NCERT SOLUTIONS

CLASS - 7TH

Class : 7th
Subject : Maths
Chapter : 9
Chapter Name : Rational Numbers

Exercise 9.1

Q1 List five rational numbers between:

(i) −1 and 0

(ii) −2 and −1

(iii) −4/5 and -2/3

(iv) − 1/2 and 2/3.

Answer. (i)

−1 and 0

$\frac{-1}{10}, \frac{-1}{20}, \frac{-1}{30}, \frac{-1}{40}, \frac{-1}{50}$

(ii)

−2 and − 1

$-2 = \frac{-12}{6}$ and $-1 = \frac{-6}{6}$

Five rational numbers are

$\frac{-11}{6}, \frac{-10}{6}, \frac{-9}{6}, \frac{-8}{6}, \frac{-7}{6}$

(iii)

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

$\frac{-4}{5} = \frac{-4 \times 9}{5 \times 9} = \frac{-36}{45}$ and $\frac{-2}{3} = \frac{-2 \times 15}{3 \times 15} = \frac{-30}{45}$

Five rational numbers are

$\frac{-35}{45}, \frac{-34}{45}, \frac{-33}{45}, \frac{-32}{45}, \frac{-31}{45}$

(iv)

$\frac{1}{2}$ and $\frac{2}{3}$

$\frac{1}{2} = \frac{1 \times 18}{2 \times 18} = \frac{18}{36}$ and $\frac{2}{3} = \frac{2 \times 12}{3 \times 12} = \frac{24}{36}$

Five rational numbers are

$\frac{19}{36}, \frac{20}{36}, \frac{21}{36}, \frac{22}{36}, \frac{23}{36}$

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

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

(ii) $\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12}, \cdots$

(iii) $\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24}, \cdots$

(iv) $\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9}, \cdots$

Answer. (i)

$$\frac{-3}{5}, \frac{-6}{10}, \frac{-9}{15}, \frac{-12}{20} \cdots$$

$$\frac{-3}{5}, \frac{-3\times2}{5\times2}, \frac{-3\times3}{5\times3}, \frac{-3\times4}{5\times4} \cdots$$

It can be observed that the numerator is a multiple of 3 while the denominator is a multiple of 5 and as we increase them further, these multiples are increasing. Therefore, the next four rational numbers in this pattern are

$$\frac{-3\times5}{5\times5}, \frac{-3\times6}{5\times6}, \frac{-3\times7}{5\times7}, \frac{-3\times8}{5\times8} \cdots$$

$$\frac{-15}{25}, \frac{-18}{30}, \frac{-21}{35}, \frac{-24}{40} \cdots$$

(ii)

$$\frac{-1}{4}, \frac{-2}{8}, \frac{-3}{12} \cdots$$

$$\frac{-1}{4}, \frac{-1\times2}{4\times2}, \frac{-1\times3}{4\times3} \cdots$$

The next four rational numbers in this pattern are

$$\frac{-1\times4}{4\times4}, \frac{-1\times5}{4\times5}, \frac{-1\times6}{4\times6}, \frac{-1\times7}{4\times7} \cdots$$

$$\frac{-4}{16}, \frac{-5}{20}, \frac{-6}{24}, \frac{-7}{28} \cdots$$

(iii)

$$\frac{-1}{6}, \frac{2}{-12}, \frac{3}{-18}, \frac{4}{-24} \cdots$$

$$\frac{-1}{6}, \frac{1\times2}{-6\times2}, \frac{1\times3}{-6\times3}, \frac{1\times4}{-6\times4} \cdots$$

The next four rational numbers in this pattern are

$$\frac{1\times5}{-6\times5}, \frac{1\times6}{-6\times6}, \frac{1\times7}{-6\times7}, \frac{1\times8}{-6\times8} \cdots$$

$$\frac{5}{-30}, \frac{6}{-36}, \frac{7}{-42}, \frac{8}{-48} \cdots$$

(iv)

$$\frac{-2}{3}, \frac{2}{-3}, \frac{4}{-6}, \frac{6}{-9} \cdots$$

$$\frac{-2}{3}, \frac{2}{-3}, \frac{2\times2}{-3\times2}, \frac{2\times3}{-3\times3} \cdots$$

