MATHEMATICS ASSIGNMENT No. 1
CLASS VII
TOPIC: RATIONAL NUMBERS

Q1. On a number line, what is the length of the line segment joining $\frac{-3}{2}$ and $\frac{-5}{2}$.

Q2. Express $\frac{-64}{128}$ as a rational number with denominator 4.

Q3. Which of the following are pairs of equivalent rational numbers?

a) $\frac{7}{15}, \frac{-28}{60}$ **b)** $\frac{-13}{7}, \frac{39}{-21}$

Q4. Write the rational number $\frac{114}{-57}$ in standard form.

Q5. Find the values of x and y, if $\frac{-36}{-75} = \frac{x}{-25} = \frac{72}{y}$

Q6. Compare: $\frac{-12}{-13}, \frac{2}{-5}$

Q7. Represent $\frac{-6}{-7}$ on the number line.

Q8. Arrange the rational numbers $\frac{1}{26}, \frac{-2}{39}, \frac{4}{-13}, \frac{-7}{-52}$ in descending order.

Q 9.Compare the absolute vales of rational numbers (-3/5) and 6/7.

Q10. The average of the middle two rational numbers if $\frac{4}{7}, \frac{1}{3}, \frac{2}{5}, \frac{5}{9}$ are arranged in ascending order is:

a) $\frac{86}{90}$ **b)** $\frac{86}{45}$ **c)** $\frac{43}{45}$ **d)** $\frac{43}{90}$ **(NSTSE)**

Comment [1]:

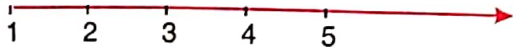
CHAPTER 1

RATIONAL NUMBERS

INTRODUCTION

Do you remember number systems?

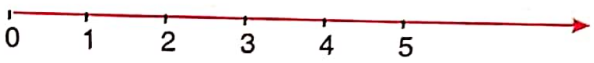
(i) Numbers 1, 2, 3, 4, . . . which we use for counting, form the **system of natural numbers.**



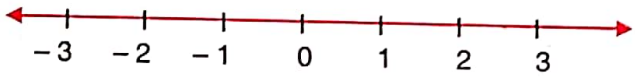
Natural numbers are
1, 2, 3, 4 .....

(ii) Natural numbers along with zero, form the **system of whole numbers.**

Whole numbers are
0, 1, 2, 3, 4, 5.....

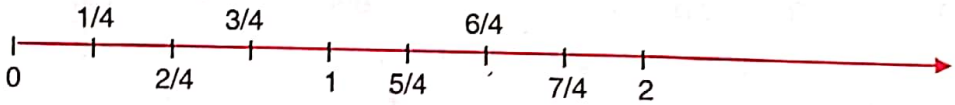


(iii) Collection of natural numbers, their opposites along with zero is called the **system of integers.**



Integers are
....., – 3, – 2, – 1, 0, 1, 2, 3 .....

(iv) A part of a whole is a fraction. **Fraction** is the ratio of two natural numbers, e.g. $\frac{1}{4}, \frac{2}{4}, \frac{3}{4}, \frac{5}{4}, \frac{6}{4}, \ldots$



Properties of fractions

(a) If $\frac{p}{q}$ is a fraction, then for any natural number m,

$$\frac{p}{q} = \frac{p \times m}{q \times m}$$

(b) If $\frac{p}{q}$ is a fraction and a natural number m is a common divisor of p and q, then

$$\frac{p}{q} = \frac{p+m}{q+m}$$

(c) Two fractions $\frac{p}{q}$ and $\frac{r}{s}$ are said to be equivalent if

$$p \times s = q \times r$$

(d) A fraction $\frac{p}{q}$ is said to be in its simplest or lowest form if

p and q have no common factor other than 1.

(e) Fractions can be compared as:

(i) $\frac{p}{q} < \frac{r}{s}$ if $p \times s < q \times r$

(ii) $\frac{p}{q} = \frac{r}{s}$ if $p \times s = q \times r$

(iii) $\frac{p}{q} > \frac{r}{s}$ if $p \times s > q \times r$

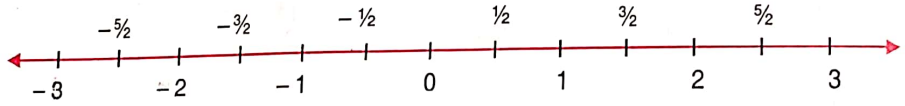
Let us do some problems to revise our memory.

