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CONTENTS

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Chapter 1	Rational Numbers	3
Chapter 2	Squares and Square Roots	86
Chapter 3	Power and Exponent	163
Chapter 4	Direct and Inverse Variation	205
Chapter 5	Algebraic Expressions and Identities	231
Chapter 6	Linear Equations	279
Chapter 7	Percentage	300
Chapter 8	Practical Geometry	314
Chapter 9	Data Handling Part I	338
Chapter 9	Data Handling Part II	345
Chapter 9	Data Handling Part III	354
Chapter 10	Mensuration I	397
Chapter 11	Surface Area and Volume of Cube and Cuboid	441
Chapter 12	Area of Trapezium and Polygon	464
Chapter 13	Surface Area and Volume of Cylinder	486
Chapter 14	Volume and Surface Area of Cube and Cuboid	522
Chapter 15	Area of Trapezium and Polygon	557
Chapter 16	Linear Equation in One Variable	579
Chapter 17	Mean Median and Mode	615
Chapter 18	Profit Loss Discount and VAT	637
Chapter 19	Compound Interest	673
Chapter 20	Algebraic Identities	708
Chapter 21	Division of Algebraic Expressions	733

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CLASS 8 • R.D. SHARMA MATHEMATICS

CHAPTER

01

RATIONAL NUMBERS



COMPLETE NOTES WITH FULL SOLUTIONS

Step-by-step solved questions
+ RIMC level challenge questions

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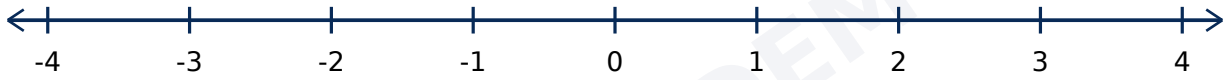
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RATIONAL NUMBERS

Chapter 1

Rational Numbers



A **rational number** is a number that can be written in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$.

$\frac{7}{0} = \infty$ (not defined)

$\frac{0}{7} = 0$

$q \in$ Integers, $q \neq 0$

e.g. 1.5

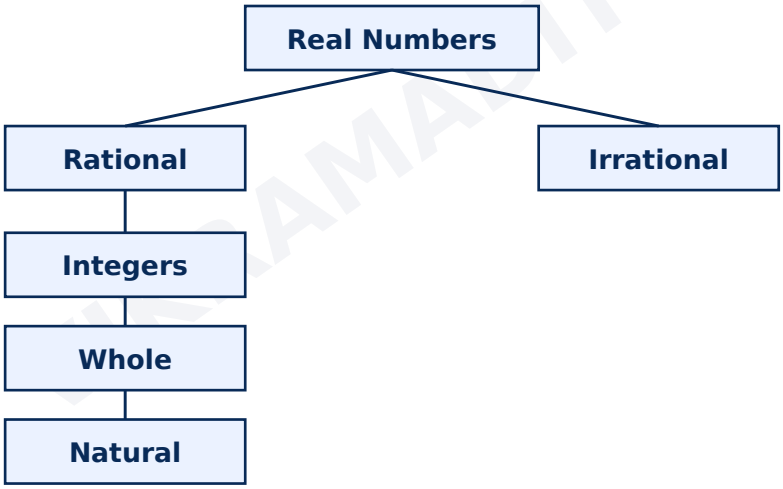
$$1.5 = \frac{15}{10} = \frac{3}{2} \quad \leftarrow \frac{p}{q}$$

The decimal form of a rational number either terminates after a finite number of digits or repeats.

Real Number System

$\Rightarrow$ Real numbers = Rational + Irrational

$\Rightarrow$ Real − Irrational = Rational numbers



Canonical form of a rational number

$$3 = \frac{3}{1} \quad (p = 3,\ q = 1)$$

Any integer can be written in the form $\frac{x}{1}$; this form is called canonical. Therefore every integer is a rational number.

