

Case Study Worksheet

Chapter 10: The Other Side of Zero | Real-Life Case Studies

Name:	Class:	Section:
Date:	Roll No.:	Marks (out of 20):

Instructions: Read each case study carefully and answer the five questions that follow. Each question carries 2 marks. Show your working.

Case Study 1: Sneha's Day at the Mall

Sneha visited a large shopping mall in Delhi with her family. The mall has three basement levels for parking, a ground level, and four floors above it. The lift buttons show the levels as integers, with the ground level marked 0. The parking for her car was on Level -3 , the Play Zone is on Level -1 , the Food Court is on Level $+2$ and the Cinema is on Level $+4$.

Sneha parked the car, went up by lift to the Cinema, then to the Food Court after the movie, then to the Play Zone for her younger brother, and finally went back to the car.

- On which level was the car parked? Write the level as an integer.

- Write the movement (button press) needed to go from the parking level (-3) to the Cinema ($+4$) as an integer.

- After the movie, they went from the Cinema ($+4$) to the Food Court ($+2$). Find the movement using Target Level – Starting Level.

- From the Food Court ($+2$) they went to the Play Zone (-1). Find the movement and say whether the lift went up or down.

- Arrange the four levels – Parking, Play Zone, Food Court and Cinema – in ascending order of their level numbers.

Case Study 2: A Winter Day in Leh

Leh, in Ladakh, is one of the coldest inhabited places in India during winter. A school weather club noted the temperature at different times of a winter day. The readings (in $^{\circ}\text{C}$) are shown in the table below. The freezing point of water is 0°C .

Time	3 a.m.	6 a.m.	9 a.m.	12 noon	3 p.m.	9 p.m.
Temperature ($^{\circ}\text{C}$)	-11	-8	-3	+4	+6	-5

1. What was the lowest temperature of the day and at what time was it recorded?

2. Find the rise in temperature from 6 a.m. to 12 noon. (Use Target – Starting.)

3. Find the change in temperature from 3 p.m. to 9 p.m. Did it rise or fall?

4. At how many of the six times was the temperature below the freezing point of water?

5. Write the six temperatures in descending order (highest to lowest). Also find the difference between the highest and the lowest temperature.

Case Study 3: The Kirana Store Passbook

Mr. Sharma runs a small kirana (grocery) store in Jaipur. His bank passbook shows a 'credit' when money comes into his account and a 'debit' when money goes out. Credits are counted as positive numbers and debits as negative numbers. On Monday morning his opening balance was ₹2,000.

Day	Entry	Amount (₹)
Monday	Credit – sales deposited	+3,500
Tuesday	Debit – stock purchase	-4,200
Wednesday	Debit – shop rent	-1,800
Thursday	Credit – sales deposited	+2,500
Friday	Debit – electricity and phone bills	-1,250

- What was his balance at the end of Tuesday?

- What was his balance at the end of Wednesday? What does this balance tell you?

- Find the total of all credits and the total of all debits for the week.

- What was his closing balance on Friday? Check it using: Opening balance + Total credits – Total debits.

- The bank asks him to keep a minimum balance of ₹1,500. How much money must he deposit on Saturday to reach this amount?

Case Study 4: Sea Level Detectives

In geography, the height of any place is measured from sea level, which is taken as 0 m. Places above sea level are shown by positive numbers and places below sea level by negative numbers. A geography club collected these approximate heights.

Place	Height / depth from sea level (m)
Mount Everest (Himalayas)	+8,848
Mount Kilimanjaro (Africa)	+5,895

Place	Height / depth from sea level (m)
Death Valley (USA)	-86
Dead Sea shore (Jordan/Israel)	-430
Challenger Deep, Mariana Trench (Pacific Ocean)	-10,994

1. Which place in the table is the highest and which is the lowest?

2. Arrange the five places in descending order of their heights.

3. Find the difference in level between the top of Mount Everest and Challenger Deep.

4. How much higher is the top of Mount Kilimanjaro than the floor of Death Valley?

5. An aeroplane is flying at +10,000 m above sea level over the Dead Sea. How far is it above the Dead Sea shore?

Case Study 5: The School Football League

In the inter-school football league, teams are ranked by points and, when points are equal, by 'goal difference'. Goal difference = Goals scored – Goals conceded. A team that concedes more goals than it scores has a negative goal difference. The table shows the goals of five teams after the group stage.

Team	Goals scored	Goals conceded
Tigers	14	6
Hawks	12	8
Eagles	9	9
Lions	7	13
Sharks	4	11

- Find the goal difference of the Tigers and of the Lions.

- Which team has a goal difference of zero? What does this mean?

- Arrange the goal differences of all five teams from the highest to the lowest.

- Find the difference between the goal difference of the Tigers and that of the Sharks.

- In their next match the Lions score 5 goals and concede 2. Find their new total goal difference.