Simplify the following:

1. $(-212) + 384 - (-137)$
2. $(-9) \times [7 + (-11)]$
3. $(-12) \times (-10) \times 6 \times (-1)$
4. $(-108) \div (-12)$
5. $(-1331) \div 11$
6. $-72 (-15 - 37 - 18)$

RATIONAL NUMBERS

In Class–VI, we have dealt with negative integers. In the same way, we shall be introdu negative fractions, e.g. corresponding to 1/2 we have negative fraction – 1/2.



Fractions with corresponding negative fractions and zero constitute the **system of rati numbers.**

The word 'rational' comes from the word 'ratio'.

Any number which can be expressed in the form of p/q, where p and q are integers and $q \neq 0$ is known as a **Rational Number.**

See the following rational numbers.

$\frac{1}{5}$ $\frac{5}{-2}$ $\frac{2}{3}$ $\frac{-1}{5}$ $\frac{-2}{3}$ $\frac{-2}{-3}$ $\frac{1}{-4}$

Positive Rational Numbers

$\frac{1}{5}, \frac{2}{3}, \frac{-2}{-3}$

The rational numbers are said to be **positive** if signs of numerator and denominator are the same.

Negative Rational Numbers

$\frac{5}{-2}, \frac{-1}{5}, \frac{-2}{3}, \frac{1}{-4}$

The rational numbers are said to be **negative** if signs of numerator and denominator are not the same.

Remember

- Every fraction is a rational number, but every rational number need not be a fraction, e.g. $\frac{-4}{7}, \frac{0}{3}$ are not fractions as fractions are part of a whole which are always positive.
- All the integers are rational numbers. Integers – 50, 15, 0 can be written as, $\frac{-50}{1}, \frac{15}{1}, \frac{0}{1}$ respectively.

Worksheet 1

1. **Which of the following are rational numbers?**

(i) -3 (ii) $-\frac{2}{3}$ (iii) $\frac{4}{0}$ (iv) $\frac{0}{-5}$

2. **Write down the rational numbers in the form $\frac{p}{q}$ whose numerators and denominators are given below:**

(i) $(-5) \times 4$ and $-5 + 4$ (ii) $64 \div 4$ and $32 - 18$

3. Which of the following are positive rational numbers?

(i) $\frac{-2}{9}$ (ii) $\frac{3}{-5}$ (iii) $\frac{4}{9}$ (iv) $\frac{-3}{-19}$ (v) $\frac{0}{-3}$

4. Answer the following:

(i) Which integer is neither positive nor negative?

(ii) A rational number can always be written as $\frac{p}{q}$. Is it necessary that any number written as $\frac{q}{p}$ is a rational number?

5. State whether the following statements are true. If not, justify your answer with example.

(i) Every whole number is a natural number. F (ii) Every natural number is an integer.

(iii) Every integer is a whole number. F (iv) Every integer is a rational number.

(v) Every rational number is a fraction. F (vi) Every fraction is a rational number

PROPERTIES OF RATIONAL NUMBERS

Property I. Two rational numbers $\frac{p}{q}$ and $\frac{r}{s}$ are said to be **equivalent** if

$$p \times s = r \times q.$$

To explain the property, let us take few examples.

Example 1: Show that $\frac{4}{-7}$ and $\frac{8}{-14}$ are equivalent rational numbers.

Solution: $4 \times (-14) = -56 = 8 \times (-7)$.

Hence, $\frac{4}{-7}$ and $\frac{8}{-14}$ are equivalent rational numbers.

Example 2: Show that $\frac{5}{8}$ and $\frac{-15}{24}$ are not equivalent rational numbers.

Solution: $5 \times 24 = 120$ and $8 \times (-15) = -120$.

Hence, $5 \times 24 \neq 8 \times (-15)$.

Therefore, the given rational numbers are not equivalent.

Property II. If $\frac{p}{q}$ is a rational number and m be any integer different from zero, then

$$\frac{p}{q} = \frac{p \times m}{q \times m}.$$

Example 3: Write three rational numbers which are equivalent to $\frac{3}{5}$.