Equality

$$\frac{a}{b} = \frac{c}{d} \Rightarrow ad = bc \qquad (b, d \neq 0)$$

e.g. $\frac{1}{2} = \frac{2}{4}$

$$1 \times 4 = 2 \times 2$$
$$\Rightarrow 4 = 4$$

Ordering

$$\frac{a}{b} < \frac{c}{d} \text{ if } ad < bc, \qquad \frac{a}{b} > \frac{c}{d} \text{ if } ad > bc \qquad (b, d \neq 0)$$

e.g. Compare $\frac{1}{2}$ and $\frac{2}{1}$

$$1 \times 1 < 2 \times 2$$
$$\Rightarrow 1 < 4$$
$$\Rightarrow \frac{1}{2} < \frac{2}{1}$$

Operations on Rational Numbers

Addition

$$\frac{1}{2} + \frac{2}{4} = \frac{4+4}{8} = \frac{8}{8} = 1$$

Multiplication

$$\frac{1}{2} \times \frac{2}{4} = \frac{1}{4}$$

Division

$$\frac{1}{2} \div \frac{2}{4} = \frac{1}{2} \times \frac{4}{2} = 1$$

Exponent with integer power

$$\left(\frac{p}{q}\right)^m = \frac{p^m}{q^m}$$

$$\left(\frac{p}{q}\right)^{-m} = \frac{q^m}{p^m} = \frac{p^{-m}}{q^{-m}}$$

Types of fractions

$\Rightarrow$ Common fraction: $\frac{8}{3}$

$\Rightarrow$ Mixed fraction: $2\frac{2}{3}$ $(= \frac{8}{3})$

$\Rightarrow$ Repeating decimal: $2.666\ldots = 2.\overline{6}$

$$\frac{64}{1000} = \frac{4^3}{10^3} = 4^3 \times 10^{-3}$$

Commutative Property of Addition

$$a + b = b + a \qquad (a, b \text{ are rational numbers})$$

$$\frac{2}{1} + \frac{7}{1} = \frac{7}{1} + \frac{2}{1}$$

Commutative Property of Multiplication

$$a \times b = b \times a \qquad (a, b \in \text{Rational numbers})$$

$$\frac{7}{1} \times \frac{5}{1} = \frac{35}{1} = \frac{5}{1} \times \frac{7}{1}$$

Associative Property

$$(a + b) + c = a + (b + c) \qquad (a, b, c \text{ are rational numbers})$$

$$\left(\frac{3}{5} + \frac{4}{5}\right) + \frac{2}{5} = \frac{3}{5} + \left(\frac{4}{5} + \frac{2}{5}\right)$$

Examples

Example 1: **Add $\frac{5}{12}$ and $\frac{3}{8}$.**

$$\frac{5}{12}+\frac{3}{8}=\frac{3}{8}+\frac{5}{12}$$
$$\frac{10+9}{24}=\frac{9+10}{24}$$

Ans: $\frac{19}{24}=\frac{19}{24}$

Example 2: **Add $\frac{7}{9}$ and 4.**

$$\frac{7}{9}+\frac{4}{1}=\frac{4}{1}+\frac{7}{9}$$

We first take the LCM.

$$\frac{7+36}{9}=\frac{36+7}{9}$$

Ans: $\frac{43}{9}=\frac{43}{9}$

Example 3: **Add $\frac{3}{8}$ and $\frac{-5}{12}$.**

$$\frac{3}{8}+\frac{-5}{12}=\frac{-5}{12}+\frac{3}{8}$$
$$\frac{9-10}{24}=\frac{-10+9}{24}$$

Ans: $\frac{-1}{24}=\frac{-1}{24}$

Example 4: **Simplify:** $\frac{8}{-15}+\frac{4}{-3}$

$$\frac{8}{-15}+\frac{4}{-3}=\frac{4}{-3}+\frac{8}{-15}$$
$$\frac{-8-20}{15}=\frac{-20-8}{15}$$

Ans: $\frac{-28}{15}=\frac{-28}{15}$

Example 5: **Simplify:** $\frac{7}{-26}+\frac{16}{39}$

$$\frac{7}{-26}+\frac{16}{39}=\frac{16}{39}+\frac{7}{-26}$$

We first take the LCM (78).

