Chapter 10 - The Other Side of Zero

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MINDMAP

1. Introduction to Integers
    - Counting numbers: 1, 2, 3, …
    - Zero (0): neither positive nor negative
    - Fractions: numbers between whole numbers
    - Negative numbers: less than zero → –1, –2, –3, …
    - Integers = { …, –3, –2, –1, 0, 1, 2, 3, … }
2. Real-Life Contexts
    - Floors in a building (+ floors above ground, – floors below)
    - Bank accounts (credits = +, debits = –)
    - Temperature (above 0°C = +, below = –)
    - Elevation (above sea level = +, below = –)
3. Number Line
    - 0 at center
    - Positive integers → right of 0
    - Negative integers ← left of 0
    - Comparison: left < right
4. Addition of Integers
    - (+a) + (+b) = +(a + b)
    - (–a) + (–b) = –(a + b)
    - (+a) + (–b) = sign of larger number after subtraction
    - a + (–a) = 0 (additive inverse)
5. Subtraction of Integers
    - a – b = a + (–b)
    - Subtracting negative = adding positive
    - Interpretation: Target – Start = Movement
6. Models for Understanding
    - Lift model (building or mine)
    - Token model (red = +, green = –; zero pairs cancel)
7. Historical Note
    - First use in China & India
    - Brahmagupta (628 CE): rules for +, –, 0
    - Spread to Arab world → Europe
8. Applications
    - Banking (account balance)
    - Geography (heights & depths)
    - Temperature (°C scale)

MASTER KIDS ACADEMY

UNIT TEST

Section A: Very Short Answer (1 mark each)

1. What is the additive inverse of –8?
2. Is 0 a positive or negative integer?
3. Which is greater: –5 or –2?
4. Write an integer between –3 and 1.
5. What symbol is used for negative numbers?

Section B: Short Answer (2 marks each)
6. Represent –4, 0, and +3 on a number line.
7. Find: (+7) + (–9)
8. Evaluate: (–5) – (–3)
9. If you start at Floor –2 and go up 5 floors, where do you reach?
10. Give one real-life example of a negative number.

Section C: Long Answer (3 marks each)
11. Using the token model, show how (+4) + (–6) = –2.
12. Explain why subtracting a negative number is the same as adding a positive number with an example.
13. Compare the following using < or >:
a) –10 ___ –15
b) +3 ___ –3
c) 0 ___ –7

Section D: Application (4 marks)
14. A bank account starts with ₹0. Credits: ₹50, ₹30. Debits: ₹20, ₹90. What is the final balance? Is it positive or negative?

WORKSHEET

Part 1: Fill in the Blanks

1. Numbers less than zero are called _____.
2. The sum of a number and its additive inverse is _____.
3. The floor just below ground is numbered _____.
4. In temperature, 0°C is the freezing point of _____.
5. On the number line, –6 is to the _____ of –3.

Part 2: Compute
6. (+12) + (–5) = _____
7. (–8) + (–6) = _____
8. (+10) – (+15) = _____
9. (–4) – (–9) = _____
10. 0 + (–12) = _____

Part 3: Word Problems
11. A lift starts at Floor 0. It goes down 3 floors, then up 7 floors. Where is it now?
12. The temperature at night was –5°C. By noon, it rose by 12°C. What is the new temperature?

Part 4: True or False
13. All negative numbers are less than zero.
14. (+3) – (–2) = +1
15. Zero has no additive inverse.

Unit Test Solutions

Section A

1. +8
2. Neither
3. –2
4. –2, –1, or 0 (any one)
5. Minus sign (–)

Section B
6. [Number line: –4 left of 0, +3 right of 0]
7. –2
8. –2
9. Floor +3
10. E.g., temperature of –5°C, basement floor, etc.

Section C
11. Draw 4 red (+) and 6 green (–) tokens → form 4 zero pairs → 2 green left → –2
12. Because subtracting a negative removes a debt or downward move. Example: 5 – (–3) = 5 + 3 = 8
13. a) > b) > c) >

Section D
14. Total = 0 + 50 + 30 – 20 – 90 = –30 → ₹(–30), negative balance

Worksheet Solutions

Part 1

1. negative numbers
2. 0
3. –1
4. water
5. left

Part 2
6. +7
7. –14
8. –5
9. +5
10. –12

Part 3
11. 0 – 3 + 7 = +4 → Floor +4
12. –5 + 12 = +7°C

Part 4
13. True
14. False (answer is +5)
15. False (inverse of 0 is 0)