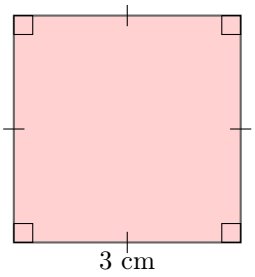
AREA FORMULAS

A AREA OF A RECTANGLE OR A SQUARE

A.1 FINDING AREAS OF SQUARES AND RECTANGLES

Ex 1: What is the area of the red square?



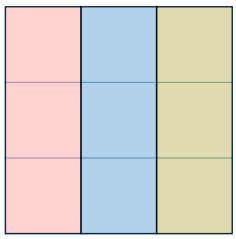
$\boxed{9}$ cm^2

Answer:

- **Method 1: Use the formula**

$$\begin{aligned}\text{Area} &= s \times s \\ &= 3 \times 3 \\ &= 9\,\text{cm}^2\end{aligned}$$

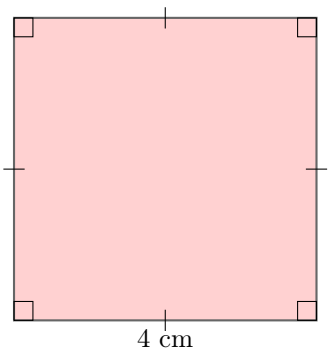
- **Method 2: Count the number of unit squares in each column**



$3 + 3 + 3$

$$\begin{aligned}\text{Area} &= 3+3+3 \\ &= 3 \times 3 \\ &= 9\,\text{cm}^2\end{aligned}$$

Ex 2: What is the area of the red square?



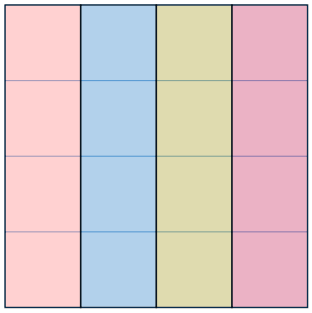
$\boxed{16}$ cm^2

Answer:

- **Method 1: Use the formula**

$$\begin{aligned}\text{Area} &= s \times s \\ &= 4 \times 4 \\ &= 16\,\text{cm}^2\end{aligned}$$

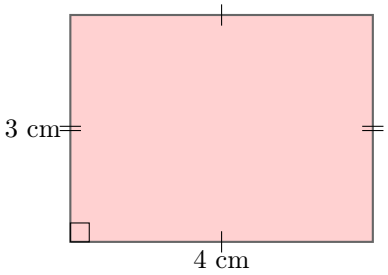
- **Method 2: Count the number of unit squares in each column**



$4 + 4 + 4 + 4$

$$\begin{aligned}\text{Area} &= 4+4+4+4 \\ &= 4 \times 4 \\ &= 16\,\text{cm}^2\end{aligned}$$

Ex 3: What is the area of the red rectangle?



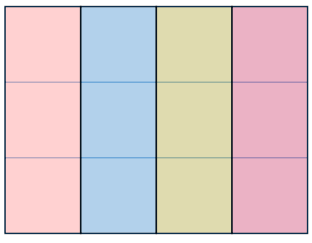
$\boxed{12}$ cm^2

Answer:

- **Method 1: Use the formula**

$$\begin{aligned}\text{Area} &= l \times w \\ &= 4 \times 3 \\ &= 12\,\text{cm}^2\end{aligned}$$

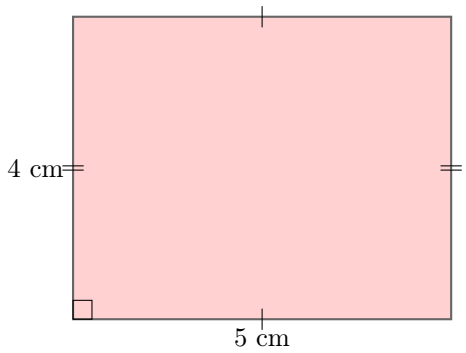
- **Method 2: Count the number of unit squares in each column**



$3 + 3 + 3 + 3$

$$\begin{aligned}\text{Area} &= 3+3+3+3 \\ &= 4 \times 3 \\ &= 12\,\text{cm}^2\end{aligned}$$

Ex 4: What is the area of the red rectangle?