$$\frac{-21+32}{78}=\frac{32-21}{78}$$

Ans: $\frac{11}{78}=\frac{11}{78}$

Exercise 1.1

Q.1 **Add the following rational numbers:**

(i) $\frac{-5}{7}$ **and** $\frac{3}{7}$

$$\frac{-5}{7}+\frac{3}{7}=\frac{-5+3}{7}=\frac{-2}{7}$$

(ii) $\frac{-15}{4}$ **and** $\frac{7}{4}$

$$\frac{-15}{4}+\frac{7}{4}=\frac{-15+7}{4}=\frac{-8}{4}=-2$$

(iii) $\frac{-8}{11}$ **and** $\frac{-4}{11}$

$$\frac{-8}{11}+\frac{-4}{11}=\frac{-8-4}{11}=\frac{-12}{11}$$

(iv) $\frac{6}{13}$ **and** $\frac{-9}{13}$

$$\frac{6}{13}+\frac{-9}{13}=\frac{6-9}{13}=\frac{-3}{13}$$

Q.2 **Add the following rational numbers:**

(i) $\frac{3}{4}$ **and** $\frac{-5}{8}$

$$\frac{3}{4}+\frac{-5}{8}=\frac{6-5}{8}=\frac{1}{8}$$

(ii) $\frac{5}{-9}$ **and** $\frac{7}{3}$

We first take the LCM (9).

$$\frac{5}{-9}+\frac{7}{3}=\frac{-5+21}{9}=\frac{16}{9}$$

(iii) -3 **and** $\frac{3}{5}$

$$\frac{-3}{1}+\frac{3}{5}=\frac{-15+3}{5}=\frac{-12}{5}$$

(iv) $\frac{-7}{27}$ **and** $\frac{11}{18}$

$$\frac{-7}{27}+\frac{11}{18}=\frac{-14+33}{54}=\frac{19}{54}$$

(v) $\frac{31}{-4}$ **and** $\frac{-5}{8}$

$$\frac{31}{-4}+\frac{-5}{8}=\frac{-62-5}{8}=\frac{-67}{8}$$

(vi) $\frac{5}{36}$ **and** $\frac{-7}{12}$

$$\frac{5}{36}+\frac{-7}{12}=\frac{5-21}{36}=\frac{-16}{36}=\frac{-4}{9}$$

(vii) $\frac{-5}{16}$ **and** $\frac{7}{24}$

$$\frac{-5}{16}+\frac{7}{24}=\frac{-15+14}{48}=\frac{-1}{48}$$

(viii) $\frac{7}{-18}$ **and** $\frac{8}{27}$

$$\frac{7}{-18}+\frac{8}{27}=\frac{-21+16}{54}=\frac{-5}{54}$$

Q.3 Simplify:

(i) $\frac{8}{9}+\frac{-11}{6}$

$$\frac{8}{9}+\frac{-11}{6}=\frac{16-33}{18}=\frac{-17}{18}$$

(ii) $3+\frac{5}{-7}$

$$\frac{3}{1}+\frac{5}{-7}=\frac{21-5}{7}=\frac{16}{7}$$

(iii) $\frac{1}{-12}+\frac{2}{-15}$

$$\frac{1}{-12}+\frac{2}{-15}=\frac{-5-8}{60}=\frac{-13}{60}$$

(iv) $\frac{-8}{19}+\frac{-4}{57}$

$$\frac{-8}{19}+\frac{-4}{57}=\frac{-24-4}{57}=\frac{-28}{57}$$

(v) $\frac{7}{9}+\frac{3}{-4}$

$$\frac{7}{9}+\frac{3}{-4}=\frac{28-27}{36}=\frac{1}{36}$$

(vi) $\frac{5}{26}+\frac{11}{-39}$

$$\frac{5}{26}+\frac{11}{-39}=\frac{15-22}{78}=\frac{-7}{78}$$

(vii) $\frac{-16}{9}+\frac{-5}{12}$

$$\frac{-16}{9}+\frac{-5}{12}=\frac{-64-15}{36}=\frac{-79}{36}$$

(viii) $\frac{-13}{8}+\frac{5}{-36}$

$$\frac{-13}{8}+\frac{5}{-36}=\frac{-117-10}{72}=\frac{-127}{72}$$

(ix) $0+\frac{-3}{5}$

$$\frac{0}{1}+\frac{-3}{5}=\frac{0-3}{5}=\frac{-3}{5}$$

(x) $1+\frac{-4}{5}$

$$\frac{1}{1}+\frac{-4}{5}=\frac{5-4}{5}=\frac{1}{5}$$

Q.4 Add and express the sum as a mixed fraction:

