of watermelons at ₹ 20 per kg. How much did she pay for the watermelons.

$$\text{No. of watermelons} = 7\frac{1}{4} \text{ kg} = \frac{29}{4} \text{ kg}$$

$$1 \text{ kg} = ₹ 20$$

$$\frac{29}{4} \text{ kg} = ₹ 20$$

$$= ₹ 20 \times \frac{29}{4}$$

$$= 5 \times 29$$

$$= ₹ 145 \text{ Ans.}$$



Case IV → Division.

* Closure property -

Let $\frac{a}{b} \in \mathbb{Q}$ are two R.no.

then, $\frac{a}{b} \div \frac{c}{d}$

$$= \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc} \text{ is also R. no.}$$

In this case this property is applicable.

But if $\frac{c}{d}$ is a Rational no.

$$\frac{c}{d} \div 0 = \text{not defined}$$

In this case this property is not applicable.

* Commutative property -

If $\frac{a}{b} \in \mathbb{Q}$ and $\frac{c}{d} \in \mathbb{Q}$ are two R.no.

$$\text{then, } \frac{a}{b} \div \frac{c}{d} \neq \frac{c}{d} \div \frac{a}{b}$$

Associative property -

$\frac{a}{b} \div \frac{c}{d}, \frac{c}{d} \div \frac{e}{f}$ are three R.no.

$$\text{then, } \left(\frac{a}{b} \div \frac{c}{d} \right) \div \frac{e}{f} \neq \frac{a}{b} \div \left(\frac{c}{d} \div \frac{e}{f} \right)$$

Identically, $\mathbb{Q}$ is not closed under division and also not applicable.

Very This!

1. Is the commutative property for division true for rational numbers? Justify your answer with the help of an example.

→ Let the numbers = $\frac{3}{6}$ and $\frac{4}{6}$

$$\frac{3}{6} \div \frac{4}{6} \neq \frac{4}{6} \div \frac{3}{6}$$

$$\frac{3}{6} \times \frac{6}{4} \neq \frac{4}{6} \times \frac{6}{3}$$

$$\frac{3}{4} \neq \frac{4}{3}$$

Hence, it is not true that commutative property not for division.

Is the associative property for division true for rational numbers? Justify your answer with the help of an example.

→ Let the numbers = $\frac{3}{6}$ and $\frac{4}{6}$ and

$$\frac{3}{6} \div \left(\frac{4}{6} \div \frac{5}{6} \right) \neq \left(\frac{3}{6} \div \frac{4}{6} \right)$$

$$\frac{3}{6} \div \frac{4}{5} = \frac{3}{4} \times \frac{5}{6}$$

$$\frac{2}{4} \times \frac{5}{5} = \frac{3}{4} \times \frac{5}{6}$$

$$\frac{5}{8} = \frac{9}{10}$$

hence, the property not applicable.

3. The product of two rational numbers is $16 \cdot \frac{9}{9}$ one of the numbers is $-\frac{8}{9}$, find other no.

$\Rightarrow$ let second no = x

ATQ $\Rightarrow$

$$16 \times x = -\frac{8}{9}$$

$$x = -\frac{8}{9} \div 16$$

$$x = -\frac{8}{9} \times \frac{1}{16}$$

$$x = -\frac{1}{18}$$

4. 21 requires $5\frac{1}{5}$ m of cloth to stitch

22 shirts of the same size. How much cloth will be required to stitch one shirt

$$\text{Shirts} = 5\frac{1}{5} \text{ m} = \frac{26}{5}$$

$$\text{Shirts} = \frac{26}{5} \div 22$$

$$= \frac{26}{5} \times \frac{1}{22}$$

$$= \frac{143}{5}$$

$$= 2\frac{3}{5} \text{ m}$$

Required cloth to stitch one shirt = $2\frac{3}{5}$



Distributive Property of Multiplication over Addition

Let, a, b, c, d, e are three R.n.s

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

Try this!

Simplify using distributive property of multiplication over addition.

$$1. \left(\frac{2}{8} \times \frac{-4}{5} \right) + \left(\frac{7}{9} \times \frac{3}{8} \right) - \left(\frac{3}{8} \times \frac{-8}{10} \right)$$

$$= \frac{30}{8} \times \left(\frac{-4}{5} + \frac{7}{9} - \frac{(-8)}{10} \right)$$

$$= \frac{30}{8} \times \left(\frac{-72 + 70 + 72}{90} \right)$$

$$= \frac{30}{8} \times \left(\frac{70}{90} \right)$$

$$= \frac{30}{8} \times \frac{70}{90}$$

$$= \frac{7}{24} \text{ Ans}$$

$$2. \frac{6}{11} \times \left(\frac{2}{9} - \frac{3}{7} + \frac{1}{3} + 2 \right)$$

$$= \frac{6}{11} \times \left(\frac{14 - 27 + 21 + 126}{63} \right)$$

$$= \frac{6}{11} \times \frac{144}{63}$$

$$= \frac{72}{11} \text{ Ans}$$

Try this!

