


From the session 2023-24, the textbooks are rationalised under the new National Education Policy 2020. This **Sanjiv Refresher** is completely based on the new rationalised textbook.



# Sanjiv Refresher

# Mathematics

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Class VII

Based on Latest NCERT Textbook


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**SANJIV PRAKASHAN**

Dhamani Market, Chaura Rasta,

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email : sanjeevprakashanjaipur@gmail.com

website : www.sanjivprakashan.com



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**Sanjiv Prakashan (DTP Department),**

Jaipur

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Email : sanjeevprakashanjaipur@gmail.com

Postal Address : Publication Department

Sanjiv Prakashan,

Dhamani Market, Chaura Rasta,

Jaipur-302003

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# Syllabus

No.	Chapter/Unit	Objectives
1.	Integers	To learn properties of integers (through patterns); Solve word problems of integers (all operations).
2.	Fractions and Decimals	Understand operations on rational numbers; rational number as a decimal and word problems involving mixed fractions.
3.	Data Handling	Calculate mean, median and mode, use of bar graphs.
4.	Simple Equations	Understand simple linear equations in one variable (in contextual problems) with two operations.
5.	Lines and Angles	Understand pairs of angles; Properties of parallel lines.
6.	Triangle and its Properties	Learn the different angle sum properties of triangles.
7.	Comparing Quantities	Learn to understand and calculate interest, increase or decrease as percent, profit or loss as percent.
8.	Rational Numbers	Understand operations on rational numbers and word problems of rational numbers.
9.	Perimeter and Area	Understand and calculate the perimeter and area of different figures using basic units.
10.	Algebraic Expressions	Learn to generate algebraic expressions (simple) involving one or two variables.
11.	Exponents and Powers	Understand the Laws of exponents; express numbers in exponential form.
12.	Symmetry	Learn reflection and rotation symmetry of simple figures.
13.	Visualising Solid Shapes	Understand the concept of faces, edges and vertices of different solid shapes.



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## Integers

## Properties of Integers under Addition

**(i) Closure property :** The sum of two integers is always an integer. If  $a$  and  $b$  are integers, then  $a + b$  is also an integer.

**For example :**  $(-2) + (-5) = -7$  which is an integer.

**(ii) Commutative property :** For any two integers  $a$  and  $b$

$$a + b = b + a$$

**For example :**  $5 + (-4) = 1$  and  $(-4) + 5 = 1$

$$\therefore 5 + (-4) = (-4) + 5$$

**(iii) Associative property :** For any three integers  $a, b, c$

$$(a + b) + c = a + (b + c)$$

**For example :**  $[-6 + 7] + 3 = 1 + 3 = 4$

and  $-6 + [7 + 3] = -6 + 10 = 4$

$$\therefore [-6 + 7] + 3 = -6 + [7 + 3]$$

**(iv) Existence of additive identity :** 0 is the additive identity of every integer  $a$ , i.e.

$$a + 0 = 0 + a = a$$

**For example :**  $-5 + 0 = 0 + (-5) = -5$

**(v) Existence of additive inverse :** If  $a$  is an integer, then  $-a$  is its additive inverse i.e.

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

**For example :**  $5 + (-5) = 0$  or  $-5$  is the additive inverse of 5 and 16 is the additive inverse of  $-16$ .

**Note :** 0 is the only integer whose additive inverse is same as the integer, i.e. the additive inverse of 0 is 0.

## Properties of Integers under Subtraction

**(i) Closure Property :** The differences of two integers is also an integer.

**Example :**  $2 - 5 = -3$  (an integer)

**(ii) Commutative Property :** For any two integers  $a$  and  $b$ ,  $a - b \neq b - a$ , i.e. the subtraction of integers is not commutative.

**Example :**  $5 - (-3) \neq -3 - (5)$

$$5 - (-3) = 8 \text{ and } -3 - (5) = -8$$

**(iii) Associative Property :** For any three integers  $a$ ,  $b$  and  $c$ ,  $a - (b - c) \neq (a - b) - c$

**Example :**  $-16 - [(-14) - 8] = -16 - (-22) = -16 + 22 = 6$

$$[-16 - (-14)] - 8 = [-16 + 14] - 8 = -2 - 8 = -10$$

$$-16 - [(-14) - 8] \neq [-16 - (-14)] - 8$$

Hence, subtraction of integers is not associative.

### Try These (With Solution)

(Page 4)

**Q. 1.** Write a pair of integers whose sum gives :

(a) a negative integer

(b) zero

(c) an integer smaller than both the integers.

(d) an integer smaller than only one of the integers.

(e) an integer greater than both the integers.

**Solution :** (a)  $(-5) + 3 = -2$       (b)  $(2) + (-2) = 0$       (c)  $(-2) + (-5) = (-7)$

$$(d) (-5) + 3 = -2 \quad (e) 5 + 2 = 7$$

**Q. 2.** Write a pair of integers whose difference gives :

(a) a negative integer

(b) zero

(c) an integer smaller than both the integers.

(d) an integer greater than only one of the integers.

