

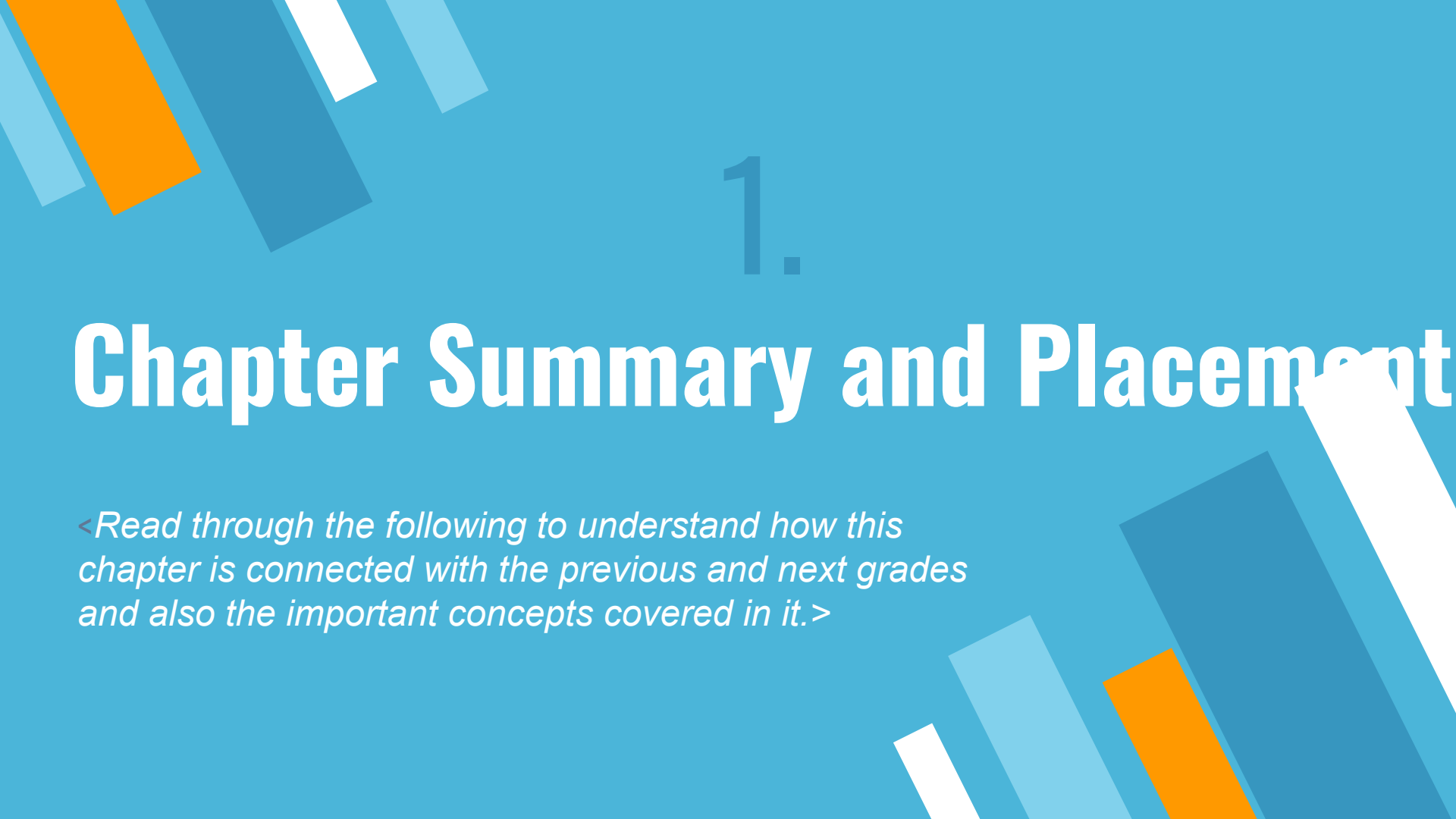


CHAPTER: Integers

Grade: 9

Board: **CBSE**

Book: **NCERT**



1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

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1. It is connected to grade 6 integers where introduction, addition and subtraction of integers was introduced. In this chapter it extends to multiplication, division with properties of integers under different operations
 2. It connects to the future grades to almost all chapters indirectly