(i) $\frac{-12}{5}$ **and** $\frac{43}{10}$

$$\frac{-12}{5}+\frac{43}{10}=\frac{-24+43}{10}=\frac{19}{10}=1\frac{9}{10}$$

(ii) $\frac{24}{7}$ **and** $\frac{-11}{4}$

$$\frac{24}{7}+\frac{-11}{4}=\frac{96-77}{28}=\frac{19}{28}$$

(iii) $\frac{-31}{6}$ **and** $\frac{-27}{8}$

$$\frac{-31}{6}+\frac{-27}{8}=\frac{-124-81}{24}=\frac{-205}{24}=-8\frac{13}{24}$$

(iv) $\frac{101}{6}$ **and** $\frac{7}{8}$

We first take the LCM (24).

$$\frac{101}{6}+\frac{7}{8}=\frac{404+21}{24}=\frac{425}{24}=17\frac{17}{24}$$

Additive Inverse

When we add two numbers and the result becomes 0, then both are **additive inverses** of each other.

$$a+(-a)=0$$

$$7+(-7)=0$$

$$\frac{1}{7}-\frac{1}{7}=0$$

Multiplicative Inverse

When we multiply two numbers and the result becomes 1, then both are **multiplicative inverses** of each other.

$$a\times\frac{1}{a}=1$$

$$\frac{1}{7} \times \frac{7}{1} = 1$$

Distributive Property

$$(a + b) \times c = ac + bc \qquad (a, b, c \in \text{Rational numbers in } \frac{p}{q} \text{ form})$$

e.g. Take $a = \frac{3}{1},\ b = \frac{4}{1},\ c = \frac{5}{1}$

$$\left(\frac{3}{1} + \frac{4}{1}\right) \times \frac{5}{1} = \left(\frac{3}{1} \times \frac{5}{1}\right) + \left(\frac{4}{1} \times \frac{5}{1}\right)$$

$$\frac{7}{1} \times \frac{5}{1} = \frac{15}{1} + \frac{20}{1}$$

$$\frac{35}{1} = \frac{35}{1}, \quad \text{Hence LHS = RHS}$$

Closure Property of Rational Numbers

1. Addition

$$\frac{3}{2} + \frac{4}{2} = \frac{7}{2}$$

(Rational + Rational = Rational)

If a and b are rational numbers, then a $*$ b is also rational, where $*$ is the operation (+, −, ×, ÷ with divisor ≠ 0).

Rearranging and Grouping

Rearrange the numbers in such a way that each group contains numbers with equal denominators.

Simplify: $\frac{-4}{7} + \frac{7}{6} + \frac{2}{7} + 3 + \frac{-11}{6}$

$$\left(\frac{-4}{7} + \frac{2}{7}\right) + \left(\frac{7}{6} - \frac{11}{6}\right) + 3$$

$$= \frac{-4+2}{7} + \frac{7-11}{6} + 3 = \frac{-2}{7} + \frac{-4}{6} + 3$$

$$= \frac{-2}{7} - \frac{2}{3} + 3 = \frac{-6-14}{21} + 3 = \frac{-20}{21} + \frac{3}{1}$$

$$= \frac{-20+63}{21}$$

Ans: $\frac{43}{21}$

Rearrange suitably and find the sum: $\frac{5}{12}+\frac{2}{7}+\frac{1}{8}+\frac{7}{12}+\frac{9}{7}-\frac{5}{16}$

$$\left(\frac{5}{12}+\frac{7}{12}\right)+\left(\frac{2}{7}+\frac{9}{7}\right)+\frac{1}{8}-\frac{5}{16}$$

$$=\frac{12}{12}+\frac{11}{7}+\frac{1}{8}-\frac{5}{16}=1+\frac{11}{7}+\frac{1}{8}-\frac{5}{16}$$

$$=\frac{7+11}{7}+\frac{1}{8}-\frac{5}{16}=\frac{18}{7}+\frac{1}{8}-\frac{5}{16}$$

$$=\frac{144+7}{56}-\frac{5}{16}=\frac{151}{56}-\frac{5}{16}=\frac{302-35}{112}$$