1. Evaluate the following -

$$a. \left(\frac{3}{5} \times \frac{10}{15} \right) - \left[\frac{2}{3} - \left(\frac{4}{7} \div \frac{2}{21} \right) \right] + \left(\frac{1}{5} \right) \times \left(\frac{2}{3} + \frac{4}{3} \right)$$

$$= \left(\frac{2}{5} \times \frac{2}{3} \right) - \left[\frac{2}{3} - \left(\frac{41}{7} \times \frac{21}{2} \right) \right] + \left(\frac{1}{5} \right) \times \left(\frac{6}{3} \right)$$

$$= \frac{2}{5} - \left[\frac{2}{3} - 6 \right] + \frac{1}{5} \times \frac{2}{1}$$

$$= \frac{2}{5} - \left[\frac{2-18}{3} \right] + \frac{2}{5}$$

$$= \frac{2}{5} - \left(\frac{-16}{3} \right) + \frac{2}{5}$$

$$= \frac{2}{5} - \frac{16}{3} + \frac{2}{5}$$

$$= \frac{6+80+6}{15}$$

$$= \frac{92}{15} \text{ when}$$

$$6. \left(\frac{3}{6} \times \frac{2}{9} \right) + \left(\frac{3}{4} \div \frac{12}{5} \right) - \left[\frac{2}{8} - \left(\frac{1}{4} \times \frac{2}{3} \right) \right]$$

$$= \left(\frac{3}{6} \times \frac{2}{9} \right) + \left(\frac{3}{4} \times \frac{5}{12} \right) - \left[\frac{2}{8} - \left(\frac{1}{2} \times \frac{2}{3} \right) \right]$$

$$= \frac{1}{9} + \frac{5}{16} - \left(\frac{2}{8} - \frac{1}{6} \right)$$

$$= \frac{1}{9} + \frac{5}{16} - \left(\frac{6-4}{24} \right)$$

$$= \frac{1}{9} + \frac{5}{16} - \frac{2}{24}$$

$$= \frac{16+45-12}{144}$$

$$= \frac{49}{144}$$

$$C. \left[\left(\frac{3}{5} + \frac{2}{9} \right) \times \frac{5}{2} \right] - \left(\frac{3}{5} \div \frac{6}{15} \right) + \left(\frac{4}{7} \times \frac{14}{5} \div \frac{16}{2} \right)$$

$$= \left[\left(\frac{27+10}{45} \right) \times \frac{5}{2} \right] - \left(\frac{3}{8} \times \frac{15}{6} \right) + \left(\frac{4}{7} \times \frac{14}{5} \times \frac{2}{16} \right)$$

$$= \left(\frac{37}{18} \times \frac{5}{2} \right) - \frac{3}{2} + \frac{1}{5}$$

$$= \frac{37}{18} - \frac{3}{2} + \frac{1}{5}$$

$$= \frac{195-135+18}{90} = \frac{185-117}{90} = \frac{68}{90}$$

$$= \frac{34}{45} \text{ when}$$

2. By what rational number should the sum of $\frac{18}{5}$ and $-\frac{7}{15}$ be divided to get $\frac{47}{6}$?

$\Rightarrow$ let x be divided =

$$\left(\frac{18}{5} + -\frac{7}{15} \right) \div x = \frac{47}{6}$$

$$\left(\frac{54-7}{15} \right) \div x = \frac{47}{6}$$

$$\frac{47}{15} \div x = \frac{47}{6}$$

$$\frac{47}{15} \times \frac{1}{x} = \frac{47}{6}$$

$$x = \frac{47}{15} \div \frac{47}{6}$$

$$x = \frac{47}{15} \times \frac{6}{47}$$

$$x = \frac{2}{5}$$

3. By what rational number should the product of $\frac{9}{7}$ and -35 be divided to get $\frac{3}{5}$?

⇒ let x be divided =

$$\left(\frac{21^3}{3} \times \frac{25^5}{2} \right) \div x = -3$$

$$-\frac{15}{2} \times \frac{1}{x} = \frac{3}{5}$$

$$x = -\frac{15}{2} \div \frac{3}{5}$$

$$x = -\frac{15}{2} \times \frac{5}{3}$$

$$x = -\frac{25}{2}$$

$$x = -12\frac{1}{2}$$

4. One bought $5\frac{2}{3}$ kg of mangoes at ₹65 per kg and Rishi bought $7\frac{3}{5}$ kg of

mangoes at the same rate. How much

did they spend in all?

⇒ Mango = $5\frac{2}{3}$ kg

Rate = ₹65

One spend = $5\frac{2}{3} \times 65$ Rs

Rishi's spend = $7\frac{3}{5} \times 65$ Rs

Total Expend = $5\frac{2}{3} \times 65 + 7\frac{3}{5} \times 65$

$$= 65 \times \left(5\frac{2}{3} + 7\frac{3}{5} \right)$$

$$= 65 \times \left(\frac{27}{5} + \frac{37}{5} \right)$$

$$= 65 \times \left(\frac{64}{5} \right)$$

$$= 2832$$

Exercise - 1.1

1. State the property -

a. $\frac{2}{3} + 0 = 0 + \frac{2}{3} = \frac{2}{3}$

= Additive Identity

b. $\frac{5}{9} + \left(-\frac{5}{9}\right) = \left(-\frac{5}{9}\right) + \frac{5}{9} = 0$

= Additive Inverse

c. $\frac{2}{3} + \frac{4}{5} = \frac{4}{5} + \frac{2}{3}$

= Commutative property

d. $\frac{1}{6} + \left(\frac{3}{10} + \frac{4}{7}\right) = \left(\frac{1}{6} + \frac{3}{10}\right) + \frac{4}{7}$

