



## Chapter 9

### Rational Number

#### **SOLUTIONS:**

#### **EXERCISE 9.1**

Q1. List five rational numbers between:

(i) -1 and 0

Ans:  $-1 = -1/1 = -6/6$      $0 = 0/1 = 0/6$  ( we multiply numerator and denominator by  $5+1 = 6$  )

Five rational numbers between -1 and 0 are  $-5/6$ ,  $-4/6$ ,  $-3/6$ ,  $-2/6$  and  $-1/6$ .

(ii) -2 and -1

Ans :  $-2 = -12/6$      $-1 = -6/6$

Five rational numbers between -2 and -1 are  $-11/6$ ,  $-10/6$ ,  $-9/6$ ,  $-8/6$  and  $-7/6$ .

(iii)  $-4/5$  and  $-2/3$

Ans:  $-4/5 = -4 \times 3 \times 6 / 5 \times 3 \times 6 = -72/90$      $-2/3 = -2 \times 5 \times 6 / 3 \times 5 \times 6 = -60/90$   
( we try to make denominators of the rational numbers equal by multiplying by 3 and 5 crossing the denominators. It is multiplied by 6 to get five fractions easily.)

Five rational numbers between  $-4/5$  and  $-2/3$  are  $-71/90$ ,  $-70/90$ ,  $-69/90$ ,  $-68/90$  and  $-66/90$ .

(iv)  $-\frac{1}{2}$  and  $\frac{2}{3}$

Ans :  $-\frac{1}{2} = -1 \times 3 \times 6 / 2 \times 3 \times 6 = -18/36$        $\frac{2}{3} = 2 \times 2 \times 6 / 3 \times 2 \times 6 = 24/36$

Five rational numbers between  $-\frac{1}{2}$  and  $\frac{2}{3}$  are  $\frac{19}{36}$ ,  $\frac{20}{36}$ ,  $\frac{21}{36}$ ,  $\frac{22}{36}$  and  $\frac{23}{36}$ .

Q2. Write four more rational numbers in each of the following patterns :

(i)  $-\frac{3}{5}$ ,  $-\frac{6}{10}$ ,  $-\frac{9}{15}$ ,  $-\frac{12}{20}$ .....

Ans:  $-\frac{3}{5}$ ,  $-\frac{6}{10}$ ,  $-\frac{9}{15}$ ,  $-\frac{12}{20}$ ,  $-\frac{15}{25}$ ,  $-\frac{18}{30}$ ,  $-\frac{21}{35}$  and  $-\frac{24}{40}$   
( we multiply numerator and denominator of each fraction by 5, 6, 7 and 8 respectively. )

(ii) Ans:  $-\frac{1}{4}$ ,  $-\frac{2}{8}$ ,  $-\frac{3}{12}$   $-\frac{4}{16}$ ,  $-\frac{5}{20}$ ,  $-\frac{6}{24}$  and  $-\frac{7}{28}$

(iii) Ans :  $-\frac{1}{6}$ ,  $\frac{2}{-12}$ ,  $\frac{3}{-18}$ ,  $\frac{4}{-24}$   $\frac{5}{-30}$ ,  $\frac{6}{-36}$ ,  $\frac{7}{-42}$ ,  $\frac{8}{-48}$

(iv) Ans:  $-\frac{2}{6}$ ,  $\frac{2}{-12}$ ,  $\frac{3}{-18}$ ,  $\frac{4}{-24}$   $\frac{8}{-12}$ ,  $\frac{10}{-15}$ ,  $\frac{12}{-18}$ ,  $\frac{14}{-21}$

Q3. Give four rational number equivalent to :

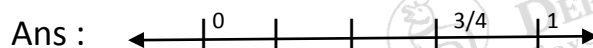
(i)  $-\frac{2}{7}$  Ans ;  $-\frac{4}{14}$ ,  $-\frac{6}{21}$ ,  $-\frac{8}{28}$  and  $-\frac{10}{35}$  ( we make equivalent rational numbers by multiplying numerator and denominator by same number.)