Ans: $\frac{267}{112}$

Subtraction

Subtract $\frac{3}{4}$ from $\frac{5}{6}$.

$$\frac{5}{6}-\frac{3}{4}=\frac{10-9}{12}$$

Ans: $\frac{1}{12}$

Existence of Identity and Inverse

⇒ Additive identity ⇒ 0

⇒ Additive inverse: $a+(-a)=0$

⇒ Multiplicative inverse: $a\times\frac{1}{a}=1$



⇒ **Integers** have only additive inverse.

⇒ **Whole numbers** (0, 1, 2, 3, ...) and **Natural numbers** (1, 2, 3, ...) have no inverse.

$\Rightarrow$ The real line contains both rational and irrational numbers. Rational numbers include integers, whole and natural numbers — any number in $\frac{p}{q}$ form with $q \neq 0$.

Word Problems

Example 1: **The sum of two numbers is $\frac{5}{9}$. If one of the numbers is $\frac{1}{3}$, find the other number.**

Given: sum of two numbers $= \frac{5}{9}$, one number $= \frac{1}{3}$

Value of second number = sum of two numbers − value of first number

$$\frac{5}{9} - \frac{1}{3} = \frac{5-3}{9} = \frac{2}{9}$$

Hence, the second number is $\frac{2}{9}$.

Ans: The second number is $\frac{2}{9}$.

Example 2: **What should be added to $\frac{-7}{8}$ so as to get $\frac{5}{9}$?**

Given: number $= \frac{-7}{8}$, to get $= \frac{5}{9}$. Let the number be x.

$$\frac{-7}{8} + x = \frac{5}{9}$$

$$x = \frac{5}{9} + \frac{7}{8} = \frac{40+63}{72}$$

Ans: $\frac{103}{72}$

Example 3: **What should be added to $\left(\frac{1}{2}+\frac{1}{3}+\frac{1}{5}\right)$ to get 3?**

Let the number be x. Given: number $= \frac{1}{2}+\frac{1}{3}+\frac{1}{5}$, to get = 3

$$\frac{31}{30} + x = 3$$

$$x = \frac{3}{1} - \frac{31}{30} = \frac{90 - 31}{30} = \frac{59}{30}$$

Hence, the number is $\frac{59}{30}$.

Ans: The number is $\frac{59}{30}$.

Example 4: **Find** $\frac{3}{7} + \left(\frac{-6}{11}\right) + \frac{8}{21} + \left(\frac{-5}{22}\right)$

$$= \frac{3}{7} - \frac{6}{11} + \frac{8}{21} - \frac{5}{22} = \frac{198 - 252 + 176 - 105}{462} = \frac{374 - 357}{462}$$

Ans: $\frac{17}{462}$

Example 5: **Find** $\frac{-7}{4} + \frac{5}{3} + \frac{-5}{6} + \frac{1}{3} + \frac{-1}{2}$

$$= \frac{-21 + 20 - 10 + 4 - 6}{12} = \frac{-37 + 24}{12}$$

Ans: $\frac{-13}{12}$

Example 6: **Solve:** $\frac{6}{7} - 2 + \frac{-7}{9} + \frac{19}{21}$

$$= \frac{54 - 126 - 49 + 57}{63} = \frac{111 - 175}{63}$$

Ans: $\frac{-64}{63}$

Example 7: **Multiply** $\frac{-7}{4} \times \frac{-3}{5}$

Ans: $\frac{-7}{4} \times \frac{-3}{5} = \frac{21}{20}$

Types of Numbers

Natural Numbers

Counting numbers starting from 1 are called **natural numbers**.

e.g. 1, 2, 3, 4, ...

