MBD

NCERT SOLUTIONS

MATHEMATICS

8

With Selected NCERT Exemplar Problems

MBD

NCERT SOLUTIONS

MATHEMATICS

8

MALHOTRA BOOK DEPOT
(Producers of Quality MBD Books)
An ISO 9001:2015 Certified Company

OUR ADDRESSES IN INDIA

- **New Delhi:** New Delhi: MBD House, Gulab Bhawan, 6, Bahadur Shah Zafar Marg *Ph. 23317931, 23318301*
- **Mumbai:** A-683, T.T.C. Industrial Area, M.I.D.C. Off. Thane-Belapur Road, Navi Mumbai *Ph. 32996410, 27780821, 8691053365*
- **Chennai:** No. 26 B/2 SIDCO Estate, North Phase, Pataravakkam Ambattur Industrial Estate, Ambattur *Ph. 26359376, 26242350*
- **Chennai:** Plot No. 3018, Old Y Block, 3rd Street, 12th Main Road, Anna Nagar West *Ph. 23741471*
- **Kolkata:** Satyam Building, 46-D, Rafi Ahmed Kidwai Marg *Ph. 22296863, 22161670*
- **Jalandhar City:** MBD House, Railway Road *Ph. 2458388, 2459046, 2455663*
- **Bengaluru:** 124/31, 1st Main, Industrial Town (Near Chowdeshwari Kalyan Mantap), West of Chord Road, Rajajinagar *Ph. 23103329, 23104667*
- **Hyderabad:** 3-4-492, Varun Towers, Barkatpura *Ph. 27564788, 9985820001*
- **Ernakulam:** Surabhi Building, South Janatha Road, Palarivattom *Ph. 2338107, 2347371*
- **Pune:** Survey No. 44, Behind Matoshree Garden, Kondhwa–Khadi Machine, Pisoli Road, at Post-Pisoli *Ph. 65271413, 65275071*
- **Nagpur:** 'Chandrakor', Plot No. G-15, Aath Rasta Chowk, West High Court Road, Laxmi Nagar *Ph. 2248104, 2248106, 2248649, 2245648*
- **Ahmedabad:** Godown No.10, Vedant Prabha Estate, Opp. ONGC Pumping Station, Sarkhej Sanand Road, Sarkhej *Ph. 26890336, 7600024542*
- **Cuttack:** Badambadi, Link Road *Ph. 2367277, 2367279, 2313013*
- **Guwahati:** Chancellor Commercial, Hem Baruah Road, Paan Bazar *Ph. 2131476, 8822857385*
- **Lucknow:** 173/15, Dr. B. N. Verma Road, Old 30 Kutchery Road *Ph. 4010992, 4010993*
- **Patna:** Ist Floor, Annapurna Complex, Naya Tola *Ph. 2672732, 2686994, 2662472*
- **Bhopal:** Plot No. 137, 138, 139, Sector-I, Special Industrial Area, Govindpura *Ph. 2581540, 2601535*
- **Jabalpur:** 840, Palash Chamber, Malviya Chowk *Ph. 2405854*
- **Goa:** H. No. 932, Plot No. 66, Kranti Nagar (Behind Azad Bhawan), Alto Porvorim, Bardez *Ph. 2413982, 2414394*
- **Jaipur:** C-66A, In front of Malpani Hospital, Road No. 1, V.K. Industrial Area, Sikar Road *Ph. 4050309, 4020168*
- **Raipur:** Behind Aligarh Safe Steel Industries, Vidhan Sabha Road, Avanti Bai Chowk, Lodhi Para Pandri *Ph. 2445370, 4052529*
- **Karnal:** Plot No. 203, Sector-3, HSIDC, Near Namaste Chowk, Opp. New World *Ph. 2220006, 2220009*
- **Shimla (H.P.):** C-89, Sector-I, New Shimla-9 *Ph. 2670221, 2670816*
- **Jammu (J&K):** Guru Nanak College of Education, Jallo Chak, Bari Brahmana *Ph. 2467376, 9419104035*
- **Ranchi (Jharkhand):** MBD House, Shivani Complex, 2nd Floor, Jyoti Sangam Lane, Upper Bazar *Ph. 7260813703, 7260813710*
- **Sahibabad (U.P.):** B-9 & 10, Site IV, Industrial Area *Ph. 3100045, 2896939*
- **Dehradun (Uttarakhand):** Plot No. 37, Bhagirathipuram, Niranjanpur, GMS Road *Ph. 2520360, 2107214*

