Worksheet -12   Subject: - Mathematics   Class: - VII   Teacher: - Ms. Neeru

Name: _____ Class & Sec: _____ Roll No. _____ Date: 25.08.2020

RATIONAL NUMBERS

A number of the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$ is called a rational number. p is called the numerator and q is called the denominator.

For example:

$\frac{1}{5}$, $\frac{3}{2}$, 2, $4.\frac{0}{1}$, 9 etc., are all rational numbers. However, we do not include $\frac{4}{0}$, $\frac{7}{0}$, where 0 is in the denominator. Such extended numbers are called the system of rational numbers.

$$\frac{5}{6}$$ → Numerator

Denominator ← $\frac{5}{6}$
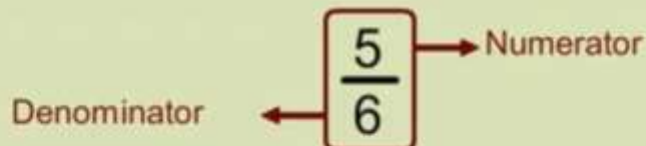
Thus, rational number is a number of the form $\frac{p}{q}$, where p, $q \in Z$ and $q \neq 0$.

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RATIONAL NUMBERS

Equivalent rational numbers

Let $\frac{p}{q}$ be a rational number and m be any integer except 0 and 1.

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

$\frac{5}{7} = \frac{5 \times 2}{7 \times 2} = \frac{10}{14}$

So, $\frac{5}{7}$ and $\frac{10}{14}$ are equivalent rational numbers.

For example,

$\frac{2}{5} = \frac{4}{10} = \frac{6}{15} = \frac{8}{20}$

Such numbers are called equivalent rational numbers.

Positive and negative rational numbers

If a and b are positive integers, then the rational numbers $\frac{a}{b}$ and $\frac{-a}{-b}$ are both positive and the rational numbers $\frac{-a}{b}$ and $\frac{a}{-b}$ are both negative.

Thus, $\frac{3}{7}$, $\frac{-11}{-5}$ are positive rational numbers and $\frac{-3}{5}$, $\frac{17}{-9}$ are negative rational numbers.

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Ex 9.1

$\frac{-1}{6}, 0, \frac{1}{3}.$

Question 2:

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

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

(ii) $\dfrac{-1}{4}, \dfrac{-2}{8}, \dfrac{-3}{12}, \ldots$

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

(iv) $\dfrac{-2}{3}, \dfrac{2}{-3}, \dfrac{4}{-6}, \dfrac{6}{-9}, \ldots$

Answer 2:

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

$\Rightarrow \dfrac{-3 \times 1}{5 \times 1}, \dfrac{-3 \times 2}{5 \times 2}, \dfrac{-3 \times 3}{5 \times 3}, \dfrac{-3 \times 4}{5 \times 4}, \ldots$

Therefore, the next four rational numbers of this pattern would be

$\dfrac{-3 \times 5}{5 \times 5}, \dfrac{-3 \times 6}{5 \times 6}, \dfrac{-3 \times 7}{5 \times 7}, \dfrac{-3 \times 8}{5 \times 8} = \dfrac{-15}{25}, \dfrac{-18}{30}, \dfrac{-21}{35}, \dfrac{-24}{40}$

(ii) $\dfrac{-1}{4}, \dfrac{-2}{8}, \dfrac{-3}{12}, \ldots$

$\Rightarrow \dfrac{-1 \times 1}{4 \times 1}, \dfrac{-1 \times 2}{4 \times 2}, \dfrac{-1 \times 3}{4 \times 3}, \ldots$

Therefore, the next four rational numbers of this pattern would be

$\dfrac{-1 \times 4}{4 \times 4}, \dfrac{-1 \times 5}{4 \times 5}, \dfrac{-1 \times 6}{4 \times 6}, \dfrac{-1 \times 7}{4 \times 7} = \dfrac{-4}{16}, \dfrac{-5}{20}, \dfrac{-6}{24}, \dfrac{-7}{28}$

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

$\Rightarrow \dfrac{-1 \times 1}{6 \times 1}, \dfrac{1 \times 2}{-6 \times 2}, \dfrac{1 \times 3}{-6 \times 3}, \dfrac{1 \times 4}{-6 \times 4}, \ldots$

Therefore, the next four rational numbers of this pattern would be

$\dfrac{1 \times 5}{-6 \times 5}, \dfrac{1 \times 6}{-6 \times 6}, \dfrac{1 \times 7}{-6 \times 7}, \dfrac{1 \times 8}{-6 \times 8} = \dfrac{5}{-30}, \dfrac{6}{-36}, \dfrac{7}{-42}, \dfrac{8}{-48}$

(iv) $\dfrac{-2}{3}, \dfrac{2}{-3}, \dfrac{4}{-6}, \dfrac{6}{-9}, \dots\dots$

$\Rightarrow \dfrac{-2\times1}{3\times1}, \dfrac{2\times1}{-3\times1}, \dfrac{2\times2}{-3\times2}, \dfrac{2\times3}{-3\times3}, \dots\dots$

Therefore, the next four rational numbers of this pattern would be

$\dfrac{2\times4}{-3\times4}, \dfrac{2\times5}{-3\times5}, \dfrac{2\times6}{-3\times6}, \dfrac{2\times7}{-3\times7} = \dfrac{8}{-12}, \dfrac{10}{-15}, \dfrac{12}{-18}, \dfrac{14}{-21}$

Question 3:

Give four rational numbers equivalent to:

(i) $\dfrac{-2}{7}$ (ii) $\dfrac{5}{-3}$ (iii) $\dfrac{4}{9}$

Answer 3:

(i) $\dfrac{-2}{7}$

$\dfrac{-2\times2}{7\times2} = \dfrac{-4}{14}, \dfrac{-2\times3}{7\times3} = \dfrac{-6}{21}, \dfrac{-2\times4}{7\times4} = \dfrac{-8}{28}, \dfrac{-2\times5}{7\times5} = \dfrac{-10}{35}$

Therefore, four equivalent rational numbers are $\dfrac{-4}{14}, \dfrac{-6}{21}, \dfrac{-8}{28}, \dfrac{-10}{35}$.

(ii) $\dfrac{5}{-3}$

$\dfrac{5\times2}{-3\times2} = \dfrac{10}{-6}, \dfrac{5\times3}{-3\times3} = \dfrac{15}{-9}, \dfrac{5\times4}{-3\times4} = \dfrac{20}{-12}, \dfrac{5\times5}{-3\times5} = \dfrac{25}{-15}$

Therefore, four equivalent rational numbers are $\dfrac{10}{-6}, \dfrac{15}{-9}, \dfrac{20}{-12}, \dfrac{25}{-15}$.

(iii) $\dfrac{4}{9}$

$\dfrac{4\times2}{9\times2} = \dfrac{8}{18}, \dfrac{4\times3}{9\times3} = \dfrac{12}{27}, \dfrac{4\times4}{9\times4} = \dfrac{16}{36}, \dfrac{4\times5}{9\times5} = \dfrac{20}{45}$

Therefore, four equivalent rational numbers are $\dfrac{8}{18}, \dfrac{12}{27}, \dfrac{16}{36}, \dfrac{20}{45}$.