2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>



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- 
1. Recalls how integers are used to represent real life situations, the properties of number line with integers, rules of addition and subtraction of integers
 2. Restate the properties of numbers for integers under addition and subtraction [Closure, commutative, associative, existence of identity and inverse]
 3. Recollect the rules of multiplication and division of integers
 4. Extend properties of numbers for multiplication and division of integers including distributive property
 5. Solve the problems involving properties of multiplication and division of integers
 6. Apply the concepts discussed in this chapter to solve problems [*Higher order of thinking*][*Worksheet 4 can be used*]



3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently



Subtopic and Learning Objective #1

Subtopic:Number line, Addition and subtraction of integers

LO:

Recallshow integers used to represent real life situations, the properties of number line with integers, rules of addition and subtraction of integers

1.To make the student recollect properties of number line of integers and rules of addition and subtraction of integers

Teacher Activity

1. A quick recap can be done about how integers are used in real life situations [like savings are represented by +, spending represented by -; profit by +, loss by-; if north is represented as + then south by-]
2. A quick recap can be done on number line of integers and rules of addition and subtraction of integers
3. Use **Resource Sheet 1** for review

Check for understanding:

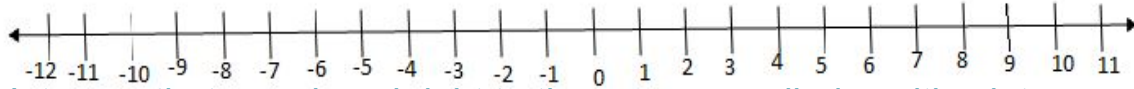
- a) If gaining a marks is represented by + then losing marks is represented as _____
- b) Deposition of Rs 100 is represented as _____ if withdrawal of Rs 100 is represented as -100
- c) Teacher can ask few questions orally to demonstrate the comparison, addition and subtraction of integers
- d) Zero is _____ positive _____ negative integer
- e) Smallest negative integer is _____
- f) Largest negative integer is _____
- g) Smallest positive integer is _____
- h) Largest positive integer is _____

Resources Suggested

Blackboard, pen and paper

Resource 1 can be used for explanation

Resource 1



Integers that are placed right to the zero are called positive integers and the integers that are placed left to the zero are negative integers.

As we move on right to the number line the value of number increases so, positive integers are greater in value than negative integers.[For comparison of integers analyse the position of integers on number line and can be compared easily]

Zero is neither positive nor negative

Smallest negative integer cannot be found

Largest negative integer is -1

Smallest positive integer is 1

Largest positive integer cannot be found

Resource 1

Rules of addition/Subtraction :

- Addition of same sign integers, Add and put same sign

$$(+3)+(+4)= +7, \quad (-3)+(-4)=-7$$

- Addition of different sign integers, Subtract and put bigger number sign

$$(-3)+(+4)=+1, \quad (+3)+(-4)= -1$$

Note : Subtraction of the integer is nothing but adding the additive inverse of the integer to be subtracted like $(-3) - (+4) = (-3) + (\text{additive inverse of } +4) = (-3) + (-4)$. Now the rules of addition are applied to get final sum

Subtopic and Learning Objective #2

Sub topic: Properties of integers addition and subtraction

LO:

Restate the properties of numbers for integers under addition and subtraction [Closure, commutative, associative, existence of identity and inverse]

1. Make students recollect the properties of numbers
2. Make students use the properties of numbers to addition and subtraction of integers

Teacher Activity

1. A quick recap of properties of numbers[which they learnt in whole numbers chapter in grade 6] to be done to make the student ready to use them for integers
2. Introduce the properties of numbers to addition and subtraction of integers[closure, commutative, associative, existence of identity and inverse]
3. Use **Resource 2** to help in explanation

Check for understanding:

- a) $a+(-b)$ is also an integer , which property was explained in the statement
- b) Additive inverse of -3 is _____
- c) Identity element for the set of integers under addition is _____
- d) Give an example for associative property of addition of integers
- e) state the properties satisfied by subtraction of integers

Teacher can ask more questions until the students get hold on the properties

Resources Suggested

Blackboard, pen and paper

Resource 2 can be used for explanation

Resource 1

Properties of numbers

Let a, b, c be numbers belonging to pre defined set and $*$ be an operation[addition/ subtraction/ multiplication/ division] then