Whole Numbers

When 0 is added to the natural numbers, we get **whole numbers**. 0 is the smallest whole number.

e.g. 0, 1, 2, 3, 4, ...

Even Numbers

A number divisible by 2, or a number whose unit digit is 0, 2, 4, 6 or 8, is called an **even number**. 2 is the smallest even (natural) number.

e.g. 2, 4, 6, 8, ...

Odd Numbers

A number not divisible by 2 is called an **odd number**. 1 is the smallest odd number.

e.g. 1, 3, 5, 7, ...

Prime Numbers

A number divisible only by 1 and itself (i.e. it has exactly 2 factors: 1 and itself) is called a **prime number**. 2 is the smallest prime number.

e.g. 2, 3, 5, 7, 11, ...

Composite Numbers

A number which is divisible by numbers other than 1 and itself (it has more than 2 factors) is called a **composite number**. 4 is the smallest composite number.

e.g. 4, 6, 8, 9, 10, 12, ...

Division of Rational Numbers

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c}$$

Divide: $\frac{2}{3} \div \frac{5}{6}$

$$\frac{2}{3} \times \frac{6}{5} = \frac{4}{5}$$

Ans: $\frac{4}{5}$

Example 1: **The product of two rational numbers is $\frac{-28}{81}$ and one of the numbers is $\frac{14}{27}$. Find the other number.**

Let the other number be x. Given: product $= \frac{-28}{81}$, number $= \frac{14}{27}$

$$\frac{14}{27} \times x = \frac{-28}{81}$$
$$x = \frac{-28}{81} \times \frac{27}{14} = \frac{-2}{3}$$

Ans: $\frac{-2}{3}$

Example 2: **By what number should we multiply $\frac{3}{-14}$ so that the product may be $\frac{5}{12}$?**

Let the number be x. Given: product $= \frac{5}{12}$, number $= \frac{3}{-14}$

$$\frac{3}{-14} \times x = \frac{5}{12}$$
$$x = \frac{5}{12} \times \frac{-14}{3} = \frac{-70}{36} = \frac{-35}{18}$$

Ans: $\frac{-35}{18}$

Closure property for division

Division of two rational numbers may or may not be closed (division by 0 is not defined).

Properties of division

Division of rational numbers is neither commutative nor associative.

For every non-zero rational number $\frac{a}{b}$, we have:

$$\Rightarrow \frac{a}{b} \div \frac{a}{b} = 1$$

$$\Rightarrow \frac{a}{b} \div \left(\frac{-a}{b}\right) = -1$$

$$\Rightarrow \left(\frac{-a}{b}\right) \div \frac{a}{b} = -1$$

Example 3: **Find** $(x+y) \div (x-y)$ **if** $x = \frac{2}{5},\ y = \frac{3}{2}$

$$\left(\frac{2}{5} + \frac{3}{2}\right) \div \left(\frac{2}{5} - \frac{3}{2}\right) = \frac{4+15}{10} \div \frac{4-15}{10}$$

$$= \frac{19}{10} \div \frac{-11}{10} = \frac{19}{10} \times \frac{10}{-11}$$

Ans: $\frac{-19}{11}$

Example 4: **Find** $(x+y) \div (x-y)$ **if** $x = \frac{2}{3},\ y = \frac{3}{2}$

$$\left(\frac{2}{3} + \frac{3}{2}\right) \div \left(\frac{2}{3} - \frac{3}{2}\right) = \frac{4+9}{6} \div \frac{4-9}{6}$$

$$= \frac{13}{6} \div \frac{-5}{6} = \frac{13}{6} \times \frac{6}{-5}$$

Ans: $\frac{-13}{5}$

Rational Numbers Between Two Numbers

Example 1: **Find 5 rational numbers between** $\frac{-3}{2}$ **and** $\frac{5}{3}$.

