## Case Study 3

Arjun is a Class 7 student who lives in a city where an underground metro system is used for daily travel. As part of a school project, Arjun observed how integers are used to represent positions above and below ground level. One morning, Arjun boarded the metro from an underground station that was at a level of $-12$ metres below the ground. The metro first moved up by 7 metres to reach another station. Later, it moved further up by 10 metres to reach an elevated platform.

In the afternoon, Arjun helped his uncle manage a parking garage in a shopping mall. Cars entering the garage were counted as positive numbers, while cars leaving were counted as negative numbers. During one hour, 35 cars entered the garage, but 48 cars left. Arjun recorded this change using integers.

In the evening, Arjun played an online quiz game. He earned 18 points for correct answers, lost 25 points due to wrong answers, and then earned 14 more points in the final round. By adding and subtracting integers, Arjun calculated his final score easily. Through travel, daily work, and games, Arjun clearly understood how integers represent increase, decrease, gain, loss, and movement in real-life situations.

## Questions

1. What was the level of the metro station after the first upward movement?

    (a) (A) $-19$ m
    (b) (B) $-5$ m
    (c) (C) 5 m
    (d) (D) 19 m

2. What was the final level of the metro after the second upward movement?

    (a) (A) $-15$ m
    (b) (B) $-5$ m
    (c) (C) 5 m
    (d) (D) 15 m

3. What integer represents the net change in the number of cars in the garage?

    (a) (A) $+83$
    (b) (B) $-83$
    (c) (C) $+13$
    (d) (D) $-13$

4. What was Arjun's final score in the quiz game?

    (a) (A) 7
    (b) (B) $-7$
    (c) (C) 11
    (d) (D) $-11$

5. Which integer correctly represents the movement from the first station to the elevated platform?

    (a) (A) $-10$

    (b) (B) $+7$

    (c) (C) $+10$

    (d) (D) $-7$

## Answer Key

- Q1: (B)

- Q2: (C)

- Q3: (D)

- Q4: (A)

- Q5: (C)

## Solutions

1. Initial level $= -12$ m. Upward movement $= +7$ m.

$$-12 + 7 = -5$$

   The new level of the station was $-5$ metres.

2. Level after first movement $= -5$ m. Second upward movement $= +10$ m.

$$-5 + 10 = 5$$

   The final level of the metro was 5 metres above ground.

3. Cars entered $= +35$, cars left $= -48$.

$$35 + (-48) = -13$$

   The net change was a decrease of 13 cars.

4. Points earned $= +18$, points lost $= -25$, points earned again $= +14$.

$$18 + (-25) + 14 = 7$$

   Arjun's final score was 7 points.

5. The movement from the first station to the elevated platform was an upward movement of 10 metres. Upward movement is represented by a positive integer, so the correct integer is $+10$.