= Associative property

e. $\frac{5}{9} + 0 = 0 + \frac{5}{9} = 0$

= Additive Identity

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

2. Is there a rational number which is its own additive inverse?

Ans = Yes, its 0

3. Write the additive inverse of -

a. $\frac{21}{-22} = \frac{21}{22}$

c. $\frac{-99}{-99} = \left(-\frac{99}{99}\right)$

b. $\frac{-1}{1} = 1$

d. $\frac{0}{7} = 0$

8.14.5 Verify the closure property of subtraction

— Closure Property —

$$\begin{array}{r} a \\ b \\ 3 \\ 5 \end{array} - \begin{array}{r} c \\ d \\ 7 \\ 11 \end{array}$$

$$33 - 35$$

$$55$$

$$-\frac{2}{55} \text{ ans}$$

8.6.4 Check whether -

a. Commutative property of subtraction

- Commutative Property -

$$\frac{a}{b} - \frac{c}{d} \neq \frac{c}{d} - \frac{a}{b}$$

$$\frac{3}{5} - \frac{7}{11} \neq \frac{7}{11} - \frac{3}{5}$$

$$\frac{33}{55} - \frac{35}{55} \neq \frac{35}{55} - \frac{33}{55}$$

$$-\frac{2}{55} \neq \frac{2}{55}$$

LHS $\neq$ RHS

b) Associative property for Subtraction

$$\frac{2}{11}, \frac{3}{11}, \frac{9}{11}$$

- Associative property -

$$\left(\frac{9}{b} - \frac{c}{d}\right) - \frac{e}{f} + \frac{g}{h} \neq \left(\frac{c}{d} - \frac{e}{f}\right) + \frac{g}{h}$$

$$\left(\frac{3}{11} - \frac{3}{11}\right) - \frac{9}{11} \neq \frac{3}{11} - \left(\frac{3-9}{11}\right)$$

$$-\frac{1}{11} - \frac{9}{11} \neq \frac{2}{11} - \left(-\frac{6}{11}\right)$$

$$-\frac{10}{11} \neq \frac{2}{11} + \frac{6}{11}$$

$$-\frac{10}{11} \neq \frac{2+6}{11}$$

$$-\frac{10}{11} \neq \frac{8}{11}$$

LHS $\neq$ RHS

8. What rational number should be:-

(a) added to $\frac{2}{3}$ to get $-\frac{4}{11}$?

$\Rightarrow$ let the no. = x

$$\text{So, } \frac{2}{3} + x = -\frac{4}{11}$$

$$x = -\frac{4}{11} - \frac{2}{3}$$

$$x = \frac{-12-22}{33}$$

$$x = \frac{-34}{33}$$

b. Subtracted from $\frac{3}{8}$ to get $\frac{7}{9}$.

let the no. = x

$$\text{So, } \frac{3}{8} - x = \frac{7}{9}$$

$$-x = \frac{7}{9} - \frac{3}{8}$$

$$-x = \frac{56-27}{72}$$

$$-x = \frac{29}{72}$$

$$x = -\frac{29}{72}$$

9. Evaluate:

$$a. \frac{3}{3} + \frac{6}{4} - \frac{1}{3} + \frac{3}{2} + \frac{5}{2} - \frac{4}{7} - \frac{3}{1}$$

$$28 + 36 - 14 + 63 + 105 - 24 - 126$$

42

$$232 - 164$$

42

$$\frac{68}{42} \times \frac{34}{21}$$

$$\frac{1}{21}$$

$$1 \frac{13}{21} \text{ ans}$$

21

6.

$$\frac{7}{8} + \frac{3}{4} - \frac{5}{9} - \frac{4}{9} + \frac{7}{8} + \frac{1}{1}$$

$$63 + 54 - 40 - 32 + 63 + 72$$

72

$$252 - 72$$

72

$$\frac{180}{72} \times \frac{20}{42}$$

$$\frac{5}{2} \text{ ans}$$

$$\frac{5}{2}$$

c.

$$\frac{1}{4} + \frac{5}{6} + \frac{3}{4} - \frac{9}{6} - \frac{3}{4} + \frac{8}{6} - \frac{1}{6}$$

$$3 + 10 + 9 - 18 - 9 + 16 - 12$$

12

$$38 - 39$$

12

$$= \frac{1}{12} \text{ ans}$$

d.

$$\frac{3}{3} + \frac{5}{2} - \frac{3}{5} + \frac{11}{2} - \frac{1}{2} + \frac{9}{5} - \frac{1}{1}$$

$$4 + 25 - 6 + 55 - 5 + 18 + 10$$

10

$$112 - 11$$

10

$$\frac{101}{10}$$

10

$$10 \frac{1}{10} \text{ ans}$$

10. State the properties -

a.

$$\frac{12}{17} \times 1 = 1 \times \frac{12}{17} = \frac{12}{17}$$

= Multiplicative identity

b.

$$\frac{5}{9} \times \frac{9}{5} = \frac{9}{5} \times \frac{5}{9} = 1$$

= Multiplicative inverse

c.

$$\frac{1}{3} \times \frac{2}{5} = \frac{2}{5} \times \frac{1}{3}$$

= Commutative property

d.

$$\left(\frac{2}{5} \times \frac{3}{7} \right) \times \frac{4}{11} = \frac{2}{5} \times \left(\frac{3}{7} \times \frac{4}{11} \right)$$

= Associative property

e.