DELHI LOCAL OFFICES:

- **Delhi (Shakarpur):** MB 161, Street No. 4 *Ph. 22546557, 22518122*
- **Delhi (Daryaganj):** MBD House, 4587/15, Opp. Times of India *Ph. 23245676*
- **Delhi (Patparganj):** Plot No. 225, Industrial Area *Ph. 22149691, 22147073*

We are committed to serve students with best of our knowledge and resources. We have taken utmost care and paid much attention while editing and printing this book but we would beg to state that Authors and Publishers should not be held responsible for unintentional mistakes that might have crept in. However, errors brought to our notice shall be gratefully acknowledged and attended to.

Published by : **MALHOTRA BOOK DEPOT**
MBD House, Railway Road, Jalandhar City.

Printed at : **HOLY FAITH INTERNATIONAL (P) LTD.**
B-9 & 10, Site IV, Industrial Area, Sahibabad (U.P.)

CONTENTS

CHAPTER 1

Rational Numbers

CHAPTER IN BRIEF

Rational Numbers and their Properties

- The numbers of the form $\frac{p}{q}$, where p and q are integers and $(q \neq 0)$, are called rational numbers. For example, $\frac{3}{4}, \frac{5}{3}, \frac{2}{9}, \frac{-6}{11}$ etc.
- **Standard Form of a Rational Number:** A rational number $\frac{p}{q}$ is said to be in standard form if p and q are integers having no common divisor other than 1 and p is positive.

  Notes:

  (*i*) Every positive rational number is greater than 0.

  (*ii*) Every negative rational number is less than 0.

  (*iii*) Rational numbers are closed under addition, subtraction, multiplication and division (provided divisor is not zero).

  (*iv*) Commutativity of addition is true for natural numbers, whole numbers and integers. It is also true for rational numbers.

  (*v*) Associativity of addition is true for natural numbers, whole numbers and integers. It is also true for rational numbers.

Properties of Rational Numbers

- **Additive Identity Element:** Zero is the **identity element** for addition and subtraction of natural numbers, whole numbers, integers and rational numbers.

  For examples,

  (*i*) $3 + 0 = 0 + 3 = 3$
- **Multiplicative Identity Element:** One is the **multiplicative identity** for natural numbers, whole numbers, integers and rational numbers.

  For example,

  (*i*) $6 \times 1 = 1 \times 6 = 6$
- **Additive inverse:** For every rational number $\frac{p}{q}$, there exists a

rational number $\left(\frac{p}{q}\right)+\left(\frac{-p}{q}\right)$ such that; $\left(\frac{p}{q}\right)+\left(\frac{-p}{q}\right)=0$ and similarly, $\left(\frac{-p}{q}\right)+\left(\frac{p}{q}\right)=0$.

Then, $\frac{-p}{q}$ is called the additive inverse of $\frac{p}{q}$.

- **Multiplicative inverse (Reciprocal):** Every non-zero rational number $\frac{p}{q}$ has its multiplicative inverse $\frac{p}{q}$. For example $\left(\frac{p}{q}\times\frac{q}{p}\right)=\left(\frac{q}{p}\times\frac{p}{q}\right)=1$

  $\therefore$ $\frac{q}{p}$ is called the reciprocal of $\frac{p}{q}$.

  Note:

  (*i*) Zero has no reciprocal (*ii*) Reciprocal of 1 is 1
  (*iii*) Reciprocal of –1 is –1

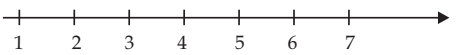
- **Distributive law of multiplication over addition:** For any three rational numbers $\frac{a}{b}, \frac{c}{d}$ and $\frac{e}{f}$, we have: $\frac{a}{b}\times\left(\frac{c}{d}+\frac{e}{f}\right)=\left(\frac{a}{b}\times\frac{c}{d}\right)+\left(\frac{a}{b}\times\frac{e}{f}\right)$.