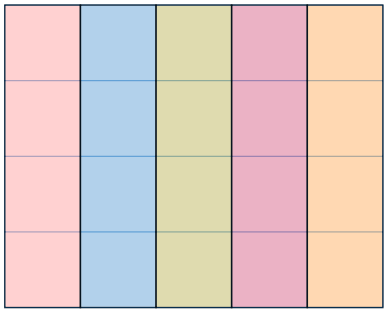
$\boxed{20}$ cm^2

Answer:

- **Method 1: Use the formula**

$$\begin{aligned}\text{Area} &= l \times w \\ &= 5 \times 4 \\ &= 20\,\text{cm}^2\end{aligned}$$

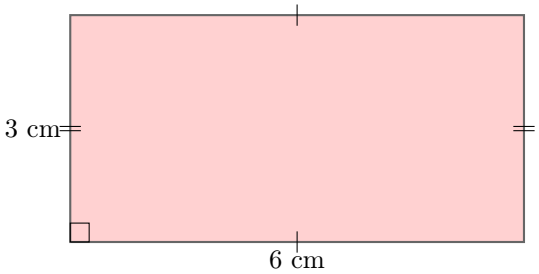
- **Method 2: Count the number of unit squares in each column**



$4 + 4 + 4 + 4 + 4$

$$\begin{aligned}\text{Area} &= 4+4+4+4+4 \\ &= 5 \times 4 \\ &= 20\,\text{cm}^2\end{aligned}$$

Ex 5: What is the area of the red rectangle?



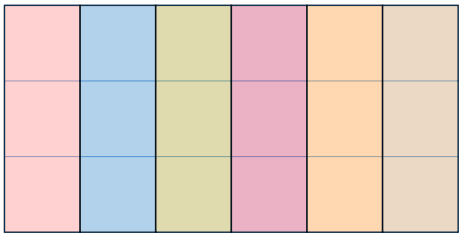
$\boxed{18}$ cm^2

Answer:

- **Method 1: Use the formula**

$$\begin{aligned}\text{Area} &= l \times w \\ &= 6 \times 3 \\ &= 18\,\text{cm}^2\end{aligned}$$

- **Method 2: Count the number of unit squares in each column**



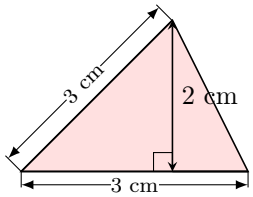
$3 + 3 + 3 + 3 + 3 + 3$

$$\begin{aligned}\text{Area} &= 3+3+3+3+3+3 \\ &= 6 \times 3 \\ &= 18\,\text{cm}^2\end{aligned}$$

B AREA OF A TRIANGLE

B.1 FINDING AREAS OF TRIANGLES

Ex 6: Find the area of the figure

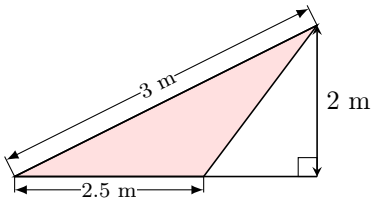


$A = \boxed{3}$ cm^2

Answer:

$$\begin{aligned}A &= \frac{b \times h}{2} \\ &= \frac{3\text{ cm} \times 2\text{ cm}}{2} \\ &= 3\text{ cm}^2\end{aligned}$$

Ex 7: Find the area of the figure

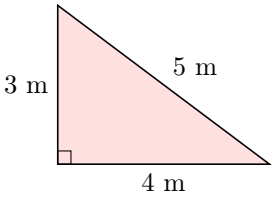


$A = \boxed{2.5}$ m^2

Answer:

$$\begin{aligned}A &= \frac{b \times h}{2} \\ &= \frac{2.5\text{ m} \times 2\text{ m}}{2} \\ &= 2.5\text{ m}^2\end{aligned}$$

Ex 8: Find the area of the figure

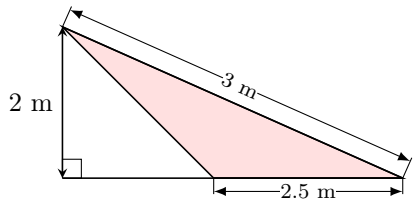


$A =$ 6 m^2

Answer:

$$A = \frac{b \times h}{2}$$
$$= \frac{4\text{ m} \times 3\text{ m}}{2}$$
$$= 6\text{ m}^2$$