Solution: To find equivalent rational numbers, multiply numerator and denominator by any same non-zero integer.

$$\frac{3 \times 2}{5 \times 2} = \frac{6}{10}$$ (Multiply numerator and denominator by 2)

$$\frac{3 \times (-3)}{5 \times (-3)} = \frac{-9}{-15}$$ (Multiply numerator and denominator by – 3)

$$\frac{3 \times 5}{5 \times 5} = \frac{15}{25}$$ (Multiply numerator and denominator by 5)

Hence, $\frac{6}{10}, \frac{-9}{-15}$ and $\frac{15}{25}$ are three rational numbers equivalent to $\frac{3}{5}$.

Example 4: Express $\frac{-4}{7}$ as a rational number with (i) numerator 12 (ii) denominator 28.

Solution: (i) To get numerator 12, we must multiply – 4 by – 3.

Hence, $\frac{(-4) \times (-3)}{7 \times (-3)} = \frac{12}{-21}$

Therefore, the required rational number is $\frac{12}{-21}$.

(ii) To get denominator 28, we must multiply the given denominator 7 by 4.

i.e. $\frac{(-4) \times 4}{7 \times 4} = \frac{-16}{28}$

Hence, the required rational number is $\frac{-16}{28}$.

Property III. If $\frac{p}{q}$ is a rational number and m is a common divisor of p and q then

$$\frac{p}{q} = \frac{p \div m}{q \div m}$$

Example 5: Express $\frac{-21}{49}$ as a rational number with denominator 7.

Solution: To get denominator 7, we must divide 49 by 7.

Therefore, $\frac{-21 \div 7}{49 \div 7} = \frac{-3}{7}$,

Hence, $\frac{-3}{7}$ is the required rational number.

Worksheet 2

1. In each of the following cases, show that the rational numbers are equivalent.

   (i) $\frac{4}{9}$ and $\frac{44}{99}$ (ii) $\frac{7}{-3}$ and $\frac{35}{-15}$ (iii) $\frac{-3}{5}$ and $\frac{-12}{20}$

2. In each of the following cases, show that rational numbers are not equivalent.

   (i) $\frac{4}{9}$ and $\frac{16}{27}$ (ii) $\frac{-100}{3}$ and $\frac{300}{9}$ (iii) $\frac{3}{-17}$ and $\frac{8}{-51}$

3. Write three rational numbers, equivalent to each of the following:

   (i) $\frac{4}{7}$ (ii) $\frac{36}{108}$ (iii) $\frac{-5}{-7}$ (iv) $\frac{-72}{180}$

4. Express $\frac{3}{5}$ as rational number with numerator,

   (i) -21 (ii) 150

5. Express $\frac{4}{-7}$ as a rational number with denominator,

   (i) 84 (ii) -28

6. Express $\frac{90}{216}$ as a rational number with numerator 5.

7. Express $\frac{-64}{256}$ as a rational number with denominator 8.

8. Find equivalent forms of the rational numbers having a common denominator in ea of the following collections of rational numbers.

   (i) $\frac{2}{5}, \frac{6}{13}$ (ii) $\frac{1}{7}, \frac{2}{8}, \frac{3}{14}$ (iii) $\frac{5}{12}, \frac{7}{4}, \frac{9}{60}, \frac{11}{3}$

STANDARD FORM OF A RATIONAL NUMBER

Let us try to express a rational number in the simplest form with positive denominator.

Example 6: Express $\frac{16}{-24}$ in the simplest form with its denominator as positive.

Solution: **Step 1.** Convert denominator into positive by multiplying numerator and denominator by -1.

$$\frac{(16)\times(-1)}{(-24)\times(-1)} = \frac{-16}{24}$$

Step 2. Find HCF of 16 and 24, which is 8 in this case, and divide numerator and denominator by it.

$$\frac{-16\div 8}{24\div 8} = \frac{-2}{3}$$

The example given above explains that every rational number $\frac{p}{q}$ can be put in the simplest form with positive denominator. This form of the rational number is called its **standard form**. For this, we take the following steps.

Step 1. Make the denominator positive.

Step 2. Find the HCF m of p and q. If m = 1, then $\frac{p}{q}$ is the required form.

Step 3. If $m \neq 1$, then divide both the numerator and the denominator by m. The rational number $\frac{p\div m}{q\div m}$ so obtained is the required standard form.

Note:

The numbers $\frac{-p}{q}$ and $\frac{p}{-q}$ represent the same rational number.

A rational number $\frac{p}{q}$ is said to be in the standard form if q is positive and the integers 'p' and 'q' have their highest common factor as 1.

Example 7: Express $\frac{-22}{-55}$ in the standard form.