$$\frac{13}{15} \times 1 = 1 \times \frac{13}{15} = \frac{13}{15}$$

= Multiplicative identity

11. Find the multiplicative inverse.

a. $-4 = \frac{-1}{4}$ e. $\frac{1}{-1} = -1$

b. $\frac{66}{-59} = \frac{-59}{66}$ d. $\frac{0}{7} = \frac{7}{0} = \infty$

c. $\frac{-1}{11} = \frac{-11}{1}$

d. $\frac{12}{21} = \frac{121}{12}$

12. a. Commutative property for division $\frac{a}{b}$ and $\frac{b}{a}$

- Commutative property -

$\frac{a}{b} \div \frac{c}{d} \neq \frac{c}{d} \div \frac{a}{b}$

$\frac{4}{9} \div \frac{5}{8} \neq \frac{5}{8} \div \frac{4}{9}$

$\frac{4}{9} \times \frac{8}{5} \neq \frac{5}{8} \times \frac{9}{4}$

$\frac{32}{45} \neq \frac{45}{32}$

LHS $\neq$ RHS

b. Associative property for division $\frac{a}{\frac{b}{c}}$ and $\frac{\frac{a}{b}}{c}$

- Associative Property -

$(\frac{a}{b} \div \frac{c}{d}) \div \frac{e}{f} \neq \frac{a}{b} \div (\frac{c}{d} \div \frac{e}{f})$

$(\frac{1}{5} \div \frac{1}{12}) \div \frac{1}{15} \neq \frac{1}{5} \div (\frac{1}{12} \div \frac{1}{15})$

$(\frac{1}{5} \times \frac{12}{1}) \times \frac{15}{1} \neq \frac{1}{5} \times (\frac{12}{1} \times \frac{15}{1})$

$\frac{12}{5} \times \frac{18}{1} \neq \frac{1}{5} \times \frac{4}{5}$

$\frac{36}{5} \neq \frac{4}{25}$

LHS $\neq$ RHS



13. Simplify using distributive property
by multiplication over addition

a. $\left(\frac{5}{8} \times \frac{-9}{7}\right) + \left(\frac{3}{7} \times \frac{5}{8}\right) - \left(\frac{5}{8} \times \frac{-2}{7}\right)$

$= \frac{5}{8} \times \left(\frac{-9}{7} + \frac{3}{7} - \left(\frac{-2}{7}\right)\right)$

$= \frac{5}{8} \times \left(\frac{-9+3+2}{7}\right)$

$= \frac{5}{8} \times \left(\frac{-9+5}{7}\right)$

$= \frac{5}{8} \times \frac{-4}{7}$

$= \frac{-5}{14} \text{ ans}$

b. $\left(\frac{7}{8} \times \frac{8}{15}\right) + \left(\frac{8}{15} \times \frac{-5}{8}\right) - \left(\frac{8}{15} \times \frac{3}{4}\right)$

$= \frac{8}{15} \times \left(\frac{7}{8} + \frac{(-5)}{8} - \frac{3}{4}\right)$

$= \frac{8}{15} \times \left(7 + \frac{(-5)-6}{8}\right)$

$= \frac{8}{15} \times \left(\frac{7-5-6}{8}\right)$

$= \frac{8}{15} \times \left(\frac{7-11}{8}\right)$

$= \frac{8}{15} \times \frac{-4}{8}$

$= \frac{-4}{15} \text{ ans}$

c. $\left(\frac{3}{10} \times \frac{8}{9}\right) + \left(\frac{3}{10} \times \frac{5}{9}\right) - \left(\frac{4}{9} \times \frac{3}{10}\right)$

$= \frac{3}{10} \times \left(\frac{8}{9} + \frac{5}{9} - \frac{4}{9}\right)$

$= \frac{3}{10} \times \left(\frac{8+5-4}{9}\right)$

$= \frac{3}{10} \times \left(\frac{13-4}{9}\right)$

$= \frac{3}{10} \times \frac{9}{9}$

$= \frac{3}{10} \text{ ans}$

d. $\left(\frac{4}{9} \times \frac{13}{15}\right) - \left(\frac{13}{15} \times \frac{4}{9}\right) + \left(\frac{4}{9} \times \frac{7}{9}\right)$

$= \frac{4}{9} \times \left(\frac{13}{15} - \frac{13}{15} + \frac{7}{9}\right)$

$= \frac{4}{9} \times \left(\frac{39-39+63}{45}\right)$

$= \frac{4}{9} \times \frac{63}{45}$

$= \frac{28}{15}$

14. Evaluate:

$$a. \left[\left(\frac{4}{7} \times \frac{5}{8} \right) - \left(\frac{4}{7} \times \frac{3}{8} \right) \right] \div \left[\left(\frac{3}{8} \times \frac{6}{7} \right) + \left(\frac{3}{8} \times \frac{2}{7} \right) \right]$$

$$= \left[\left(\frac{4}{7} \times \frac{5}{8} \right) - \left(\frac{4}{7} \times \frac{3}{8} \right) \right] \div \left[\left(\frac{3}{8} \times \frac{6}{7} \right) + \left(\frac{3}{8} \times \frac{2}{7} \right) \right]$$

$$= \left(\frac{5}{14} - \frac{3}{14} \right) \div \left(\frac{9}{28} + \frac{3}{28} \right)$$

$$\frac{2}{14} \div \frac{12}{28}$$

$$\frac{2}{14} \times \frac{28}{12} = \frac{1}{3}$$

$$b. \left[\left(\frac{3}{9} \times \frac{3}{7} \right) + \left(\frac{5}{9} \times \frac{3}{7} \right) \right] + \left[\left(\frac{5}{8} \div \frac{1}{4} \times \frac{4}{9} \right) - \left(\frac{5}{2} \times \frac{2}{9} \right) \right]$$