Make the denominators equal (LCM = 6):

$$\frac{-3}{2} \times \frac{3}{3} = \frac{-9}{6}$$

$$\frac{5}{3} \times \frac{2}{2} = \frac{10}{6}$$

Ans: $\frac{-8}{6}, \frac{-7}{6}, \frac{-6}{6}, \frac{-5}{6}, \frac{-4}{6}$

Example 2: **Find 5 rational numbers between** $\frac{-2}{3}$ **and** $\frac{1}{4}$.

$$\frac{-2}{3} \times \frac{4}{4} = \frac{-8}{12}$$

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

Ans: $\frac{-7}{12}, \frac{-6}{12}, \frac{-5}{12}, \frac{-4}{12}, \frac{-3}{12}$

Exercise 1.2 — Examples

Example 1: **Verify** $\left(\frac{a}{b}+\frac{c}{d}\right)+\frac{e}{f}=\frac{a}{b}+\left(\frac{c}{d}+\frac{e}{f}\right)$ **for** $\frac{a}{b}=\frac{-2}{3}, \frac{c}{d}=\frac{5}{7}, \frac{e}{f}=\frac{-1}{6}$

$$\left(\frac{-2}{3}+\frac{5}{7}\right)+\frac{-1}{6}=\frac{-2}{3}+\left(\frac{5}{7}+\frac{-1}{6}\right)$$

$$\frac{-14+15}{21}-\frac{1}{6}=\frac{-2}{3}+\frac{30-7}{42}$$

$$\frac{1}{21}-\frac{1}{6}=\frac{-2}{3}+\frac{23}{42}$$

$$\frac{2-7}{42}=\frac{-28+23}{42}$$

Ans: $\frac{-5}{42}=\frac{-5}{42}$**, hence verified.**

Example 2: **Using commutativity and associativity of addition of rational numbers, express each of the following as a rational number:**

(i) $\frac{3}{5}+\frac{-7}{6}+\frac{2}{5}+\frac{-5}{6}$

$$\left(\frac{3}{5}+\frac{2}{5}\right)+\left(\frac{-7}{6}+\frac{-5}{6}\right)=\frac{5}{5}+\frac{-12}{6}=1-2$$

Ans: -1

(ii) $\frac{4}{3}+\frac{-4}{5}+\frac{-2}{3}+\frac{7}{5}-2$

$$\left(\frac{4}{3}+\frac{-2}{3}\right)+\left(\frac{-4}{5}+\frac{7}{5}\right)-2=\frac{2}{3}+\frac{3}{5}-2$$

$$=\frac{10+9-30}{15}=\frac{19-30}{15}$$

Ans: $\frac{-11}{15}$

Example 3: Re-arrange suitably and find the sum in each of the following:

(i) $\frac{5}{3}+\frac{11}{2}+\frac{-9}{4}+\frac{-8}{3}+\frac{-7}{2}$

$$\left(\frac{11}{2}+\frac{-7}{2}\right)+\left(\frac{5}{3}+\frac{-8}{3}\right)+\frac{-9}{4}=\frac{4}{2}+\frac{-3}{3}-\frac{9}{4}$$

$$=2-1-\frac{9}{4}=\frac{8-4-9}{4}$$

Ans: $\frac{-5}{4}$

(ii) $\frac{-4}{7}+\frac{7}{6}+\frac{2}{7}+3+\frac{-11}{6}$

$$\left(\frac{-4}{7}+\frac{2}{7}\right)+\left(\frac{7}{6}+\frac{-11}{6}\right)+3=\frac{-2}{7}-\frac{2}{3}+3=\frac{-6-14+63}{21}$$

Ans: $\frac{43}{21}$

Exercise 1.2

Q.1 Verify commutativity of addition of rational numbers for each of the following pairs:

(i) $\frac{-11}{5}$ **and** $\frac{4}{7}$

$$\frac{-11}{5}+\frac{4}{7}=\frac{4}{7}+\frac{-11}{5}$$

$$\frac{-77+20}{35}=\frac{20-77}{35}$$

Ans: $\frac{-57}{35}=\frac{-57}{35}$

(ii) $\frac{4}{9}$ **and** $\frac{7}{-12}$

$$\frac{4}{9}+\frac{-7}{12}=\frac{-7}{12}+\frac{4}{9}$$

$$\frac{16-21}{36}=\frac{-21+16}{36}$$