Solution: **Step 1.** $\frac{-22\times(-1)}{-55\times(-1)} = \frac{22}{55}$

Step 2. HCF of 22 and 55 is 11.

$\frac{22\div11}{55\div11} = \frac{2}{5}$ which is the standard form.

Example 8: Find x such that the rational numbers in each of the following pairs are equival

(i) $\frac{x}{12}, \frac{5}{6}$ (ii) $\frac{15}{x}, \frac{-3}{8}$

Solution: (i) $\frac{x}{12}, \frac{5}{6}$ will be equivalent if

$6 \times x = 5 \times 12$

$x = \frac{5\times\cancel{12}^{2}}{\cancel{6}} = 5 \times 2 = 10$

Hence, $x = 10.$

(ii) $\frac{15}{x}, \frac{-3}{8}$ will be equivalent if

$15 \times 8 = (-3) \times x$

$x = \frac{15\times8}{-3} = -5 \times 8 = -40$

Hence, $x = -40.$

Example 9: Fill in the blanks: $\frac{-3}{5} = \frac{6}{---} = \frac{---}{-15}$

Solution: In the first two given rational numbers, we have to find the number which when multiplied by – 3 gives the product 6. Here, the number shall be $6 \div (-3) = -2$. Now, we multiply both numerator and denominator of the given rational number by – 2.

We get $\frac{-3}{5} = \frac{(-3)\times(-2)}{5\times(-2)} = \frac{6}{-10}$

To get denominator – 15,

$$\frac{-3}{5} = \frac{(-3)\times(-3)}{5\times(-3)} = \frac{9}{-15}$$ (Multiply numerator and denominator by – 3)

Thus, $\frac{-3}{5} = \frac{6}{-10} = \frac{9}{-15}$

Worksheet 3

1. Write the following rational numbers in standard form.

(i) $\frac{33}{77}$ (ii) $\frac{64}{-20}$ (iii) $\frac{-27}{-15}$ (iv) $\frac{-105}{98}$

2. Find x such that the rational numbers in each of the following pairs, become equivalent.

(i) $\frac{9}{-5}, \frac{x}{10}$ (ii) $\frac{8}{7}, \frac{x}{-35}$ (iii) $\frac{36}{x}, 2$ (iv) $\frac{x}{6}, -13$

3. Check whether the following rational numbers are in standard form. If not, write them in standard form.

(i) $\frac{-3}{19}$ (ii) $\frac{4}{-7}$ (iii) $\frac{14}{35}$ (iv) $\frac{8}{-72}$

4. Fill in the blanks.

(i) $\frac{2}{7} = \frac{8}{---} = \frac{---}{-63}$ (ii) $\frac{36}{---} = \frac{-4}{9} = \frac{-84}{---}$ (iii) $\frac{105}{---} = \frac{---}{-99} = \frac{-5}{-11}$

ABSOLUTE VALUE OF A RATIONAL NUMBER

We have studied in Class–VI that absolute value of an integer is its numerical value without taking the sign into account, e.g. $|-3| = 3, |3| = 3, |0| = 0$

The absolute value of a rational number is written in the following ways.

Absolute value of $\frac{4}{5}$ is $\left|\frac{4}{5}\right| = \frac{4}{5}$

Absolute value of $\frac{-4}{5}$ is $\left|\frac{-4}{5}\right| = \frac{4}{5}$

Absolute value of $\frac{4}{-5}$ is $\left|\frac{4}{-5}\right| = \frac{4}{5}$

Absolute value of $\frac{-4}{-5}$ is $\left|\frac{-4}{-5}\right| = \frac{4}{5}$

Remember

- Absolute value of every rational number other than zero is positive.
- The absolute value of zero is zero itself.
- Absolute value of a rational number is greater than or equal to the number itself.

Worksheet 4

1. Find the absolute value of the following rational numbers.

(i) $\frac{1}{-5}$ (ii) $\frac{7}{9}$ (iii) $\frac{0}{-4}$ (iv) $\frac{-3}{-2}$

2. Compare the absolute values of the rational numbers in the following pairs.

(i) $\frac{3}{-7}, \frac{-3}{7}$ (ii) $\frac{-5}{7}, \frac{4}{3}$ (iii) $\frac{-4}{5}, -3$

3. Find all the rational numbers whose absolute value is–

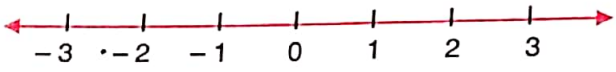
(i) $\frac{2}{5}$ (ii) 0 (iii) $\frac{3}{4}$

REPRESENTATION OF RATIONAL NUMBERS ON A NUMBER LINE

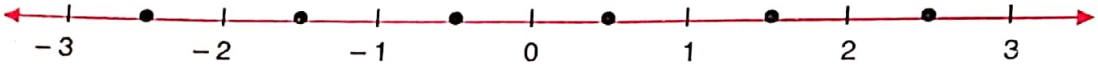
You have dealt with the definition and properties of rational numbers. Now, you will learn how to plot rational numbers on a number line.