Closure property: If $a * b$ is also belongs to the same set of numbers then the set of numbers is closed under the operation $*$

Commutative property : If $a * b = b * a$ then the set of numbers satisfy the commutative property under the operation $*$

Associative property: If $a * (b * c) = (a * b) * c$ then the set of numbers satisfy the associative property under the operation $*$

Existence of identity element : If $a * i = i * a = a$ then i is called as the identity element under the operation $*$

Existence of inverse of the element : If $a * (a^{-1}) = (a^{-1}) * a = i$ then a^{-1} is called as inverse of a under the operation $*$

Distributive property: let $*$ be multiplication/division and if

$ax(b+c) = axb + axc$ then multiplication is said to be distributive over addition

$ax(b-c) = axb - axc$ then multiplication is said to be distributive over subtraction

Resource 2

$a \div (b+c) = a \div b + a \div c$ then division is said to be distributive over addition

$a \div (b-c) = a \div b - a \div c$ then division is said to be distributive over subtraction

Note:

1. * can be any operation among addition/ subtraction/ multiplication/ division
2. Pre defined set can be set of integers

Subtopic and Learning Objective #3

Subtopic: Multiplication and division of integers

LO:

Recollect the rules of multiplication and division of integers

1. To make student to find product and quotient of 2 or more integers

Teacher Activity

1. Introduce multiplication of integers as repeated addition process as given in NCERT text book,[1.4.1 and 1.4.2]
2. Introduce division of integers by taking help of multiplication facts as given in NCERT text book
3. Rules of multiplication and division are introduced make operations easier
4. Activity can be performed to make the students practice and generate interest

Check for understanding:

- a) $(-8) \times (4) = \underline{\hspace{2cm}}$
- b) $(-12) \div (-3) = \underline{\hspace{2cm}}$
- c) List out the rules for multiplication/ division of two integers

Teacher can ask more questions until the students get hold

Resources Suggested

Blackboard, pen and paper

Resource 3 can be used for explanation

Activity

Name of the activity- Face off game

Type of activity – Individual/Group

Use it for – Practice

Materials –Number cards from 1 to 9[both positive and negative] 4 cards for each student,5 to 10 Bigger size cards with number and 4 cards with operation symbols[+, -, x, ÷] for teacher

Procedure –

Instructions to the teachers

1. Each group/student must be given 4 cards each. Can increase the number if it is performed as group activity. [Cards must be both negative and positive integers]
2. Teacher must keep the big sized cards and operations cards closed on the table.
3. One student from a group must come and open one card from number cards and one card from operation cards and announce to all groups
4. Students should quickly do the operation with the face off number and the numbers they have in hand and answer to the teacher
5. Points can be allotted to make the activity interesting[5 points for the first answered group, 4 for next group and so on]
6. If division card comes as face off card they can divide to one decimal place as they know decimal divisions already

Resource 3

Rules of Multiplication/division:

- **Multiplication/division of same sign integers, multiply/divide [respectively] and put + sign**
 $(+3) \times (+4) = +12$, $(-3) \times (-4) = +12$; $(+15) \div (+3) = +5$, $(-15) \div (-5) = +3$
- **Multiplication/division of different sign integers, multiply/divide [respectively] and put - sign**
 $(+3) \times (-4) = -12$, $(-3) \times (+4) = -12$; $(+15) \div (-3) = -5$, $(-15) \div (+5) = -3$

Note:

- Sum of two or more positive integers is positive
- Sum of two or more negative integers is negative
- Sum of two or more positive and negative integers is either positive or negative or zero
- Product of odd number of negative integers is negative
- Product of even number of negative integers is positive

Subtopic and Learning Objective #4

Sub topic: Properties of integers under multiplication and division

LO:

Extend properties of numbers for multiplication and division of integers including distributive property

1. Make students understand and give examples of properties under multiplication and division

Teacher Activity

Introduce the properties of integers under multiplication and division with examples

Explain: Multiplication by zero and one; Division by zero and one

Check for understanding:

- a) Give an example for associative under multiplication
- b) Is division of integers is commutative
- c) State the properties that were satisfied by division of integers?
- d) Is division distributive over addition?