Case Study 6: Scuba Diving at Havelock Island

Rohit went scuba diving near Havelock Island in the Andaman Sea. His diving instructor recorded the depth of each stop of the dive. The surface of the sea is taken as 0 m and depths below the surface are negative numbers. The dive plan was: Boat (0 m) → Coral Garden (–8 m) → Shipwreck (–20 m) → Turtle Point (–12 m) → Safety Stop (–5 m) → Boat (0 m).

- Write the depths of the Coral Garden, the Shipwreck and the Turtle Point as integers. Which is the deepest?

2. Find the movement from the Coral Garden to the Shipwreck.

3. Find the movement from the Shipwreck to the Turtle Point. Is it upward or downward?

4. Find the total upward movement from the Shipwreck to the surface, going through the Turtle Point and the Safety Stop.

5. Find the total vertical distance covered by Rohit in the whole dive, from the first dive to the boat, i.e., Boat → Coral Garden → Shipwreck → Turtle Point → Safety Stop → Boat.

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ANSWER KEY – Case Study Worksheet**Case Study 1: Sneha's Day at the Mall**

1. Level -3 (three levels below the ground).
2. $(+4) - (-3) = (+4) + (+3) = +7$. The lift moves 7 levels up.
3. $(+2) - (+4) = -2$. The lift moves 2 levels down.
4. $(-1) - (+2) = -3$. The lift moves 3 levels down.
5. -3 (Parking) < -1 (Play Zone) $< +2$ (Food Court) $< +4$ (Cinema).

Case Study 2: A Winter Day in Leh

1. -11°C at 3 a.m.
2. $(+4) - (-8) = (+4) + (+8) = +12$. The temperature rose by 12°C .
3. $(-5) - (+6) = -11$. It fell by 11°C .
4. 4 times (3 a.m., 6 a.m., 9 a.m. and 9 p.m.) because -11 , -8 , -3 and -5 are below 0.
5. $+6$, $+4$, -3 , -5 , -8 , -11 . Difference $= (+6) - (-11) = 6 + 11 = 17^{\circ}\text{C}$.

Case Study 3: The Kirana Store Passbook

1. $2000 + 3500 = 5500$; then $5500 - 4200 = ₹1,300$.
2. $1300 - 1800 = -₹500$. The account is overdrawn (negative) by ₹500.
3. Credits $= 3500 + 2500 = ₹6,000$. Debits $= 4200 + 1800 + 1250 = ₹7,250$.
4. After Thursday: $-500 + 2500 = ₹2,000$. After Friday: $2000 - 1250 = ₹750$. Check: $2000 + 6000 - 7250 = ₹750$.
5. $1500 - 750 = ₹750$ must be deposited.

Case Study 4: Sea Level Detectives

1. Highest: Mount Everest ($+8,848$ m). Lowest: Challenger Deep ($-10,994$ m).
2. Everest ($+8,848$), Kilimanjaro ($+5,895$), Death Valley (-86), Dead Sea shore (-430), Challenger Deep ($-10,994$).
3. $(+8848) - (-10994) = 8848 + 10994 = 19,842$ m.
4. $(+5895) - (-86) = 5895 + 86 = 5,981$ m.
5. $(+10000) - (-430) = 10000 + 430 = 10,430$ m.

Case Study 5: The School Football League

1. Tigers: $14 - 6 = +8$. Lions: $7 - 13 = -6$.
2. Eagles ($9 - 9 = 0$). It means they scored exactly as many goals as they conceded.
3. Tigers $+8$, Hawks $+4$ ($12 - 8$), Eagles 0 , Lions -6 , Sharks -7 ($4 - 11$). Order: $+8 > +4 > 0 > -6 > -7$.
4. $(+8) - (-7) = 8 + 7 = 15$.
5. New goals: scored $7 + 5 = 12$, conceded $13 + 2 = 15$. New goal difference $= 12 - 15 = -3$.

Case Study 6: Scuba Diving at Havelock Island

1. Coral Garden $= -8$, Shipwreck $= -20$, Turtle Point $= -12$. The Shipwreck (-20 m) is the deepest.
2. $(-20) - (-8) = -12$. He moves 12 m downward.
3. $(-12) - (-20) = +8$. It is an upward movement of 8 m.
4. Shipwreck to Turtle Point $+8$, then to Safety Stop $(-5) - (-12) = +7$, then to the surface $0 - (-5) = +5$. Total $= 8 + 7 + 5 = +20$ m (same as $0 - (-20)$).
5. Distances: $8 + 12 + 8 + 7 + 5 = 40$ m. (Boat $\rightarrow$ Coral Garden 8 m; $\rightarrow$ Shipwreck 12 m; $\rightarrow$ Turtle Point 8 m; $\rightarrow$ Safety Stop 7 m; $\rightarrow$ Boat 5 m.)