(ii)  $\frac{5}{-3}$  Ans:  $\frac{10}{-6}$ ,  $\frac{15}{-9}$ ,  $\frac{20}{-12}$  and  $\frac{25}{-15}$

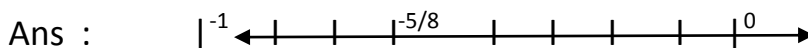
(iii)  $\frac{4}{9}$  Ans :  $\frac{8}{18}$ ,  $\frac{12}{27}$ ,  $\frac{16}{36}$  and  $\frac{20}{45}$

Q4 Draw the number line and represent the following rational numbers on it:

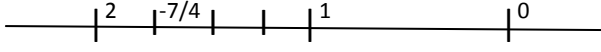
(i)  $\frac{3}{4}$



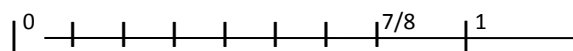
(ii)  $-\frac{5}{8}$



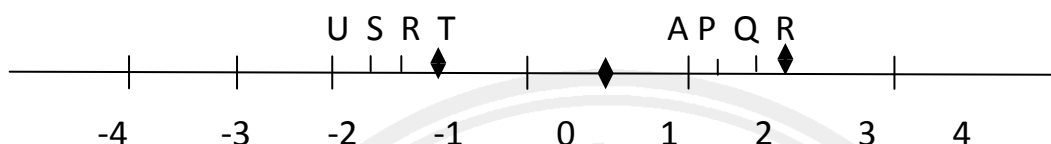
(iii)  $-7/4$

Ans :  $-\frac{7}{4} = -1\frac{3}{4}$  

(iv)  $7/8$

Ans : 

Q5. Name the rational numbers represented by P, Q, R and S



Ans :  $P = 2\frac{1}{3} = 7/3$      $Q = 2\frac{2}{3} = 8/3$      $R = -1\frac{1}{3} = -4/3$      $S = -1\frac{2}{3} = -5/3$

Q6. Which of the following pairs represent the same rational number ?

- (i)  $-7/21$  and  $3/9$     (ii)  $-16/20$  and  $20/-25$     (iii)  $-2/-3$  and  $2/3$     (iv)  $-3/5$  and  $-12/20$   
 (v)  $8/-5$  and  $-24/15$     (vi)  $1/3$  and  $-1/9$     (vii)  $-5/-9$  and  $5/-9$

Ans : (ii) , (iii) , (iv) and (v) represents the same rational number.

Because they belong to the same point on the number line.

Q7. Rewrite the following rational numbers in the simplest form :

(i) Ans :  $-\frac{8}{6} = -\frac{\cancel{2} \times 2 \times 2}{\cancel{2} \times 3} = -\frac{4}{3}$

(ii) Ans:  $\frac{25}{45} = \frac{5 \times \cancel{5}}{3 \times 3 \times \cancel{5}} = \frac{5}{9}$

(iii) Ans :  $-\frac{44}{72} = -\frac{\cancel{2} \times \cancel{2} \times 11}{\cancel{2} \times \cancel{2} \times 2 \times 3 \times 3} = -\frac{11}{18}$

(IV) Ans :  $-\frac{8}{10} = -\frac{\cancel{2} \times 2 \times 2}{\cancel{2} \times 5} = -\frac{4}{5}$

Q8. Fill in the boxes with the correct symbol  $<$ ,  $>$  and  $=$

(i)  $\frac{-5}{7} < \frac{2}{3}$  (ii)  $-4/5 < -5/7$  (iii)  $-7/8 = 14 / -16$  (iv)  $-8/5 > -7/4$

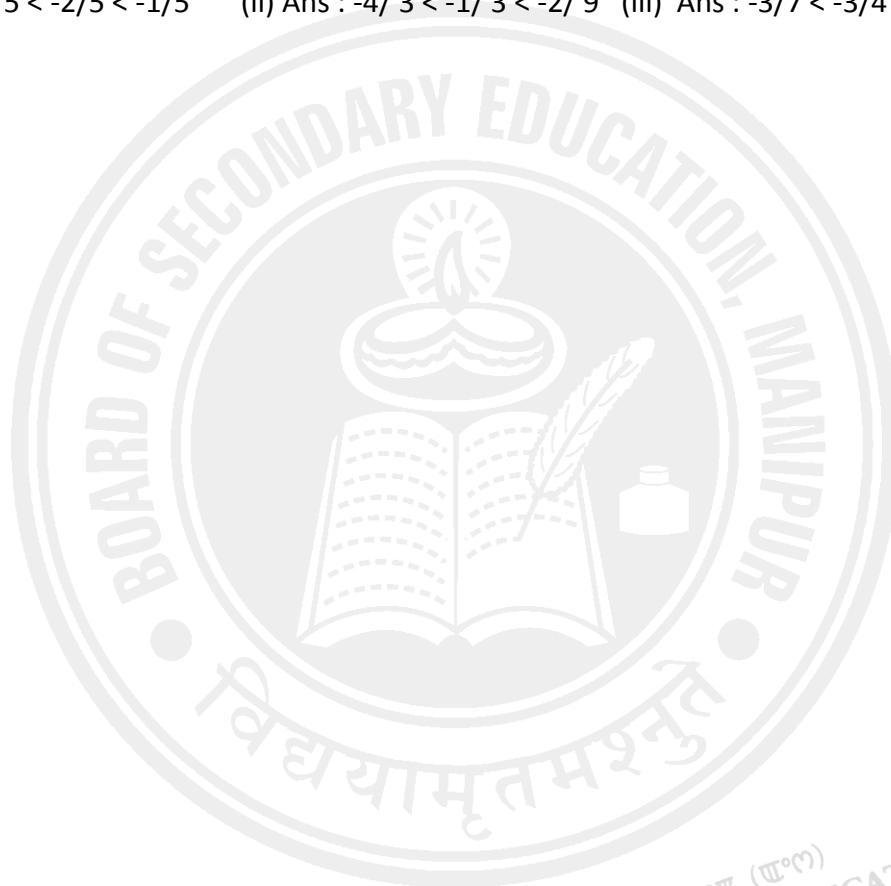
(v)  $1/-3 < -1/4$  (vi)  $5/-11 = -5/11$  (vii)  $0 > -7/6$