(e) an integer greater than both the integers.

**Solution :** (a) 4 and 9

$$\text{Difference : } 4 - 9 = -5 \text{ (negative integer)}$$

(b) -6 and -6

$$\text{Difference : } -6 - (-6) = 0$$

(c) 8 and 5

$$\text{Difference : } 8 - 5 = 3$$

(3 is smaller than 8 as well as 5)

(d) 13 and 4

$$\text{Difference : } 13 - 4 = 9$$

(9 is greater than 4)

(e) 11 and -7

$$\text{Difference : } 11 - (-7) = 18$$

(18 is greater than 11 as well as -7)

## EXERCISE 1.1

**Q. 1.** Write down a pair of integers whose :

(a) sum is -7    (b) difference is -10    (c) sum is 0

**Solution :** (a)  $(-3) + (-4) = -7$     (b)  $(-7) - 3 = -10$     (c)  $(-2) + 2 = 0$

- Q. 2.** (a) Write a pair of negative integers whose difference gives 8.  
 (b) Write a negative integer and a positive integer whose sum is  $-5$ .  
 (c) Write a negative integer and a positive integer whose difference is  $-3$ .

**Solution :** (a)  $(-5) - (-13) = -5 + 13 = 8$  (b)  $(-15) + 10 = -5$  (c)  $(-2) - (1) = -3$

**Q. 3.** In a quiz, team A scored  $-40, 10, 0$  and team B scored  $10, 0, -40$  in three successive rounds. Which team scored more? Can we say that we can add integers in any order?

**Solution :** Scores of team A =  $(-40) + 10 + 0 = -30$

Total scores of team B =  $10 + 0 + (-40) = -30$ , hence both team scored equal.

Yes, we can add integers in any order (by commutative property).

**Q. 4.** Fill in the blanks to make the following statements true :

- (i)  $(-5) + (-8) = (-8) + (\dots\dots)$       (ii)  $-53 + \dots\dots = -53$   
 (iii)  $17 + \dots\dots = 0$       (iv)  $[13 + (-12)] + (\dots\dots) = 13 + [(-12) + (-7)]$   
 (v)  $(-4) + [15 + (-3)] = [-4 + 15] + \dots\dots$

**Solution :** (i)  $(-5)$  (Commutative property)  
 (ii)  $0$  (Additive inverse property)  
 (iii)  $(-17)$  (Additive identity property)  
 (iv)  $(-7)$  (Associative property)  
 (v)  $(-3)$  (Associative property)

## Multiplication of Integers

**Multiplication of whole numbers is nothing but repeated addition :**

**For example :**  $5 + 5 + 5 = 3 \times 5 = 15$

Product of even numbers of negative integers is positive, whereas product of odd number of negative integers is negative.

**For example :**  $(-4) \times (-3) = +12$

$$(-2) \times (-1) \times (-3) = -6$$

$$(-10) \times (-2) \times (-3) \times (-5) = 300$$

**Multiplication of a positive and a negative integers on a number line :**

**For example :**  $(-4) + (-4) + (-4) + (-4) + (-4) = 5 \times (-4) = -20$

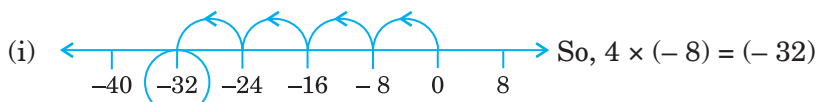


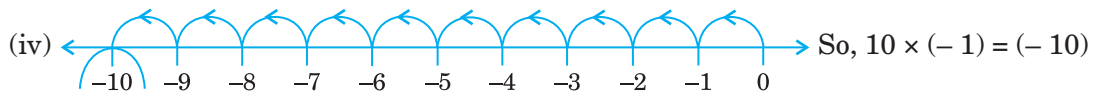
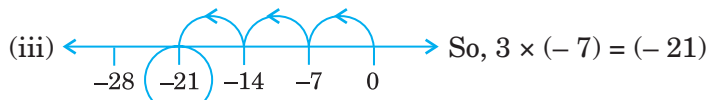
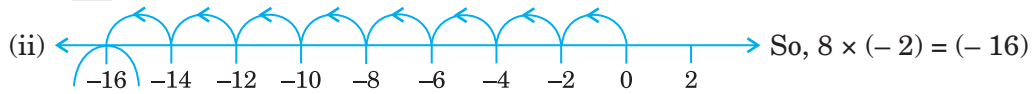
### Try These (With Solution)

(Page 5)

**Q. Find :** (i)  $4 \times (-8)$  (ii)  $8 \times (-2)$  (iii)  $3 \times (-7)$  (iv)  $10 \times (-1)$  using number line.

**Solution :**





### Multiplication of a positive and a negative integers without using number line

While multiplying a positive integer and a negative integer, we multiply them as whole numbers and put a (-) sign before the product. Thus, we get a negative integer.

**For example :** Find  $3 \times (-5)$  in a different way.

First find  $3 \times 5$  and then put minus sign (-) before the product obtained. You get -15. Thus, we find  $-(3 \times 5) = -15$ .