Representation of Rational Numbers on the Number Line

You have learnt to represent natural numbers, whole numbers, integers and rational number on a number line. We shall revise them.

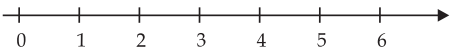
(*i*) Natural numbers:

e.g.,



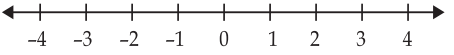
(*ii*) Whole numbers:

e.g.,



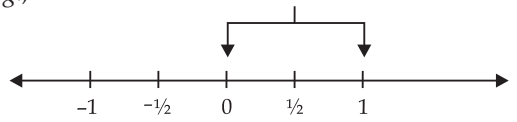
(*iii*) Integers:

e.g.,



(*iv*) Rational numbers:

e.g.,



Rational Numbers between two Rational Numbers

If x and y be two rational numbers, such that $x < y$, then, $\frac{1}{2}(x + y)$ is a rational number between x and y.

For example, between $\frac{1}{3}$ and $\frac{1}{2}$, the required rational number is

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

Hence, $\frac{5}{12}$ is a rational number lying between $\frac{1}{3}$ and $\frac{1}{2}$.

NCERT TEXTBOOK EXERCISE (SOLVED)

TRY THESE **[TEXTBOOK PAGE 4]**

Q. 1. Fill in the blanks in the following table:

Numbers	Closed Under			
	Addition	**Subt-raction**	**Multip-lication**	**Division**
Rational Numbers	Yes	Yes	…	No
Integers	…	Yes	…	No
Whole Numbers	…	…	Yes	…
Natural Numbers	…	No	…	…

Sol.

Numbers	Closed Under			
	Addition	**Subt-raction**	**Multip-lication**	**Division**
Rational Numbers	Yes	Yes	Yes	No
Integers	Yes	Yes	Yes	No
Whole Numbers	Yes	No	Yes	No
Natural Numbers	Yes	No	Yes	No

TRY THESE **[TEXTBOOK PAGE 6]**

Q. 1. Complete the following table:

Numbers	Commutative for			
	Addition	**Subtraction**	**Multiplication**	**Division**
Rational Numbers	Yes	…	…	…
Integers	…	No	…	…
Whole Numbers	…	…	Yes	…
Natural Numbers	…	…	…	No

Sol.

Numbers	Commutative for			
	Addition	Subtraction	Multiplication	Division
Rational Numbers	Yes	No	Yes	No
Integers	Yes	No	Yes	No
Whole Numbers	Yes	No	Yes	No
Natural Numbers	Yes	No	Yes	No

THINK, DISCUSS AND WRITE **[TEXTBOOK PAGE 11]**

Q. 1. If a property holds for rational numbers, will it also hold for integers? For whole numbers which will? Which will not?

Sol. Try yourself.

TRY THESE **[TEXTBOOK PAGE 9]**

Q. 1. Complete the following table:

Numbers	Associative for			
	Addition	Subtraction	Multiplication	Division
Rational Numbers	…	…	…	No
Integers	…	…	Yes	…
Whole Numbers	Yes	…	…	…
Natural Numbers	…	Yes	…	…

Numbers	Associative for			
	Addition	Subt-raction	Multiplication	Division
Rational Numbers	Yes	No	Yes	No
Integers	Yes	No	Yes	No
Whole Numbers	Yes	No	Yes	No
Natural Numbers	Yes	Yes	Yes	No

TRY THESE **[TEXTBOOK PAGE 13]**

Q. 1. Find using distributively:

(*i*) $\left\{\frac{7}{5}\times\left(\frac{-3}{12}\right)\right\}+\left\{\frac{7}{5}\times\frac{5}{12}\right\}$ (*ii*) $\left\{\frac{9}{16}\times\frac{4}{12}\right\}+\left\{\frac{9}{16}\times\frac{-3}{9}\right\}$

Sol. (*i*) $\left\{\frac{7}{5}\times\left(\frac{-3}{12}\right)\right\}+\left\{\frac{7}{5}\times\frac{5}{12}\right\} = \frac{7}{5}\times\left\{\left(\frac{-3}{12}\right)+\frac{5}{12}\right\}$