Ask more questions until students are confident in concept

Resources Suggested

Blackboard, pen and paper

Resource 2 can be used for explanation

Subtopic and Learning Objective #5

Sub topic: Solving problems

LO:

Solve the problems involving properties of multiplication and division of integers

1. To make student solve given problems

Teacher Activity

1. Introduce how multiplication and division can be easier by grouping and regrouping.
2. Introduce the method of solving mathematical statements by using BODMAS

Check for understanding:

- a) Write the order of solving the following operations
Addition, multiplication, division, brackets subtraction, of
- b) Solve the following statement
 $12 \div 3 \times 4 - (12 + 4)$
- c) Multiply by regrouping $-4 \times (30 \times 25)$ what are all properties are used for doing so
- d) Solve $4 - 3 \times 2 \div 2(4 - 6)$

Resources Suggested

Blackboard, pen and paper



4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after the chapter is complete, homework

1. Represent the following with integers

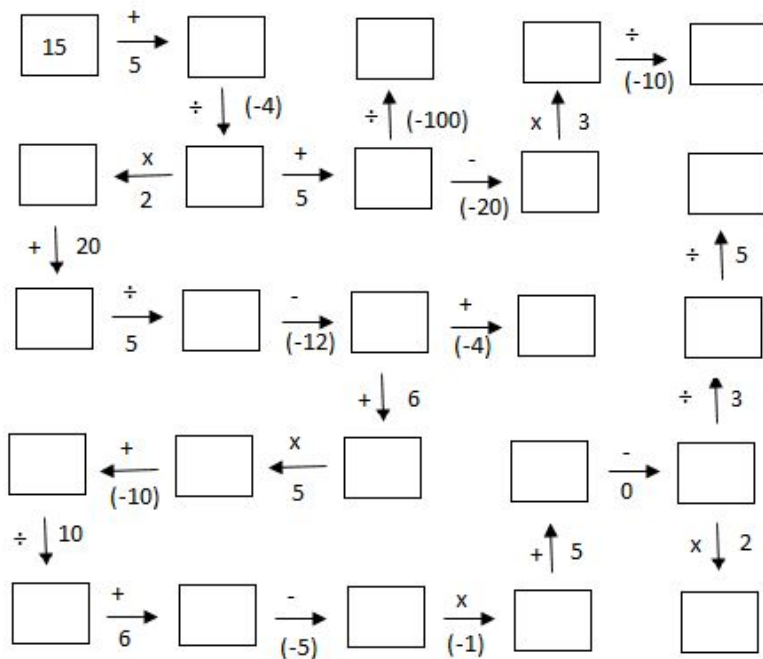
1. Rs 500 withdrawl from a bank account.
2. Rs 1500 loss in a business
3. 200 meters below sea level
4. 20° c drop in temperature
5. If moving towards west is taken as negative then represent 20 km moving towards east

2. In an exam positive marks are given for correct answers and negative marks for wrong answers. John scored the following marks in five successive tests as -25, +30, -15, +50, -20 find his final score.

3. If a man is on the top of a mountain of height 330 meters above sea level and there is a treasure which is exactly 120 meter below sea level under the mountain find the distance between man and treasure.

Worksheet 2

Solve the following puzzle



Worksheet 3

Use it like: test after the chapter is complete, homework

Answer the following:

1. Write the properties satisfied by set of integers under addition.
2. Identify the following properties and state whether set of integers satisfy those properties or not:
 - i) $(-2) + (-3) = (-3) + (-2)$
 - ii) $1 \times (-4) = (-4) \times 1 = -4$
 - iii) $2 \times [(-8) + (-3)] = 2 \times (-8) + 2 \times (-3)$
 - iv) $4 + (-4) = (-4) + 4 = 0$
 - v) $3 - (-4)$ is an integer
 - vi) $5 + 0 = 0 + 5 = 5$

Worksheet 4

1. $-1+2-3+4-5+6-7+8\ldots\ldots\ldots-99+100=$ _____
2. $(-5)+5(-5)+5(-5)+5\ldots\ldots\ldots 100 \text{ times}=$ _____
3. $(-1)\times(-1)\times(-1)\times(-1)\ldots\ldots\ldots 100 \text{ times}=$ _____
4. $0\times 1\times 2\times 3\times 4\times 5\times 6\ldots\ldots\ldots\times 100=$ _____
5. If $a*b$ is defined as $a+b-2$
 $a\#b$ is defined as $-a+b-(-3)$ then find
 - (i) $6*(-2)$
 - (ii) $(-7)\#(-3)$
 - (iii) $(4*3)-(3\#4)$

6. In a test +3 marks is given for correct answer and -2 marks for wrong answer. Aarvi attempted all questions and got +20 marks though she got 10 questions right. Find the number of questions in the test and how many questions were wrongly attempted?

