Overlapping Area and Perimeter Solutions

1. Two identical cards, measuring 16 cm by 8 cm were placed such that the midpoints of their breadths meet each other at point C. Find the area of the shaded region.

   \[8 \div 2 = 4\]
   \[4 \times 16 = 64 \text{ cm}^2 (\text{Ans})\]

2. The figure below is made up of two identical right-angled triangles overlapping each other. Find the area of the shaded region.

   \[15 - 6 = 9\]
   \[9 \times 9 + \frac{1}{2} \times 9 \times 6 = 81 + 27 = 108 \text{ cm}^2 (\text{Ans})\]
3. In the figure below, Point R is the centre of the big rectangle. Find the difference between the area of the shaded region and the area of the unshaded region.

Difference between shaded and unshaded
= Region (1 + 2 + 3 + 4 + 5 – A – B – C – D)

(1-C) = (3 – B) = (4 – A) = (5 – D) = 0

Difference between shaded and unshaded
= Region 2 = (14 + 14) × (5 + 5) = 280 cm² (Ans)
4. The figure below is made up of two overlapping rectangles. \( \frac{3}{20} \) of the bigger rectangle and \( \frac{4}{7} \) of the smaller rectangle is shaded.

a) What fraction of the figure is unshaded?
b) If the difference between the area of the shaded and the area of the unshaded region is 130 cm\(^2\), find the area of the shaded region.

\[ \begin{align*}
\ \text{a)} \quad & \frac{3}{20} = \frac{12}{80} \\
\ \text{b)} \quad & \frac{4}{7} = \frac{12}{21} \\
\ \text{c)} \quad & 80 - 12 = 68 \\
\ \text{d)} \quad & 21 - 12 = 9 \\
\ \text{e)} \quad & 68 + 9 = 77 \text{ (unshaded region)} \\
\ \text{f)} \quad & 68 + 9 + 12 = 89 \text{ (total figure)} \\
\ \text{g)} \quad & \text{Unshaded fraction} = \frac{77}{89} \\
\ \text{h)} \quad & 77 - 12 = 65 \text{ (difference)} \\
\ \text{i)} \quad & 65 \text{ units} = 130 \text{ cm}^2 \\
\ \text{j)} \quad & 1 \text{ unit} = 2 \text{ cm}^2 \\
\ \text{k)} \quad & 12 \text{ units} = 24 \text{ cm}^2 (\text{Ans})
\end{align*} \]
5. In the figure below, two identical right-angled triangles overlapped each other as shown. Find the area of the shaded region.

\[ 30 - 21 = 9 \]

\[ 21 \times 4 + \frac{1}{2} \times 9 \times 4 = 84 + 18 = 102 \text{ cm}^2 \text{ (Ans)} \]

6. Find the perimeter of the figure shown below.

\[ 26 + 26 + 15 + 10 + 15 + 10 = 72 \text{ cm} \]
7. The figure below is made up of four identical squares. AB is a straight line of 27 cm. Find the perimeter of the figure.

After shifting the square to the left,
new AB length = 27 + 3 = 30 cm = lengths of 3 squares
Length of each square = 30 ÷ 3 = 10
10 – 3 = 7

Shifting the square to the right,
Perimeter = 10 × 10 + 7 + 7 = 114 cm (Ans)
8. The figure below is made up of a rectangle, measuring 12 cm by 7 cm, overlapping a triangle as shown. The triangle has a base of 18 cm. The total area of the figure is 74 cm². Find the area of the shaded region.

\[
\begin{align*}
12 \times 7 &= 84 \text{ cm}^2 \\
\frac{1}{2} \times 18 \times 7 &= 63 \text{ cm}^2 \\
84 + 63 &= 147 \\
147 - 74 &= 73 \text{ cm}^2 \text{ (Ans)}
\end{align*}
\]

9. The figure below is made up one big triangle and two smaller identical triangles. The big triangle has a base of 8 cm and a height of 17 cm. The unshaded region overlapped by the two smaller triangles has an area of 16 cm². If each of the smaller triangle has a base of 14 cm and a height of 5 cm, find the area of the unshaded region.

\[
\begin{align*}
\text{Area of 2 Smaller triangles} &= 14 \times 5 = 70 \text{ cm}^2 \\
\text{Area of Shaded region} &= 70 - 16 - 16 = 38 \text{ cm}^2 \\
\text{Area of Big triangle} &= \frac{1}{2} \times 8 \times 17 = 72 \text{ cm}^2 \\
\text{Area of Unshaded region} &= 72 - 38 = 34 \text{ cm}^2
\end{align*}
\]
10. In the figure below, two identical rectangles, each measuring 18 cm by 10 cm, overlapped to form the shaded region. If the perimeter of the shaded region is 23 cm, find the perimeter of the figure.

Perimeter of one rectangle = 18 + 10 + 18 + 10 = 56 cm
Perimeter of 2 rectangles = 56 × 2 = 112 cm
Perimeter of figure = 112 − 23 = 89 cm (Ans)