### Try These (With Solution)

(Page 6)

**Q. Find :** (i)  $6 \times (-19)$  (ii)  $12 \times (-32)$  (iii)  $7 \times (-22)$

**Solution :** (i)  $6 \times (-19) = -(6 \times 19) = -114$

(ii)  $12 \times (-32) = -(12 \times 32) = -384$

(iii)  $7 \times (-22) = -(7 \times 22) = -154$

### Try These (With Solution)

(Page 7)

**Q. 1. Find :** (a)  $15 \times (-16)$  (b)  $21 \times (-32)$  (c)  $(-42) \times 12$  (d)  $-55 \times 15$

**Solution :** Since  $-a \times b = -(a \times b) = a \times -b$

(a)  $-(15 \times 16) = -240$

(c)  $-(42 \times 12) = -504$

(b)  $-(21 \times 32) = -672$

(d)  $-(55 \times 15) = -825$

**Q. 2. Check if** (a)  $25 \times (-21) = (-25) \times 21$  (b)  $(-23) \times 20 = 23 \times (-20)$

**Write five more such examples.**

**Solution :**

(a) LHS =  $25 \times (-21) = -(25 \times 21) = -525$  (b) LHS =  $(-23) \times 20 = -(23 \times 20) = -460$

RHS =  $-25 \times 21 = -(25 \times 21) = -525$

RHS =  $(23) \times (-20) = -(23 \times 20) = -460$

LHS = RHS

LHS = RHS

Hence verified.

Hence verified.

Five more examples are :

(i)  $15 \times (-16) = (-15) \times 16$

(ii)  $(-24) \times 22 = 24 \times (-22)$

(iii)  $(-19) \times 17 = 19 \times (-17)$

(iv)  $20 \times (-10) = (-20) \times 10$

(v)  $17 \times (-12) = (-17) \times 12$



**Try These (With Solution)****(Page 8)****Q. 1. (i) Starting from  $(-5) \times 4$ , find  $(-5) \times (-6)$** **(ii) Starting from  $(-6) \times 3$ , find  $(-6) \times (-7)$** **Solution :**

(i) $-5 \times 4 = -20$	$-5 \times 3 = -15 = (-20) - (-5)$
$-5 \times 2 = -10 = (-15) - (-5)$	$-5 \times 1 = -5 = (-10) - (-5)$
$-5 \times 0 = 0 = -5 - (-5)$	$(-5) \times (-1) = 5 = 0 - (-5)$
$(-5) \times (-2) = 10 = 5 - (-5)$	$(-5) \times (-3) = 15 = +10 - (-5)$
$(-5) \times (-4) = 20 = 15 - (-5)$	$(-5) \times (-5) = 25 = 20 - (-5)$
$(-5) \times (-6) = 30 = 25 - (-5)$	
(ii) $(-6) \times 3 = -18$	$(-6) \times 2 = -12 = (-18) - (-6)$
$(-6) \times 1 = -6 = (-12) - (-6)$	$(-6) \times 0 = 0 = (-6) - (-6)$
$(-6) \times (-1) = 6 = 0 - (-6)$	$(-6) \times -2 = 12 = 6 - (-6)$
$(-6) \times (-3) = 18 = 12 - (-6)$	$(-6) \times -4 = 24 = 18 - (-6)$
$(-6) \times (-5) = 30 = 24 - (-6)$	$(-6) \times -6 = 36 = 30 - (-6)$
$(-6) \times (-7) = 42 = 36 - (-6)$	

**Note :** The product of two negative integers is a positive integer. We multiply the two negative integers as whole numbers and put the positive sign before the product. In general, for any two positive integers  $a$  and  $b$ ,

$$(-a) \times (-b) = a \times b$$

**Try These (With Solution)****(Page 8)****Q. Find : (i)  $(-31) \times (-100)$  (ii)  $(-25) \times (-72)$  (iii)  $(-83) \times (-28)$** **Solution :** Since  $(-a) \times (-b) = a \times b$ 

(i)  $31 \times 100 = 3100$       (ii)  $25 \times 72 = 1800$       (iii)  $83 \times 28 = 2324$

**Properties of Integers under Multiplication**

**(i) Closure Property :** The product of 2 integers is also an integer, i.e. if  $a$ ,  $b$  and  $c$  are integers then

$$a \times b = c$$

**For example :**  $13 \times (-5) = -65$ , which is an integer.

**(ii) Commutative Property :** For any 2 integers  $a$  and  $b$

$$a \times b = b \times a$$

**For example :**  $(-4) \times (-5) = 20$  and  $(-5) \times (-4) = 20$

$$\therefore (-4) \times (-5) = (-5) \times (-4)$$

**(iii) Multiplication by Zero :** We know that any whole number when multiplied by zero gives zero. Let us observe the following table showing the product of a negative integer and zero.

$$(-3) \times 0 = 0$$

$$0 \times (-4) = 0$$

$$(-5) \times 0 = 0$$

$$0 \times (-6) = 0$$