

2.

Commutative Property:i) Addition $\rightarrow (a+b) = (b+a)$

$$\frac{-5}{9} + \frac{3}{8} = \frac{3}{8} + \frac{-5}{9}$$

$$\frac{-13}{72} = \frac{-13}{72}$$

\therefore Addition of rational no.'s is closed under Commutative Property

ii) Subtraction $\Rightarrow (a-b) \neq (b-a)$

$$\frac{5}{6} \text{ and } \frac{-3}{8}$$

$$\frac{5}{6} - \left(\frac{-3}{8}\right) =$$

$$\left(\frac{-3}{8}\right) - \frac{5}{6}$$

$$= \frac{5}{6} + \frac{3}{8}$$

$$\frac{-3}{8} - \frac{5}{6}$$

$$\Rightarrow \frac{20+9}{24}$$

$$\frac{-9-20}{24}$$

$$\Rightarrow \frac{29}{24}$$

$$\neq$$

$$\frac{-29}{24}$$

Subtraction is not closed under Com. Prop

iii) Multiplication — $(a \times b = b \times a)$

$\frac{7}{9}$ and $\frac{1}{2}$

$$\frac{7}{9} \times \frac{1}{2}$$

$$\frac{1}{2} \times \frac{7}{9}$$

$$\Rightarrow \frac{7}{18} = \frac{7}{18}$$

Multiplication of two rational numbers is closed & under Comm. Property.

iv) Division :- $\frac{2}{7}$ and $\frac{-4}{9}$

$$\Rightarrow \frac{2}{7} \div \left(\frac{-4}{9}\right)$$

$$\left(\frac{-4}{9}\right) \div \frac{2}{7}$$

$$\Rightarrow \frac{2}{7} \times \left(\frac{-9}{4}\right)$$

$$\frac{-4}{9} \times \frac{7}{2}$$

$$\Rightarrow \frac{-9}{14} \neq \frac{-14}{9}$$

$$[a \div b \neq b \div a]$$

Division of any two rational no's

are not closed under Comm. Property

3.

Associative Property

i) Addition — $-\frac{4}{9}, \frac{5}{7}$ and $\frac{3}{8}$

$$\Rightarrow -\frac{4}{9} + \left(\frac{5}{7} + \frac{3}{8}\right)$$

$$\left(\frac{-4}{9} + \frac{5}{7}\right) + \frac{3}{8}$$

$$\Rightarrow -\frac{4}{9} + \left(\frac{40+21}{56}\right)$$

$$\left(\frac{-28+45}{63}\right) + \frac{3}{8}$$

$$\Rightarrow -\frac{4}{9} + \frac{61}{56}$$

$$\frac{17}{63} + \frac{3}{8}$$

$$\Rightarrow \frac{-224+549}{504}$$

$$\frac{136+189}{504}$$

$$\Rightarrow \frac{325}{504} = \frac{325}{504}$$

$$\frac{325}{504}$$

Three
Addition of any two integer no's are closed & under associative property.

for a, b, c

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

ii) Subtraction — $\frac{3}{5}$, $\frac{2}{9}$ and $-\frac{2}{3}$

$$\Rightarrow \frac{3}{5} - \left(\frac{2}{9} - \frac{-2}{3} \right)$$

$$\left(\frac{3}{5} - \frac{2}{9} \right) - \left(\frac{-2}{3} \right)$$

$$\Rightarrow \frac{3}{5} - \left[\frac{2}{9} + \frac{2}{3} \right]$$

$$\left(\frac{27-10}{45} \right) + \frac{2}{3}$$

$$\Rightarrow \frac{3}{5} - \frac{8}{9}$$

$$\frac{17}{45} + \frac{2}{3}$$

$$\Rightarrow \frac{27-40}{45}$$

$$\frac{17+30}{45}$$

$$\Rightarrow \frac{-13}{45}$$

$$\neq \frac{47}{45}$$

Subtraction of any integers are not closed under associative property.

for $a, b, c \rightarrow a - (b - c) \neq (a - b) - c$

iii) Multiplication: — $\frac{1}{5}$, $\frac{3}{4}$ and $-\frac{2}{9}$

$$\Rightarrow \frac{1}{5} \times \left[\frac{3}{4} \times \left(\frac{-2}{9} \right) \right]$$

$$\left(\frac{1}{5} \times \frac{3}{4} \right) \times \left(\frac{-2}{9} \right)$$

$$\Rightarrow \frac{1}{5} \times \left(-\frac{1}{6} \right)$$

$$\frac{3}{20} \times \left(\frac{-2}{9} \right)$$

$$= -\frac{1}{30}$$

$$= -\frac{1}{30}$$

Multiplication of rational no's are closed under associative property.

for $a, b \& c \rightarrow$

$$a \times (b \times c) = (a \times b) \times c$$

iv) Division: — $\frac{3}{8}$, $-\frac{4}{5}$ and $\frac{1}{9}$

$$\Rightarrow \frac{3}{8} \div \left(\frac{-4}{5} \div \frac{1}{9} \right)$$

$$\left(\frac{3}{8} \div \left(\frac{-4}{5} \right) \right) \div \frac{1}{9}$$

$$\Rightarrow \frac{3}{8} \div \left(\frac{-4}{5} \times \frac{9}{1} \right)$$

$$\left(\frac{3}{8} \times \frac{5}{-4} \right) \div \frac{1}{9}$$

$$\Rightarrow \frac{3}{8} \div \left(\frac{-36}{5} \right)$$

$$\frac{15}{-32} \div \frac{1}{9}$$

$$\Rightarrow \frac{3}{8} \times \frac{5}{-36 \cdot 12}$$

$$\frac{15}{-32} \times \frac{9}{1}$$

$$\Rightarrow -\frac{5}{96} \neq -\frac{135}{32}$$

Division property for any three rational no's are not closed under associative property.

for $a, b, c \rightarrow$

$$a \div (b \div c) \neq (a \div b) \div c$$