The next four rational numbers in this pattern are

$$\frac{2\times4}{-3\times4}, \frac{2\times5}{-3\times5}, \frac{2\times6}{-3\times6}, \frac{2\times7}{-3\times7} \cdots$$

$$\frac{8}{-12}, \frac{10}{-15}, \frac{12}{-18}, \frac{14}{-21} \cdots$$

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Q3 Give four rational numbers equivalent to:

(i) -2/7

(ii) 5/-3

(iii) 4/9

Answer. (i) Four rational numbers are

$$\frac{-2\times2}{7\times2}, \frac{-2\times3}{7\times3}, \frac{-2\times4}{7\times4}, \frac{-2\times5}{7\times5}$$

$$\frac{-4}{14}, \frac{-6}{21}, \frac{-8}{28}, \frac{-10}{35}$$

(ii) Four rational numbers are

$$\frac{5\times2}{-3\times2}, \frac{5\times3}{-3\times3}, \frac{5\times4}{-3\times4}, \frac{5\times5}{-3\times5}$$

$$\frac{10}{-6}, \frac{15}{-9}, \frac{20}{-12}, \frac{25}{-15}$$

(iii) Four rational numbers are

$$\frac{4\times2}{9\times2}, \frac{4\times3}{9\times3}, \frac{4\times4}{9\times4}, \frac{4\times5}{9\times5}$$

$$\frac{8}{18}, \frac{12}{27}, \frac{16}{36}, \frac{20}{45}$$

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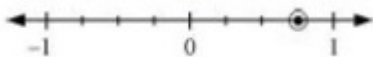Q4 Draw the number line and represent the following rational numbers on it:

(i) 3/4

(ii) -5/8

(iii) -7/4

(iv) 7/8

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

This fraction represents 3 parts out of 4 equal parts. Therefore, each space between two integers on number line must be divided into 4 equal parts $\frac{3}{4}$ can be represented as.
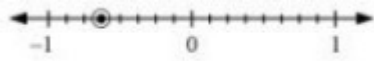

(ii) $\frac{-5}{8}$

This fraction represents 5 parts out of 8 equal parts. Negative sign represents that it is on the negative side of number line. Therefore, each space between two integers on number
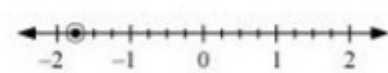
line must be divided into 8 equal parts.

$\frac{-5}{8}$ can be represented as

(iii) $\frac{-7}{4} = -1\frac{3}{4}$

This fraction represents 1 full part and 3 parts out of 4 equal parts. Negative sign represents that it is on the negative side of number line. Therefore, each space between two integers on number line must be divided into 4 equal parts.
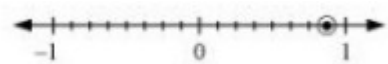
$\frac{-7}{4}$ can be represented as

(iv) $\frac{7}{8}$

This fraction represents 7 parts out of 8 equal parts. Therefore, each space between two integers on number line must be divided into 8 equal parts.

$\frac{7}{8}$ can be represented as

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Q5 The points P, Q, R, S, T, U, A and B on the number line are such that, TR = RS = SU and AP = PQ = QB. Name the rational numbers represented by P, Q, R and S.

Answer. Distance between U and T = 1 unit

It is divided into 3 equal parts.

TR = RS = SU = 1/3

$R = \quad -1 - \frac{1}{3} = -\frac{3}{3} - \frac{1}{3} = \frac{-4}{3}$

$S = \quad -1 - \frac{2}{3} = -\frac{3}{3} - \frac{2}{3} = -\frac{5}{3}$

Similarly,

AB = 1 unit

It is divided into 3 equal parts.