[By distributivity property]

$$=\frac{7}{5}\times\left\{\frac{-3+5}{12}\right\}=\frac{7}{5}\times\frac{2}{12}=\frac{14}{60}=\frac{7}{30}$$

(*ii*) $\left\{\frac{9}{16}\times\frac{4}{12}\right\}+\left\{\frac{9}{16}\times\frac{-3}{9}\right\} = \frac{9}{16}\times\left\{\frac{4}{12}+\left(\frac{-3}{9}\right)\right\}$

$$=\frac{9}{16}\times\left\{\frac{4}{12}-\frac{3}{9}\right\} = \frac{9}{16}\times\left\{\frac{12-12}{36}\right\}$$

$$=\frac{9}{16}\times\frac{0}{36} = \frac{0}{576} = 0$$

TEXTBOOK EXERCISE 1.1

Q. 1. Using appropriate properties find:

(*i*) $\frac{-2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

(*ii*) $\frac{2}{5}\times\left(-\frac{3}{7}\right)-\frac{1}{6}\times\frac{3}{2}+\frac{1}{14}\times\frac{2}{5}$

Sol. (*i*) We have: $\frac{-2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

$=\frac{-2}{3}\times\frac{3}{5}-\frac{3}{5}\times\frac{1}{6}+\frac{5}{2}$ (By commutativity)

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

$=\frac{3}{5}\left(\frac{-4-1}{6}\right)+\frac{5}{2}=\frac{3}{5}\times\frac{-5}{6}+\frac{5}{2}$

$=-\frac{1}{2}+\frac{5}{2}=\frac{-1+5}{2}$

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

(*ii*) We have: $\frac{2}{5}\times\left(-\frac{3}{7}\right)-\frac{1}{6}\times\frac{3}{2}+\frac{1}{14}\times\frac{2}{5}$

$=\frac{2}{5}\times\left(-\frac{3}{7}\right)+\frac{1}{14}\times\frac{2}{5}-\frac{1}{6}\times\frac{3}{2}$ (By commutativity)

$=\frac{2}{5}\left[-\frac{3}{7}+\frac{1}{14}\right]-\frac{1}{4}=\frac{2}{5}\left[\frac{-6+1}{14}\right]-\frac{1}{4}$

$=\frac{2}{5}\times\left(\frac{-5}{14}\right)-\frac{1}{4}$

$=-\frac{1}{7}-\frac{1}{4}=\frac{-4-7}{28}=\frac{-11}{28}$

Q. 2. Write the additive inverse of each of the following:

(*i*) $\frac{\mathbf{2}}{\mathbf{8}}$ (*ii*) $\frac{\mathbf{-5}}{\mathbf{9}}$ (*iii*) $\frac{\mathbf{-6}}{\mathbf{-5}}$

(*iv*) $\frac{\mathbf{2}}{\mathbf{-9}}$ (*v*) $\frac{\mathbf{19}}{\mathbf{-6}}$

Sol. (*i*) Additive inverse of $\frac{2}{8}$ is $\frac{-2}{8}$.

(*ii*) Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$ because

$=\frac{-5}{9}+\frac{5}{9}=\frac{-5+5}{9}=\frac{0}{9}=0$

(*iii*) We may write; $\frac{-6}{-5}=\frac{(-6)\times(-1)}{(-5)\times(-1)}=\frac{6}{5}$

$\therefore$ Additive inverse of $\frac{6}{5}$ is $\frac{-6}{5}$ because

$\frac{-6}{5} + \frac{6}{5} = \frac{-6+6}{5} = \frac{0}{5} = 0$

(*iv*) In standard form, we write; $\frac{2}{-9}$ as $-\frac{2}{9}$.

$\therefore$ Additive inverse of $-\frac{2}{9}$ is $+\frac{2}{9}$

because $\frac{-2}{9}+\frac{2}{9} = \frac{-2+2}{9} = \frac{0}{9} = 0$

(*v*) In standard form, we write; $\frac{19}{-6}$ as $-\frac{19}{6}$.