Let us mark the rational numbers $\frac{-5}{2}, \frac{-3}{2}, \frac{-1}{2}, \frac{1}{2}, \frac{3}{2}, \frac{5}{2}$ on the number line.

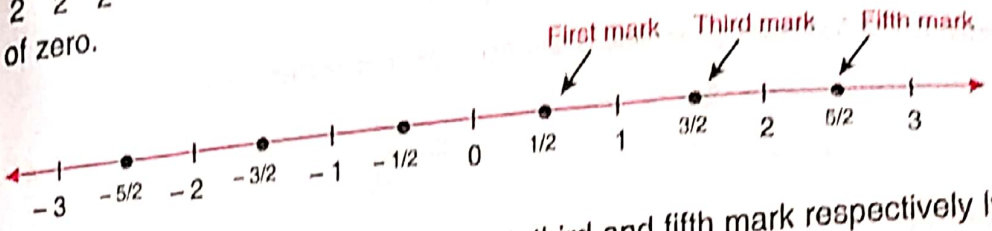
Step 1. Mark integers on the number line.



Step 2. Divide each unit segment into two equal parts (equal to denominator).



Step 3. $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}$ are represented by first, third and fifth mark respectively lying to the right of zero.



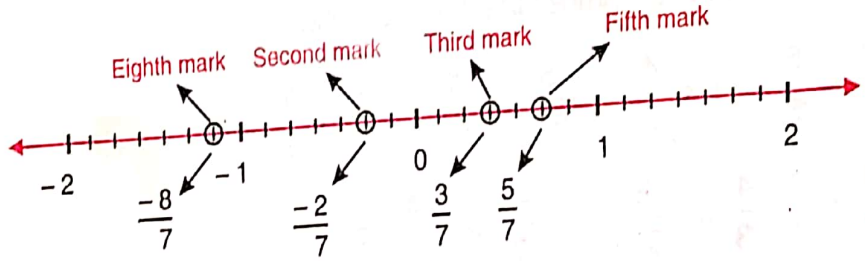
$\frac{-1}{2}, \frac{-3}{2}, \frac{-5}{2}$ are represented by first, third and fifth mark respectively lying to the left of zero.

Example 10: Represent $\frac{3}{7}, \frac{5}{7}, \frac{-8}{7}, \frac{-2}{7}$ on number line.

Solution: **Step 1.** Mark integers on number line.

Step 2. Divide each unit segment into seven equal parts.

Step 3. Third and fifth mark on right side of zero represent $\frac{3}{7}$ and $\frac{5}{7}$. Eighth and second mark on left side of zero represent $\frac{-8}{7}$ and $\frac{-2}{7}$ respectively.



Worksheet 5

1. State whether the following statements are true. If not, justify your answer.

(i) On a number line, all the numbers to the right of zero are positive. True

(ii) Rational number $\frac{-7}{-19}$ lies to the left of zero on the number line. False

(iii) On a number line, numbers become progressively larger as we move away from zero. False

(iv) Rational numbers $\frac{2}{3}$ and $\frac{-2}{3}$ are at equal distance from zero. True

(v) On a number line, number lying left to a given number is greater. False

2. Mark the following rational numbers on number line.

(i) $\frac{4}{5}$ (ii) $\frac{-8}{3}$ (iii) $\frac{5}{2}$ (iv) $\frac{-7}{3}$

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

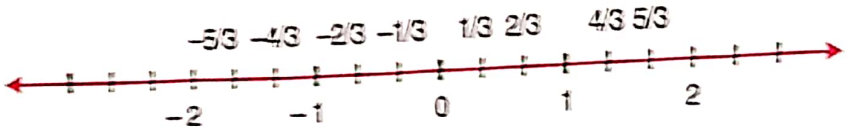
(i) $\frac{-3}{5}$ (ii) $\frac{2}{-3}$ (iii) $\frac{3}{4}$ (iv) $\frac{-4}{-7}$

COMPARING RATIONAL NUMBERS

Rational numbers can be compared in two different ways.