$P = 2 + \frac{1}{3} = \frac{6}{3} + \frac{1}{3} = \frac{7}{3}$

$Q = 2 + \frac{2}{3} = \frac{6}{3} + \frac{2}{3} = \frac{8}{3}$

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

(i) $\frac{-7}{21}$ and $\frac{3}{9}$

(ii) $\frac{-16}{20}$ and $\frac{20}{-25}$

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

(iv) $\frac{-3}{5}$ and $\frac{-12}{20}$

(v) $\frac{8}{-5}$ and $\frac{-24}{15}$

(vi) $\frac{1}{3}$ and $\frac{-1}{9}$

(vii) $\frac{-5}{-9}$ and $\frac{5}{-9}$

Answer. (i)

$\frac{-7}{21}$ and $\frac{3}{9}$

$\frac{-7}{21} = \frac{-1}{3}$

$\frac{3}{9} = \frac{1}{3}$

$\frac{-1}{As\ 3} \neq \frac{1}{3}$

Therefore, it does not represent same rational numbers.

(ii)

$\frac{-16}{20}$ and $\frac{20}{-25}$

$\frac{-16}{20} = \frac{-4}{5}$

$\frac{-20}{25} = \frac{-4}{5}$

Therefore, it represents same rational numbers.

(iii)

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

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

Therefore, it represents same rational numbers.

(iv)

$\frac{-3}{5}$ and $\frac{-12}{20}$

$\frac{-12}{20} = \frac{-3}{5}$

Therefore, it represents same rational numbers.

(v)

$\frac{8}{-5}$ and $\frac{-24}{15}$

$\frac{-24}{15} = \frac{-8}{5}$

$\frac{8}{-5} = \frac{-8}{5}$

Therefore, it represents same rational numbers.

(vi)
$\frac{1}{3}$ and $\frac{-1}{9}$

As $\frac{1}{3} \neq \frac{-1}{9}$

Therefore, it does not represent same rational numbers.

(vii)
$\frac{-5}{-9}$ and $\frac{5}{-9}$

$\frac{-5}{-9} = \frac{5}{9}$

As $\frac{5}{9} \neq \frac{-5}{9}$

Therefore, it does not represent same rational numbers.

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Q7 Rewrite the following rational numbers in the simplest form:
(i) -8/6
(ii) 25/45
(iii) -44/72
(iv) -8/10

Answer. (i) $\frac{-8}{6} = \frac{-4 \times 2}{3 \times 2} = \frac{-4}{3}$

(ii) $\frac{25}{45} = \frac{5 \times 5}{9 \times 5} = \frac{5}{9}$

(iii) $\frac{-44}{72} = \frac{-11 \times 4}{18 \times 4} = \frac{-11}{18}$

(iv) $\frac{-8}{10} = \frac{-4 \times 2}{5 \times 2} = \frac{-4}{5}$

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

(i) $\frac{-5}{7} \boxed{} \frac{2}{3}$ (ii) $\frac{-4}{5} \boxed{} \frac{-5}{7}$ (iii) $\frac{-7}{8} \boxed{} \frac{14}{-16}$

(iv) $\frac{-8}{5} \boxed{} \frac{-7}{4}$ (v) $\frac{1}{-3} \boxed{} \frac{-1}{4}$ (vi) $\frac{5}{-11} \boxed{} \frac{-5}{11}$

(vii) $0 \boxed{} \frac{-7}{6}$

Answer. (i)

$\frac{-5}{7} = \frac{-5 \times 3}{7 \times 3} = \frac{-15}{21}$

$\frac{2}{3} = \frac{2 \times 7}{3 \times 7} = \frac{14}{21}$

As $-15 < 14$

Therefore, $\frac{-5}{7} \boxed{<} \frac{2}{3}$

(ii)

$\frac{-4}{5} = \frac{-4 \times 7}{5 \times 7} = \frac{-28}{35}$

$\frac{-5}{7} = \frac{-5 \times 5}{7 \times 5} = \frac{-25}{35}$

As $-28 < -25$

Therefore, $\frac{-4}{5} \boxed{\leq} \frac{-5}{7}$

(iii)

$\frac{14}{-16} = \frac{7 \times 2}{-8 \times 2} = \frac{7}{-8} = \frac{-7}{8}$

Therefore, $\frac{-7}{8} \square \frac{14}{-16}$

(iv)