$$= \left[\left(\frac{3}{9} \times \frac{3}{7} \right) + \left(\frac{5}{9} \times \frac{3}{7} \right) \right] + \left[\left(\frac{5}{8} \times \frac{4}{1} \times \frac{4}{9} \right) - \left(\frac{5}{2} \times \frac{2}{9} \right) \right]$$

$$= \left(\frac{2}{21} + \frac{5}{21} \right) + \left(\frac{10}{9} - \frac{5}{9} \right)$$

$$= \frac{7}{21} + \frac{5}{9}$$

$$= \frac{21 + 35}{63} = \frac{56}{63} = \frac{8}{9}$$

$$c. \left[\left(\frac{3}{5} \times \frac{4}{9} \right) - \left(\frac{3}{5} \times \frac{2}{9} \right) \right] \div \left[\left(\frac{3}{7} \div \frac{6}{14} \times \frac{6}{5} \right) - \left(\frac{2}{3} \times \frac{4}{5} \right) \right]$$

$$= \left(\frac{4}{15} - \frac{2}{15} \right) \div \left(\frac{4}{5} - \frac{8}{15} \right)$$

$$= \frac{2}{15} \div \left(\frac{12-8}{15} \right)$$

$$= \frac{2}{15} \div \frac{4}{15}$$

$$= \frac{2}{15} \times \frac{15}{4} = \frac{1}{2}$$

$$d. \left[\left(\frac{2}{9} \times \frac{1}{8} \right) + \left(\frac{5}{8} \times \frac{2}{9} \right) - \left(\frac{5}{9} \times \frac{3}{10} \right) - \left(\frac{5}{9} \times \frac{1}{10} \right) \right]$$

$$= \left(\frac{2}{9} \times \frac{1}{8} \right) + \left(\frac{5}{8} \times \frac{2}{9} \right) - \left(\frac{5}{9} \times \frac{3}{10} \right) - \left(\frac{5}{9} \times \frac{1}{10} \right)$$

$$= \left[\left(\frac{1}{36} + \frac{5}{36} \right) - \frac{1}{6} - \frac{1}{18} \right]$$

$$= \left[\left(\frac{1+5}{36} \right) - \left(\frac{3-1}{18} \right) \right]$$

$$= \left[\frac{6}{36} - \frac{2}{18} \right]$$

$$= \frac{6-4}{36} = \frac{2}{36} = \frac{1}{18}$$

15. A man walked $6\frac{2}{3}$ km the first day, $5\frac{5}{6}$ km the second day, and $5\frac{1}{3}$ km the third day. How much did he walk in all?

down worked total = $6\frac{2}{3} \text{ km} + 5\frac{5}{6} + 5\frac{1}{3}$

$$= \frac{20}{3} + \frac{35}{6} + \frac{16}{3}$$

$$= \frac{40 + 35 + 32}{6} \text{ km}$$

$$= \frac{107}{6}$$

$$= 17\frac{5}{6} \text{ km}$$

16. The sum of two numbers is $23\frac{7}{8}$. If one of the numbers is $7\frac{3}{4}$, find the other number.

$$= 23\frac{7}{8} - 7\frac{3}{4} = \frac{191}{8} - \frac{31}{4}$$

$$= \frac{191 - 62}{8}$$

$$= \frac{129}{8}$$

$$= 16\frac{1}{8} \text{ km}$$

17. By which rational number should

- a. $\frac{9}{8}$ be divided to get $\frac{8}{11}$?

$$\frac{9}{8} \div x = \frac{8}{11}$$

$$\frac{11}{9} \times \frac{11}{82}$$

$$\frac{11}{18} \text{ km}$$

- b. $\frac{3}{8}$ be multiplied to get $\frac{15}{88}$?

$$= \frac{15}{88} \div \frac{3}{8}$$

$$= \frac{15}{88} \times \frac{8}{3}$$

$$= \frac{5}{11} \text{ km}$$

18. By which rational number should be divide the product of $\frac{12}{35}$ and $\frac{49}{60}$?

$$a. \frac{12}{35} \times \frac{49}{60} = \frac{1}{25}$$

$$\frac{7}{25} \times x = \frac{7}{25}$$

$$x = \frac{7}{25} \div \frac{7}{25}$$

$$x = \frac{7}{25} \times \frac{25}{7}$$

$$x = \frac{25}{25}$$

$$x = 1 \text{ km}$$

Area of remaining parts are uncovered

$$= \frac{39 \times 65}{2}$$

Area of border = $\frac{41}{2} \times \frac{67}{4} = \frac{39}{2} \times \frac{65}{4}$

Area of one tile = $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

No. of tiles to cover border =

$$= \frac{\text{Area of Border}}{\text{Area of tile}}$$

$$\begin{aligned} &= \frac{\frac{39}{2} \times \frac{65}{4}}{\frac{1}{8}} \\ &= \frac{\frac{2535}{2}}{\frac{1}{8}} \\ &= 2535 \times 4 \\ &= 10140 \end{aligned}$$

Cost of tiling = 212×62
 $= 213,144$ Ans

Q1. One sixth --- class.