I. BY REPRESENTING ON NUMBER LINE

Rational numbers can be compared easily when they are represented on the number line.



Any number on the number line is greater than any other number lying to the left of it.

Any number on a number line is less than any other number lying to the right of it.

Therefore, from the above number line it is clear that

$\frac{2}{3} < \frac{5}{3}$, $1 < \frac{4}{3}$, $\frac{-5}{3} < \frac{-1}{3}$, $\frac{-4}{3} < \frac{1}{3}$, etc.

and $\frac{4}{3} > \frac{1}{3}$, $\frac{4}{3} > \frac{-2}{3}$, $\frac{-1}{3} > \frac{-4}{3}$, etc.

II. WITHOUT REPRESENTING ON NUMBER LINE

Without representing the rational numbers on the number line, we can compare them by method similar to the one used for fractional numbers.

If two rational numbers have the same positive denominator, the number with the larger numerator will be greater than the one with smaller numerator.

Example 11: Compare,

(i) $\frac{2}{7}$ and $\frac{5}{7}$ (ii) $\frac{-6}{17}$ and $\frac{-13}{17}$

Solution: (i) The rational numbers $\frac{2}{7}$ and $\frac{5}{7}$ have same denominator, therefore, smaller the numerator, smaller will be the rational number. Since $2 < 5$, therefore, $\frac{2}{7} < \frac{5}{7}$.

(ii) $\frac{-6}{17}$ and $\frac{-13}{17}$ have the same denominator. Therefore, we shall compare the numerators–

$$-6 > -13$$

Therefore, $\frac{-6}{17} > \frac{-13}{17}$.

If two rational numbers have different denominators, then first make denominators equal and then compare.

Example 12: Compare $\frac{7}{5}$ and $\frac{8}{7}$.

Solution: First, convert the rational numbers to have the same positive denominator.

$$\left.\begin{aligned} \frac{7}{5} &= \frac{7\times 7}{5\times 7} = \frac{49}{35} \\ \frac{8}{7} &= \frac{8\times 5}{7\times 5} = \frac{40}{35} \end{aligned}\right] \quad \text{(Denominators are same)}$$

Now, compare $\frac{49}{35}$ and $\frac{40}{35}$

As $49 > 40$, therefore, $\frac{49}{35} > \frac{40}{35}$

Hence, $\frac{7}{5} > \frac{8}{7}$.

Example 13: Compare the rational numbers $\frac{-4}{9}$ and $\frac{5}{-6}$.

Solution: First write $\frac{5}{-6}$ in standard form, i.e. $\frac{-5}{6}$.

Now, convert them to have the same denominator.

$$\frac{-4}{9} \times \frac{2}{2} = \frac{-8}{18}$$

$$\frac{-5}{6} \times \frac{3}{3} = \frac{-15}{18}$$

Now, compare $\frac{-8}{18}$ and $\frac{-15}{18}$

Since, numerator $-8 > -15$, therefore, $\frac{-8}{18} > \frac{-15}{18}$.

Hence, $\frac{-4}{9} > \frac{5}{-6}$.

There is yet another method to compare two rational numbers $\frac{p}{q}$ and $\frac{r}{s}$ with unequal denominators. It is assumed that q and s are both positive integers.

To compare $\frac{p}{q}$ and $\frac{r}{s}$, we may compare ps and qr $\left(\frac{p}{q} \times \frac{r}{s}\right)$

Find products ps and qr.

If $ps > qr$ then $\frac{p}{q} > \frac{r}{s}$.

If $ps < qr$ then $\frac{p}{q} < \frac{r}{s}$.

Example 14: Compare $\frac{5}{3}$ and $\frac{2}{7}$.

Solution: $\frac{5}{3} \times \frac{2}{7}$

The products are $5 \times 7 = 35$ and $3 \times 2 = 6$

Since, $35 > 6$, therefore, $\frac{5}{3} > \frac{2}{7}$.

Example 15: Compare $\frac{-5}{7}$ and $\frac{4}{-9}$.

Solution: First write $\frac{4}{-9}$ in standard form as $\frac{-4}{9}$.