Q9. Which is greater in each of the following :

(i) Ans :  $5/2$  (ii) Ans :  $-5/6$  (iii) Ans :  $2/-3$  (iv) Ans :  $\frac{1}{4}$  (v)  $-3\frac{2}{7}$

Q10. Write the following rational numbers in ascending order:

(i) Ans :  $-3/5 < -2/5 < -1/5$  (ii) Ans :  $-4/3 < -1/3 < -2/9$  (iii) Ans :  $-3/7 < -3/4 < -3/7$



मानिपुरसराज्य शासक शिक्षण विभाग (अ०)  
DEPARTMENT OF EDUCATION (S)  
Government of Manipur

## Exercise 9.2

Q1. Find the sum :

(i) soln:  $\frac{5}{4} + \left(\frac{-11}{4}\right)$

$$= \frac{5}{4} - \frac{11}{4}$$

$$= \frac{5-11}{4}$$

$$= \frac{-6}{4}$$

(ii) soln:  $\frac{5}{3} + \frac{3}{5}$

$$= \frac{5 \times 5}{3 \times 5} + \frac{3 \times 3}{5 \times 3}$$

$$= \frac{25}{15} + \frac{9}{15}$$

$$= \frac{25+9}{15}$$

$$= \frac{34}{15}$$

(iii) Ans :  $\frac{-9}{10} + \frac{22}{15}$

$$= \frac{-9 \times 3}{10 \times 3} + \frac{22 \times 2}{15 \times 2}$$

$$= \frac{-27}{30} + \frac{44}{30}$$

$$= \frac{-27+44}{30}$$

$$= \frac{17}{30}$$

We make the denominators equal either by cross multiplying the denominators or by some factor to make up to the L C M of the denominators. Same factor multiplies numerator and denominator of the same rational number

(iv) Soln :  $\frac{-3}{-11} + \frac{5}{9}$

$$= \frac{3}{11} + \frac{5}{9}$$

$$= \frac{3 \times 9}{11 \times 9} + \frac{5 \times 11}{9 \times 11}$$

$$= \frac{27+55}{99}$$

$$= \frac{82}{99}$$

(v) Soln :  $\frac{-8}{19} + \frac{-2}{57}$

$$= \frac{-8 \times 3}{19 \times 3} + \frac{-2}{57}$$

$$= \frac{-24}{57} + \frac{-2}{57}$$

$$= \frac{-24-2}{57}$$

$$= \frac{-26}{57}$$

(vi) Soln :  $\frac{-2}{3} + 0$

$$= \frac{-2}{3}$$

property of 0

(vii) Soln :  $-2\frac{1}{3} + 4\frac{3}{5}$

$$= \frac{7}{3} + \frac{23}{5}$$

$$= \frac{7 \times 5}{3 \times 5} + \frac{23 \times 3}{5 \times 3}$$

$$= \frac{35+69}{15}$$

$$= \frac{104}{15}$$



মণিগোপালৰ অ'ফিছ (অ'ম)  
DEPARTMENT OF EDUCATION (S)  
Government of Manipur

Q2. Find:

(i) soln: L C M of 24 and 36 is 72

$$\begin{aligned} & \frac{7}{24} - \frac{17}{36} \\ &= \frac{7 \times 3}{24 \times 3} - \frac{17 \times 2}{36 \times 2} \\ &= \frac{21-34}{72} \\ &= \frac{-13}{72} \end{aligned}$$

(ii)  $\frac{5}{63} - (\frac{-6}{21})$

$$\begin{aligned} &= \frac{5}{63} + \frac{6 \times 3}{21 \times 3} \\ &\text{L C M is 63} \\ &= \frac{5+18}{63} \\ &= \frac{23}{63} \end{aligned}$$

(iii)  $\frac{-6}{13} - \frac{-6}{15}$

$$\begin{aligned} &= \frac{-6 \times 15}{13 \times 15} - \frac{-6 \times 13}{15 \times 13} \\ &= \frac{-90}{195} + \frac{78}{195} \\ &= \frac{-90+78}{195} \\ &= -\frac{12}{195} \end{aligned}$$

(iv)  $\frac{-3}{8} - \frac{7}{11}$

$$\begin{aligned} &= \frac{-3 \times 11}{8 \times 11} - \frac{7 \times 8}{11 \times 8} \\ &= \frac{-33}{88} - \frac{56}{88} \\ &= \frac{-33-56}{88} \\ &= \frac{-89}{88} \end{aligned}$$

(v)  $-2\frac{1}{9} - 6$

$$\begin{aligned} &= \frac{-19}{9} - 6 \\ &= \frac{-19}{9} - \frac{6 \times 9}{1 \times 9} \\ &= \frac{-19}{9} - \frac{54}{9} \\ &= \frac{-19-54}{9} \\ &= \frac{-73}{9} \end{aligned}$$

Q3. Find the product:

(i)  $\frac{9}{2} \times (\frac{-7}{4})$

$$\begin{aligned} &= \frac{9 \times -7}{2 \times 4} \\ &= \frac{-63}{8} \end{aligned}$$

(ii)  $\frac{3}{10} \times (-9)$

$$\begin{aligned} &= \frac{3 \times (-9)}{10 \times 1} \\ &= \frac{-27}{10} \end{aligned}$$

(iii)  $\frac{-6}{5} \times \frac{9}{11}$

$$\begin{aligned} &= \frac{-6 \times 9}{5 \times 11} \\ &= \frac{-54}{55} \end{aligned}$$

(iv)  $\frac{3}{7} \times \frac{-2}{5}$

$$\begin{aligned} &= \frac{3 \times -2}{7 \times 5} \\ &= \frac{-6}{35} \end{aligned}$$

(v)  $\frac{3}{11} \times \frac{2}{5}$

$$\begin{aligned} &= \frac{3 \times 2}{11 \times 5} \\ &= \frac{6}{55} \end{aligned}$$

(vi)  $\frac{3}{-5} \times \frac{(-5)}{3}$

$$\begin{aligned} &= \frac{3 \times (-5)}{-5 \times 3} \end{aligned}$$

$$= 1$$

NB : product of the numerators and denominators are found out and kept as new numerator and denominator.

Q4. Find the value of :

$$(i) (-4) \div \frac{2}{3} \quad (ii) \frac{-3}{5} \div 2 \quad (iii) \frac{-4}{5} \div (-3) \quad (iv) \frac{-1}{8} \div \frac{3}{4}$$

$$= -4 \times \frac{3}{2} \quad = \frac{-3}{5} \times \frac{1}{2} \quad = \frac{-4}{5} \times \frac{1}{-3} \quad = \frac{-1}{8} \times \frac{4}{3}$$

$$= -2 \times 3 \quad = \frac{-3}{10} \quad = \frac{-4}{-15} \quad = \frac{-4}{24}$$

$$= -6 \quad \quad \quad = \frac{4}{15} \quad \quad \quad = \frac{-1}{6}$$

$$(v) \frac{-2}{13} \div \frac{1}{7} \quad (vi) \frac{-7}{12} \div \frac{-2}{13} \quad (vii) \frac{3}{13} \div \frac{-4}{65}$$

$$= \frac{-2}{13} \times \frac{7}{1} \quad = \frac{-7}{12} \times \frac{13}{-2} \quad = \frac{3}{13} \times \frac{65}{-4}$$

$$= \frac{-14}{13} \quad = \frac{-91}{-24} \quad = \frac{195}{-52}$$

$$= \frac{91}{24} \quad = -\frac{195}{52}$$

NB: In finding division , the second rational number is taken reciprocal, the division sign changes to product sign. Process of multiplication follows



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