$\therefore$ Additive inverse of $-\frac{19}{6}$ is $\frac{19}{6}$

because $\frac{-19}{6}+\frac{19}{6} = \frac{-19+19}{6} = \frac{0}{6} = 0$

Q. 3. Verify that: $-(-x) = x$ for:

(*i*) $x = \frac{11}{15}$ **(*ii*) $x = \frac{-13}{17}$**

Sol. (*i*) For $x = \frac{11}{15}$

$\Rightarrow -(-x) = \frac{-(-11)}{15} = \frac{11}{15} = x$

Thus; $-(-x) = x$ is verified.

(*ii*) For $x = -\frac{13}{17}$

$\Rightarrow$ here $-(-x) = -\left[-\frac{(-13)}{17}\right] = -\frac{13}{17} = x$

Thus $-(-x) = x$ is verified.

Q. 4. Find the multiplicative inverse of the following:

(*i*) –13 **(*ii*) $\frac{-13}{19}$** **(*iii*) $\frac{1}{5}$**

(*iv*) $\frac{-5}{8} \times \frac{-3}{7}$ **(*v*) $-1 \times \frac{-2}{5}$** **(*vi*) –1**

Sol. (*i*) –13

$\therefore$ Multiplicative inverse of –13 is $\frac{1}{-13}$, *i.e.*, $\frac{-1}{13}$.

(*ii*) $\frac{-13}{19}$

$\therefore$ Multiplicative inverse of $\frac{-13}{19}$ is $\frac{19}{-13}$,

i.e., $-\frac{19}{13}$.

(*iii*) $\frac{1}{5}$

$\therefore$ Multiplicative inverse of $\frac{1}{5}$ is $\frac{5}{1}$, *i.e.*, 5.

(*iv*) $\frac{-5}{8}\times\frac{-3}{7} = \frac{(-5)\times(-3)}{8\times7} = \frac{15}{56}$

$\therefore$ Multiplicative inverse of $\frac{15}{56}$ is $\frac{56}{15}$.

(*v*) $-1\times\frac{-2}{5} = \frac{(-1)\times(-2)}{5} = \frac{2}{5}$

$\therefore$ Multiplicative inverse of $\frac{2}{5}$ is $\frac{5}{2}$.

(*vi*) –1

$\therefore$ Multiplicative inverse of –1 is $\frac{1}{-1}$,

i.e., $\frac{-1}{1} = -1$

Q. 5. Name the property under multiplication used in each of the following:

(*i*) $\frac{-4}{5} \times 1 = 1 \times \frac{-4}{5} = -\frac{4}{5}$

(*ii*) $\frac{-13}{17}\times\frac{-2}{7} = \frac{-2}{7}\times\frac{-13}{17}$

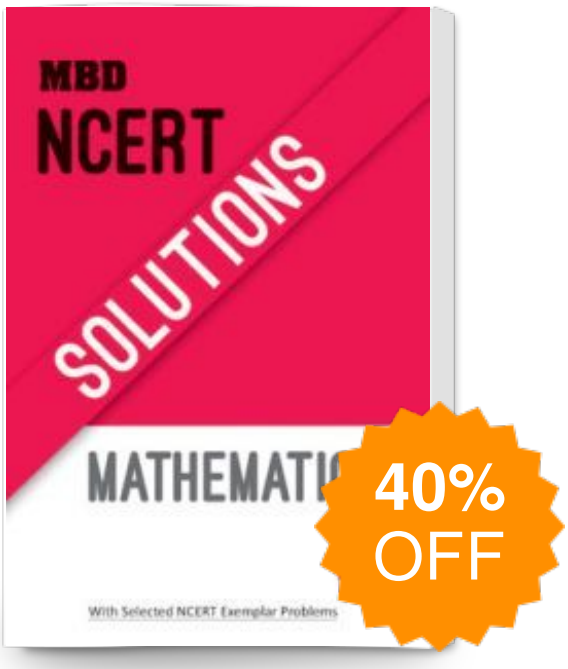
(*iii*) $\frac{-19}{29}\times\frac{29}{-19} = 1$

Sol. (*i*) Multiplicative identity.

(*ii*) Commutative property of multiplication.

(*iii*) Multiplicative inverse.

MBD NCERT Solutions Mathematics For Class-8



Publisher : MBD Group Publishers

Author : MBD Group Publishers

Type the URL : http://www.kopykitab.com/product/23272