Now, find the products $\frac{-5}{7} \times \frac{-4}{9}$

The products are $-5 \times 9 = -45$ and $7 \times (-4) = -28$

Since, $-45 < -28$, therefore, $\frac{-5}{7} < \frac{-4}{9}$.

Worksheet 6

1. Determine which rational number is greater in each case.

(i) $\frac{5}{8}, \frac{-3}{7}$

(ii) $\frac{2}{3}, \frac{8}{9}$

(iii) $\frac{-4}{3}, \frac{-6}{7}$

(iv) $\frac{-8}{3}, \frac{19}{-6}$

(v) $\frac{-3}{-13}, \frac{-5}{-21}$

(vi) $\frac{-7}{11}, \frac{5}{-8}$

2. Find the value of x, if–

(i) $\frac{3}{-5} = \frac{x}{15}$

(ii) $\frac{9}{15} = \frac{x}{-50}$

(iii) $\frac{36}{x} = -4$

(iv) $\frac{7}{-x} = 7$

3. Compare the rational numbers.

(i) $\frac{-2}{9}, \frac{8}{-36}$

(ii) $\frac{5}{9}, \frac{4}{6}$

(iii) $\frac{-7}{-8}, \frac{14}{17}$

(iv) $\frac{-4}{7}, \frac{5}{-9}$

(v) $\frac{-5}{8}, \frac{-3}{4}$

(vi) $\frac{6}{7}, \frac{-54}{-63}$

4. Arrange the following in ascending order.

(i) $\frac{4}{7}, \frac{5}{9}, \frac{2}{5}$

(ii) $\frac{-3}{4}, \frac{-5}{-12}, \frac{-7}{16}$

5. Arrange the following in descending order.

(i) $\frac{2}{5}, \frac{-1}{2}, \frac{8}{-15}, \frac{-3}{-10}$

(ii) $\frac{-7}{10}, \frac{8}{-15}, \frac{19}{30}, \frac{-2}{-5}$

VALUE BASED QUESTIONS

1. **Sukhdev, a farmer, had a son and a daughter. He decided to divide his property among his children. He gave $\frac{2}{5}$ of the property to his son and $\frac{4}{10}$ to his daughter, and the rest to a charitable trust.**

   (a) Whose share was more, son's or daughter's?

   (b) What do you feel about Sukhdev's decision? Which values are exhibited here?

2. **Kavita along with her family was planning a vacation at a hill station. But, they were confused where to go. Kavita's mother asked her to find out the maximum temperature of few hill stations for deciding on the place to visit. She checked the weather report on the internet and found that—**

   Simla's temperature = $\left(\frac{-7}{2}\right)^{\circ}C$

   Dalhousie's temperature = $-5^{\circ}C$

   Manali's temperature = $\left(\frac{-8}{5}\right)^{\circ}C$

   (a) Arrange the temperatures of these hill stations in ascending order.

   (b) Which place will they decide to visit?

   (c) What value is exhibited in the above situation?

BRAIN TEASERS

1. **A. Tick (✓) the correct option.**

   (a) The value of x such that $\frac{-3}{8}$ and $\frac{x}{-24}$ are equivalent rational numbers is–

   (i) 64 (ii) -64

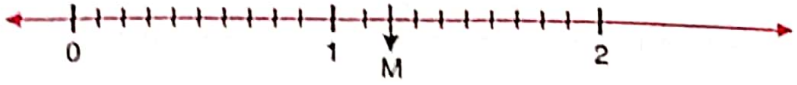
   (iii) -9 (iv) 9

   (b) Which of the following is a negative rational number?

   (i) $\frac{-15}{-4}$ (ii) 0

   (iii) $\frac{-5}{7}$ (iv) $\frac{4}{9}$

(c) In the given number line, which of the following rational numbers does the point M represent?



(i) $\frac{2}{8}$ (ii) $\frac{6}{5}$ (iii) $\frac{2}{3}$ (iv) $\frac{12}{5}$

(d) Which is the greatest rational number out of $\frac{5}{-11}, \frac{-5}{12}, \frac{5}{-17}$?

(i) $\frac{5}{-11}$ (ii) $\frac{-5}{12}$

(iii) $\frac{5}{-17}$ (iv) cannot be compared

(e) Which of the following rational numbers is the smallest?

(i) $\left|\frac{7}{11}\right|$ (ii) $\left|\frac{-8}{11}\right|$ (iii) $\left|\frac{-2}{11}\right|$ (iv) $\left|\frac{-9}{-11}\right|$

B. Answer the following questions.

(a) Find the average of the rational numbers $\frac{4}{5}, \frac{2}{3}, \frac{5}{6}$.