Let total no. of students = x
 Students opted for instrumental music

$$= \frac{1}{6} \text{ of } x$$

$$= \frac{x}{6}$$

Remaining student = $x - \frac{x}{6}$

$$= \frac{6x - x}{6} = \frac{5x}{6}$$

Students opted of vocal music = $\frac{1}{5}$ of $\frac{5x}{6}$

$$= \frac{1}{5} \times \frac{5x}{6} = \frac{x}{6}$$

A.T.G $\rightarrow$

$$\frac{x}{6} = 6$$

$$x = 6 \times 6$$

$$x = 36$$

Hence, total no. of students = 36

Q2. Ravi --- beginning

Let Ravi had marble = x
 He gave marbles to his brother = $\frac{x}{7}$

$$\text{Remaining marble} = x - \frac{x}{7} = \frac{6x}{7}$$

He gave marbles to his friends

$$= \frac{1}{2} \times \frac{2x}{7}$$

$$= \frac{2x}{7}$$

Left marbles with Sam = $6x - 2x$

$$= \frac{4x}{7}$$

A.T.Q =

$$\frac{4x}{7} = 24$$

$$4x = 24 \times 7$$

$$x = \frac{24 \times 7}{4}$$

$$x = 42$$

Hence, Sam had 42 marbles.

~~Correct Ans~~
~~42~~

Representation of Rational Numbers

Qn A Number

line

Try This!

1. Write five rational numbers - 121

$$\frac{-12}{10}, \frac{12}{10}, \frac{12}{10}, \frac{12}{10}, \frac{12}{10}$$

$$\frac{-10}{10}, \frac{10}{10}$$

$$\frac{-9}{10}, \frac{-8}{10}, \frac{-7}{10}, \frac{-6}{10}, \frac{-5}{10}$$

2. Write seven numbers between 3 and 5

$$\begin{array}{l} 3 \times 8 \leftarrow 5 \times 7 = 29 \leftarrow 3 \times 7 \\ 7 \times 8 \quad 8 \times 7 \quad 56 \quad 56 \end{array}$$

$$\begin{array}{l} 85 \quad 26 \quad 27 \quad 28 \quad 29 \quad 30 \quad 31 \\ 56 \quad 56 \quad 56 \quad 56 \quad 56 \quad 56 \quad 56 \end{array}$$

3. Write six numbers between $\frac{7}{9}$ and $\frac{5}{11}$

$$\begin{array}{l} 7 \times 11 \quad 1 \quad 5 \times 9 \\ 9 \times 11 \quad 11 \times 9 \end{array} = -\frac{77}{99} \leftarrow \frac{45}{99}$$

$$\begin{array}{l} -\frac{76}{99} \quad -\frac{75}{99} \quad -\frac{74}{99} \quad -\frac{73}{99} \quad -\frac{72}{99} \quad -\frac{71}{99} \end{array}$$

4. Using $\frac{0}{2} + \frac{3}{2} = \frac{3}{2}$

$$\frac{0}{2} + \frac{3}{2} = \frac{3}{2}$$

$$\frac{0}{1} + \frac{3}{2} = \frac{3}{2}$$

$$\frac{0}{1} + \frac{3}{4} = \frac{3}{4} \quad \left\{ \frac{3}{2}, \frac{3}{4}, \frac{3}{8}, \frac{3}{16} \right\}$$

$$\frac{0}{1} + \frac{3}{8} = \frac{3}{8}$$

Exercise - 1.2

1. Write the rational numbers represent by the labelled points

a. $\frac{2}{4} = \frac{1}{2} = \frac{2}{4} = \frac{5}{2}$

b. $-\frac{4}{3} = -\frac{4}{3} = -\frac{13}{3}$

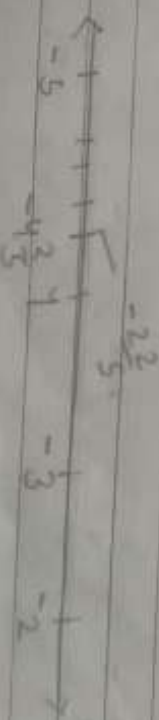
c. $\frac{6}{5} = \frac{32}{5}$

d. $-\frac{8}{7} = -\frac{58}{7}$

2. a) Represent $\frac{13}{4}$ on a number line.



b) Represent $-\frac{22}{5}$ on a number line.



3. Mark the rational number on a number line.

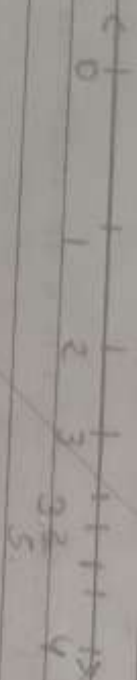
a. $\frac{2}{9}$



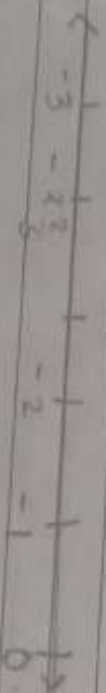
b. $\frac{6}{7}$



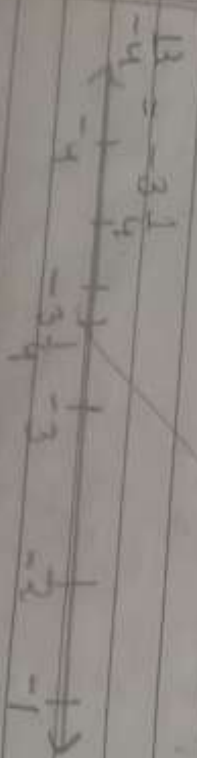
c. $\frac{13}{8} = 3\frac{3}{8}$



d. $-\frac{8}{3} = -2\frac{2}{3}$



e. $\frac{13}{4} = 3\frac{1}{4}$



4. Write five rational numbers between 2 and 3.

$\frac{2 \times 6}{1 \times 6} + \frac{3 \times 6}{1 \times 6} = \frac{13}{6} + \frac{18}{6}$

Five = $\frac{13}{6}, \frac{14}{6}, \frac{15}{6}, \frac{16}{6}, \frac{17}{6}$

6) Write four rational numbers between $\frac{4}{5}$ and $\frac{5}{5}$.