$\frac{-8}{5} = \frac{-8 \times 4}{5 \times 4} = \frac{-32}{20}$

$\frac{-7}{4} = \frac{-7 \times 5}{4 \times 5} = \frac{-35}{20}$

As $-32 > -35$

Therefore, $\frac{-8}{5} \boxed{\geq} \frac{-7}{4}$

Therefore, $\frac{-8}{5} \boxed{>} \frac{-7}{4}$

(v)

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

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

As $-4 < -3$

Therefore, $\frac{-1}{3}\,[\leq]\,\frac{-1}{4}$

(vi) $\frac{5}{-11} = \frac{-5}{11}$

(vii) $0\,[>]\,\frac{-7}{6}$

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Q9 Which is greater in each of the following:
(i) $\frac{2}{3}, \frac{5}{2}$
(ii) $\frac{-5}{6}, \frac{-4}{3}$
(iii) $\frac{-3}{4}, \frac{2}{-3}$
(iv) $\frac{-1}{4}, \frac{1}{4}$
(v) $-3\frac{2}{7}, -3\frac{4}{5}$

Answer. (i) $\frac{2}{3}, \frac{5}{2}$
By converting these into like fractions,
$\frac{2}{3} = \frac{2\times2}{3\times2} = \frac{4}{6}$
$\frac{5}{2} = \frac{5\times3}{2\times3} = \frac{15}{6}$
As 15 > 4, therefore, $\frac{5}{2}$ is greater.

(ii)
$\frac{-5}{6}, \frac{-4}{3}$
$\frac{-4}{3} = \frac{-4\times2}{3\times2} = \frac{-8}{6}$
As -5 > -8,
Therefore, $\frac{-5}{6}$ is greater.

(iii)
$\frac{-3}{4}, \frac{2}{-3}$
 Or, $\frac{-3}{4}, \frac{-2}{3}$
By converting these into like fractions,
$\frac{-3}{4} = \frac{-3\times3}{4\times3} = \frac{-9}{12}$
$\frac{-2}{3} = \frac{-2\times4}{3\times4} = \frac{-8}{12}$
As -8 > -9 ,
Therefore, $\frac{-2}{3}$ is greater.

(iv)

$\frac{-1}{4}, \frac{1}{4}$

$\frac{1}{4} > \frac{-1}{4}$

(v)

$-3\frac{2}{7}, -3\frac{4}{5}$

$\frac{-23}{7}, \frac{-19}{5}$

By converting these into like fractions,

$\frac{-23}{7} = \frac{-23 \times 5}{7 \times 5} = \frac{-115}{35}$

$\frac{-19}{5} = \frac{-19 \times 7}{5 \times 7} = \frac{-133}{35}$

As $-115 > -133$, therefore, $-3\frac{2}{7}$ is greater.

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Q10 Write the following rational numbers in ascending order:

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

(ii) $\frac{-1}{3}, \frac{-2}{9}, \frac{-4}{3}$

(iii) $\frac{-3}{7}, \frac{-3}{2}, \frac{-3}{4}$

Answer. (i) As $-3 < -2 < -1$

$\therefore \frac{-3}{5} < \frac{-2}{5} < \frac{-1}{5}$

(ii) By converting these into like fractions,

$\frac{-1 \times 3}{3 \times 3}, \frac{-2}{9}, \frac{-4 \times 3}{3 \times 3}$

$\frac{-3}{9}, \frac{-2}{9}, \frac{-12}{9}$

As $-12 < -3 < -2$

$\therefore \frac{-4}{3} < \frac{-1}{3} < \frac{-2}{9}$

(iii) By converting these into like fractions,

$\frac{-3 \times 4}{7 \times 4}, \frac{-3 \times 14}{2 \times 14}, \frac{-3 \times 7}{4 \times 7}$

$\frac{-12}{28}, \frac{-42}{28}, \frac{-21}{28}$

As $-42 < -21 < -12$

$\therefore \frac{-3}{2} < \frac{-3}{4} < \frac{-3}{7}$

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