# Case Study 1

The Municipal Corporation of a growing city has decided to renovate a local community park to make it more functional for residents. The park is currently a large rectangular plot of land measuring 120 meters in length and 80 meters in breadth. According to the new architectural plan, a 5-meter wide jogging track will be constructed inside the park along its entire boundary. The remaining area inside the jogging track will be divided into two distinct sections. One section will be a square-shaped yoga platform with a side length of 20 meters, and the other section will be developed into a lush green lawn.

To enhance the aesthetics, the authorities plan to install a decorative fence around the outer boundary of the entire park. Additionally, a circular fountain will be placed at the center of the yoga platform. The radius of this circular fountain is 7 meters. The cost of laying the grass for the lawn is estimated at Rs 50 per square meter, while the cost of fencing the outer boundary is Rs 150 per meter. The project manager needs to calculate various measurements to estimate the total budget required for materials and labor.

1. What is the total length of the decorative fence required to cover the outer boundary of the rectangular park?

   (a) 200 meters
   (b) 400 meters
   (c) 600 meters
   (d) 480 meters

   **Answer:** (b) 400 meters
   **Solution:** The length of the fence is equal to the perimeter of the rectangular park. Perimeter $= 2 \times (\text{length} + \text{breadth})$. Perimeter $= 2 \times (120 + 80) = 2 \times 200 = 400$ meters.

2. Calculate the area of the jogging track constructed inside the park boundary.

   (a) 1900 square meters
   (b) 2000 square meters
   (c) 1500 square meters
   (d) 1800 square meters

   **Answer:** (a) 1900 square meters
   **Solution:** Inner length $= 120 - (5 + 5) = 110$ m. Inner breadth $= 80 - (5 + 5) = 70$ m. Area of outer rectangle $= 120 \times 80 = 9600$ sq m. Area of inner rectangle $= 110 \times 70 = 7700$ sq m. Area of track $= 9600 - 7700 = 1900$ sq m.

3. What is the area of the green lawn section (excluding the yoga platform)?

   (a) 7300 square meters
   (b) 7700 square meters
   (c) 7500 square meters
   (d) 8000 square meters

   **Answer:** (a) 7300 square meters
   **Solution:** The area available inside the track is 7700 sq m. Area of the square yoga platform $= \text{side} \times \text{side} = 20 \times 20 = 400$ sq m. Area of lawn $=$ Inner Area - Area of yoga platform $= 7700 - 400 = 7300$ sq m.

4. If the circular fountain is placed on the yoga platform, what is the area of the fountain? (Use $\pi = \frac{22}{7}$)

   (a) 44 square meters

   (b) 154 square meters

   (c) 144 square meters

   (d) 132 square meters

   **Answer:** (b) 154 square meters
   **Solution:** Area of a circle $= \pi r^2$. Given $r = 7$ m. Area $= \frac{22}{7} \times 7 \times 7 = 154$ sq m.

5. What is the total cost of laying grass on the lawn at the rate of Rs 50 per square meter?

   (a) Rs 3,65,000

   (b) Rs 3,85,000

   (c) Rs 4,00,000

   (d) Rs 3,50,000

   **Answer:** (a) Rs 3,65,000
   **Solution:** Area of the lawn $= 7300$ sq m. Cost $=$ Area $\times$ Rate $= 7300 \times 50 = 3,65,000$.