$\frac{4 \times 5}{1 \times 5} + \frac{5 \times 5}{1 \times 5} = \frac{30}{5} + \frac{25}{5}$

down = $\frac{21}{5}, \frac{22}{5}, \frac{23}{5}, \frac{24}{5}$

5. Using arithmetic mean, find three rational numbers between $\frac{5}{9}$ and $\frac{7}{9}$.

① $\frac{5}{9} + \frac{7}{9} = \frac{12}{9}$

② $\frac{5}{9} + \frac{14}{9} = \frac{19}{9}$

③ $\frac{5}{9} + \frac{27}{9} = \frac{32}{9}$

Ans = $\frac{12}{9}, \frac{19}{9}, \frac{26}{9}, \frac{32}{9}$

6. Using arithmetic mean, find a rational number between $\frac{11}{5}$ & $\frac{7}{3}$

(Rational number = $\frac{11}{5} + \frac{7}{3}$)

$$\frac{33+35}{2} = \frac{68}{2} = 34$$

Ans: $\frac{34}{15}$

~~Correct answer~~
~~34/15~~

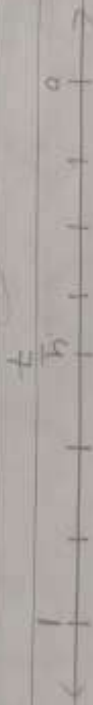
Day This!

1. Represent the following rational numbers on a number line.

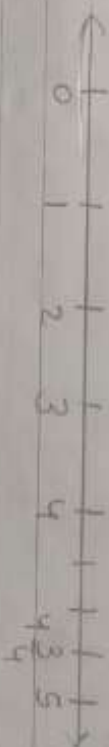
a. $\frac{2}{5}$



b. $\frac{4}{7}$



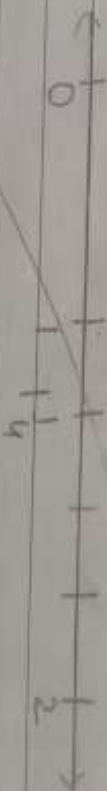
c. $\frac{19}{4} = 4\frac{3}{4}$



d. $-\frac{7}{3} = -2\frac{1}{3}$



e. $\frac{5}{4} = 1\frac{1}{4}$



f. $\frac{12}{7} = 1\frac{5}{7}$



2. Write the rational number represented by labelled points

a. $2\frac{1}{2} = -\frac{5}{2}$

b. $-1\frac{1}{4} = -\frac{5}{4}$

c. $\frac{3}{5}$

d. $\frac{1}{3}$

e. $3\frac{5}{7} = \frac{26}{7}$

d. $2\frac{3}{8} = \frac{19}{8}$

Revision Exercise...

1. Write the additive inverse of each

a. $\frac{21}{8} = -\frac{21}{8}$

b. $-\frac{5}{39} = \frac{5}{39}$

c. $-\frac{17}{11} = \frac{17}{11}$

d. $\frac{14}{15}$

d. $-\frac{6}{35} = \frac{6}{35}$

e. $\frac{0}{2} = 0$

f. $\frac{19}{14} = -\frac{19}{14}$

2. Write the multiplicative inverse of each

a. $-\frac{19}{81} = -\frac{81}{19}$

b. $1 = 1$

c. $-1 = -1$

d. $-\frac{11}{79} = \frac{79}{11}$

e. $\frac{48}{7} = \frac{7}{48}$

f. $\frac{2}{3} = \infty$ (Infinite)

3. Are there any rational numbers which are their own multiplicative inverse?
Yes, 1 and -1

4. Is there any rational number which does not have a multiplicative inverse?
 Yes, 0

5. Evaluate,

$$\begin{aligned}
 a. & \left[\frac{3}{5} \times \left(-\frac{7}{7} \right) + \left[\frac{-1}{6} \times \frac{3}{2} \right] + \left[\frac{-1}{14} \times \frac{-2}{5} \right] \right. \\
 & \left. - \left[\frac{2}{5} \times \left(-\frac{3}{7} \right) \right] + \left[\frac{-1}{6} \times \frac{8}{2} \right] + \left[\frac{-1}{14} \times \frac{-2}{5} \right] \right] \\
 & = \frac{-6}{35} - \left(\frac{-1}{4} \right) + \left(\frac{-1}{35} \right) + \\
 & = \frac{-24 - 35 - 4}{140} = \frac{-63}{140} \text{ Ans}
 \end{aligned}$$

$$\begin{aligned}
 b. & \left(\frac{5}{6} \times \frac{-1}{4} \right) - \left(\frac{2}{3} \times \frac{5}{6} \right) + \left(\frac{5}{6} \times \frac{-5}{6} \right) \\
 & = \frac{5}{6} \times \left[-\frac{1}{4} - \frac{2}{3} + \left(\frac{-5}{6} \right) \right] \\
 & = \frac{5}{6} \times \left[\frac{-6-16-20}{24} \right] \\
 & = \frac{5}{6} \times \frac{-42}{24} \\
 & = \frac{-35}{24}
 \end{aligned}$$

$$c. \left[\frac{13}{9} \times \left(-\frac{13}{26} \right) \right] - \left(\frac{3}{7} \times \frac{7}{5} \right) + \left(\frac{2}{3} - \left(\frac{4}{5} \div \frac{2}{15} \right) \right)$$