(b) How will you write $\frac{12}{-18}$ in the standard form?

(c) How many rational numbers are there between any two rational numbers?

(d) On the number line, the rational number $\frac{-5}{-7}$ lies on which side of zero?

(e) Express $\frac{-7}{-8}$ as a rational number with denominator 40.

2. State whether the following statements are true. If not, then give an example in support of your answer.

(i) If $\frac{p}{q} > \frac{r}{s}$ then $\left|\frac{p}{q}\right| > \left|\frac{r}{s}\right|$

(ii) If $|x| = |y|$ then $x = y$

(iii) $\frac{p}{q}$ is a non-zero rational number in standard form. It is necessary that rational number $\frac{q}{p}$ will also be in standard form.

3. Represent $5\frac{1}{3}$ and $\frac{-20}{4}$ on a number line.

4. Arrange the following rational numbers in descending order.

$\frac{-3}{10}, \frac{-7}{-5}, \frac{9}{-15}, \frac{18}{30}$

5. On a number line, what is the length of the line-segment joining,

(i) 3 and −3?

(ii) $\frac{1}{2}$ and $\frac{-1}{2}$?

(iii) $\frac{1}{2}$ and $2\frac{1}{2}$?

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

6. Find the values of x in each of the following:

(i) $\frac{23}{x} = \frac{2}{-8}$

(ii) $\frac{x}{9} = \frac{19}{3}$

(iii) $\frac{15}{-x} = \frac{1}{-7}$

7. Compare the numbers in each of following pairs of numbers.

(i) $\frac{-5}{7}, \frac{9}{-13}$

(ii) $\frac{-4}{9}, \frac{-3}{7}$

(iii) $\frac{-3}{-5}, \frac{12}{20}$

(iv) $\left|\frac{-4}{5}\right|, \left|\frac{-5}{4}\right|$

(v) $\left|\frac{5}{7}\right|, \left|\frac{-15}{21}\right|$

(vi) $\left|\frac{-8}{-9}\right|, \left|\frac{-3}{9}\right|$

8. Fill in the following blank squares.

(i) $\frac{3}{5} = \frac{138}{\square}$

(ii) $\frac{7}{9} = \frac{\square}{108}$

(iii) $\frac{\square}{-15} = \frac{48}{90}$

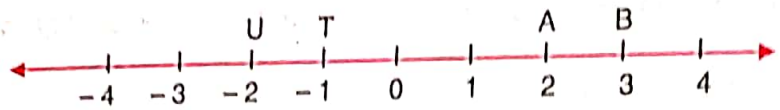
(iv) $\frac{121}{\square} = \frac{-11}{12}$

HOTS

The points P, Q, R, S, T, U, A and B are on the number line representing integers such tha

TR = RS = SU and AP = PQ = QB

Locate and write the rational numbers represented by points P, Q, R, and S.



YOU MUST KNOW

1. A number of the form $\frac{p}{q}$ is called a fraction, if p and q are natural numbers. If p and q are integers and $q \neq 0$, then it is said to be a rational number.
2. Every integer and fraction is a rational number but the converse may not be true.
3. A rational number is said to be positive if both numerator and denominator are of same sign. If numerator and denominator are of opposite signs, then rational number is said to be negative.
4. If $\frac{p}{q}$ be a rational number and m be any integer different from zero, then $\frac{p}{q} = \frac{p \times m}{q \times m}$.
5. If $\frac{p}{q}$ be a rational number and m be a common divisor of p and q, then $\frac{p}{q} = \frac{p \div m}{q \div m}$.
6. A rational number $\frac{p}{q}$ is said to be in standard form if q is positive and HCF of p and q is 1.
7. Two rational numbers $\frac{p}{q}$ and $\frac{r}{s}$ are said to be equivalent (equal) if $p \times s = q \times r$.
8. Every rational number can be represented on the number line.
9. If $\frac{p}{q}$ and $\frac{r}{s}$ are two rational numbers with q and s positive integers then $\frac{p}{q} > \frac{r}{s}$ if $p \times s > q \times r$, $\frac{p}{q} < \frac{r}{s}$ if $p \times s < q \times r$ and $\frac{p}{q} = \frac{r}{s} =$ if $p \times s = q \times r$.
10. Every rational number has an absolute value which is greater than or equal to zero.