7. In a one word answer test containing 50 questions(+2) marks is awarded for every right answer and (-2) marks for every wrong answer and 0 marks for an unattempted question if a girl score 94 marks what are the possibilities of marking right and wrong answers?



5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.



Worksheet 1

i) -500

ii) -1500

iii) -200

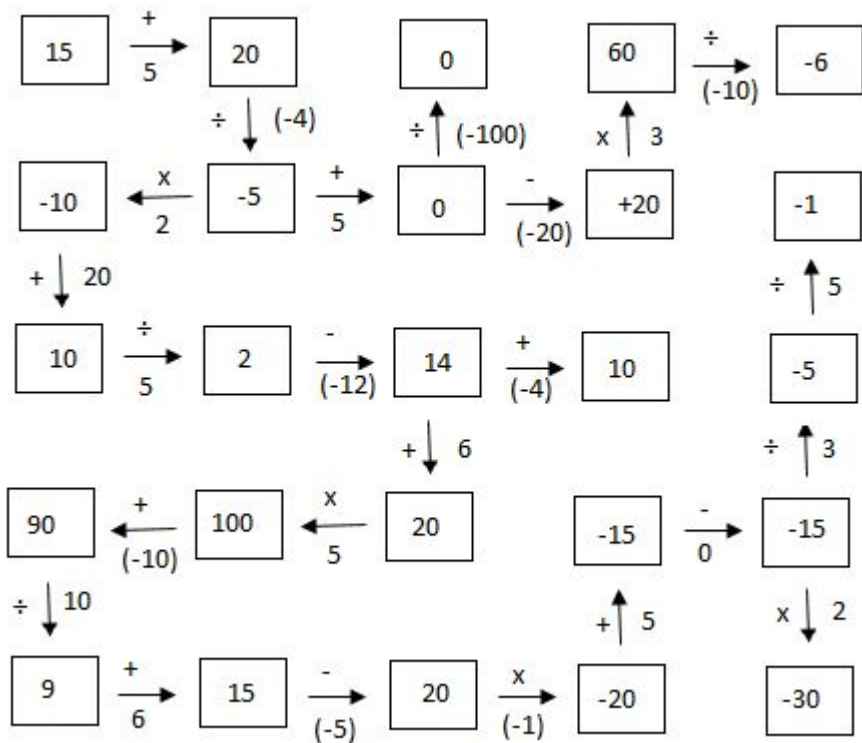
iv) -20

v) +20

2. Final score is 20

3. 550 meters

Worksheet 2



Worksheet 3

1. Closure, commutative, associative, existence of identity element, existence of inverse are the properties satisfied by the addition of integers
2.
 - (i) Commutative property under addition
 - (ii) Identity element under multiplication
 - (iii) Distributive property over addition
 - (iv) Existence of additive inverse
 - (v) Identity element under addition

Worksheet 4

1. +50
2. 0
3. +1
4. 0
5. (i) $6+(-2)-2= +2$ (ii) $-(-7)+(-3)-(-3)= +7$ (iii) $[4+3-2] - [-(-3)+4-(-3)] = 5 - 10= -5$
6. Number of right questions x marks for right questions + Number of wrong questions x marks for wrong questions = Marks Aarvi got
 $10 \times 3 + \underline{\hspace{2cm}} \times (-2) = +2$
By observing above equation number of wrong questions is 5 and total number of questions are 15



6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them



Teacher can use these videos if time and facilities permit:

1. https://www.youtube.com/watch?v=ZYHjT0m_iyQ- addition rules
2. <https://www.youtube.com/watch?v=-auZb8rkR6Y>- multiplication rules