$$\begin{aligned}
 & = \left[\frac{13}{9} \times \frac{-13}{26} \right] - \left[\frac{3}{7} \times \frac{7}{5} \right] + \left(\frac{2}{3} - \left(\frac{4}{5} \div \frac{2}{15} \right) \right) \\
 & = \frac{-2}{3} - \frac{3}{5} + \left(\frac{2}{3} - \frac{4}{1} \right) \\
 & = \frac{-2}{3} - \frac{3}{5} + \left(\frac{2-18}{3} \right) \\
 & = \frac{-2}{3} - \frac{3}{5} + \left(-\frac{16}{3} \right) \\
 & = \frac{-10-9-80}{15} \\
 & = \frac{-99}{15} = \frac{-33}{5} \text{ Ans}
 \end{aligned}$$

6. Evaluate.

$$\begin{aligned}
 a. & \frac{8}{9} + \left(-\frac{1}{4} \right) + \left(-\frac{4}{9} \right) + \frac{3}{4} + \frac{7}{9} + \frac{5}{4} + \frac{2}{9} - 1 \\
 & = \frac{2-4+7+2}{9} + \frac{-1+3+5-1}{4} \\
 & = \frac{11-4}{9} + \frac{-1+8}{4} \\
 & = \frac{7}{9} + \frac{7}{4} - \frac{1}{1} \\
 & = \frac{28+63-36}{36} = \frac{55}{36}
 \end{aligned}$$

$$b. \frac{3}{5} - \frac{2}{9} + \frac{7}{15} + \left(-\frac{5}{18} \right) + 2$$

$$54 - 20 + 42 - 25 + 180$$

$$\frac{236}{90} = \frac{32 \times 4}{90} = \frac{77}{30}$$

$$c. \frac{2}{7} - \left(-\frac{3}{5}\right) - \frac{11}{4} + \frac{3}{10} + \left(-\frac{2}{35}\right)$$

$$40 + 84 - 385 + 42 - 8 + 280$$

$$\frac{446 - 392}{140} = \frac{54}{140}$$

$$d. \frac{2}{5} - \left(-\frac{3}{7}\right) + \frac{1}{5} + \frac{2}{7} + \frac{3}{5} + \frac{1}{7}$$

$$\frac{2}{5} + \frac{1}{5} + \frac{3}{5} + \frac{3}{7} + \frac{2}{7} + \frac{1}{7}$$

$$\frac{2+1+3}{5} + \frac{3+2+1}{7}$$

$$\frac{6}{5} + \frac{6}{7}$$

$$\frac{42 + 40 + 175}{35} = \frac{257}{35}$$

7. What --- -- -- -4?

8. The sum --- -- -- of

$$the no = 17\frac{3}{8} - 6\frac{5}{8}$$

$$= \frac{139}{8} - \frac{53}{8}$$

$$= \frac{139 - 53}{8} = \frac{86}{8} = \frac{43}{4}$$

9. What --- -- -- -- -3?

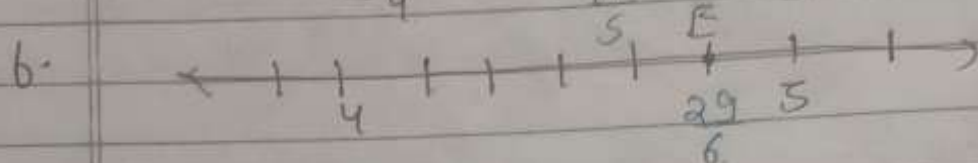
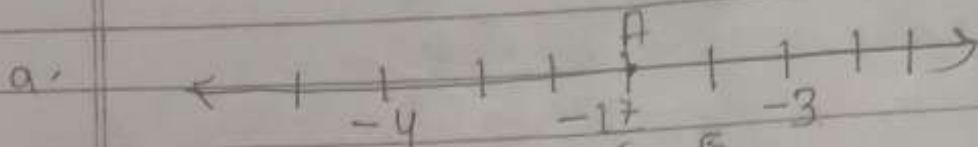
10. What --- -- -- -- -5?

11. Represent the following rational no

$$a. -\frac{18}{5}$$

e.

12. Find the rational numbers.

13. Write $\frac{a+b}{2}$ $\frac{-1+3}{2}$ $\frac{1}{2}$ $\frac{-1}{4}$

$$\frac{a+b}{2} = \frac{-1+3}{2} = \frac{1}{2}$$

$$= \frac{\frac{1}{2} + \frac{1}{2}}{2} = \frac{-2+1}{2} = \frac{-1}{4}$$

14. Using $\frac{12}{5}$ and $\frac{10}{3}$

$$= \frac{12 \times 3}{5 \times 3} \text{ and } \frac{10 \times 5}{3 \times 5} = \frac{36}{15} \text{ and } \frac{50}{15}$$

$$= \frac{37}{15}, \frac{38}{15}, \frac{39}{15}, \frac{40}{15}, \frac{41}{15}, \frac{42}{15}, \frac{43}{15}$$

15. One $\frac{23}{4}$ correct.

$$\Rightarrow \text{Weight of an cement} = 5 \frac{3}{4} \text{ kg}$$

$$\text{weight of 10 block cement} = 5 \frac{3}{4} \times 10 \text{ kg}$$

$$= \frac{23}{4} \times 10$$

$$= \frac{230}{4} = 57 \frac{1}{2}$$