Ex 9: Find the area of the figure

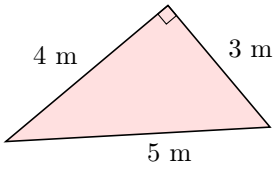


$A =$ 2.5 m^2

Answer:

$$A = \frac{b \times h}{2}$$
$$= \frac{2.5\text{ m} \times 2\text{ m}}{2}$$
$$= 2.5\text{ m}^2$$

Ex 10: Find the area of the figure



$A =$ 6 m^2

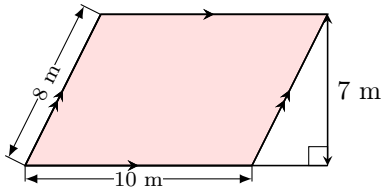
Answer:

$$A = \frac{b \times h}{2}$$
$$= \frac{4\text{ m} \times 3\text{ m}}{2}$$
$$= 6\text{ m}^2$$

C AREA OF A PARALLELOGRAM

C.1 FINDING AREAS OF PARALLELOGRAMS

Ex 11: Find the area of the figure

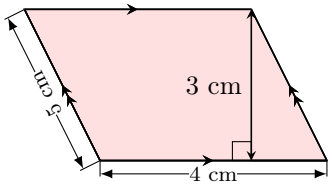


$A =$ 70 m^2

Answer:

$$A = b \times h$$
$$= 10\text{ m} \times 7\text{ m}$$
$$= 70\text{ m}^2$$

Ex 12: Find the area of the figure

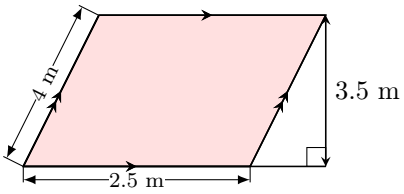


$A =$ 12 cm^2

Answer:

$$A = b \times h$$
$$= 4\text{ cm} \times 3\text{ cm}$$
$$= 12\text{ cm}^2$$

Ex 13: Find the area of the figure.

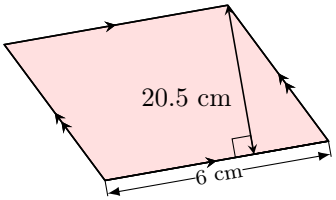


$A =$ 8.75 m^2

Answer:

$$A = b \times h$$
$$= 2.5\text{ m} \times 3.5\text{ m}$$
$$= 8.75\text{ m}^2$$

Ex 14: Find the area of the figure.



$A =$ 123 cm^2

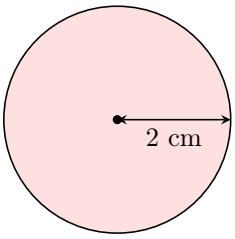
Answer:

$$A = b \times h$$
$$= 6\text{ cm} \times 20.5\text{ cm}$$
$$= 123\text{ cm}^2$$

D AREA OF A CIRCLE

D.1 FINDING AREAS OF CIRCLES

Ex 15: Find the area of the figure (round to 1 decimal place)

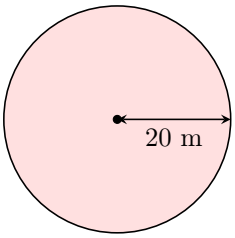


$A \approx \boxed{12.6}$ cm^2

Answer:

$$\begin{aligned} A &= \pi \times r \times r \\ &= \pi \times 2 \text{ cm} \times 2 \text{ cm} \\ &= 12.56637... \text{ cm}^2 \\ &\approx 12.6 \text{ cm}^2 \end{aligned}$$

Ex 16: Find the area of the figure (round to 1 decimal place)

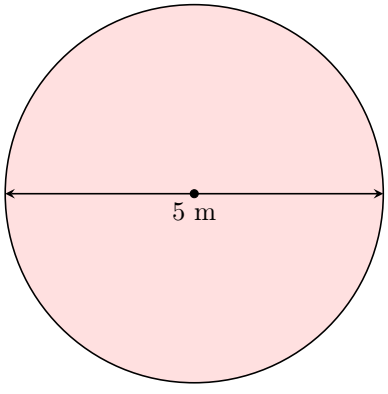


$A \approx \boxed{1256.6}$ m^2

Answer:

$$\begin{aligned} A &= \pi \times r \times r \\ &= \pi \times 20 \text{ m} \times 20 \text{ m} \\ &= 1256.63706... \text{ m}^2 \\ &\approx 1256.6 \text{ m}^2 \end{aligned}$$

Ex 17: Find the area of the figure (round to 1 decimal place)



$A \approx \boxed{19.6}$ m^2

Answer:

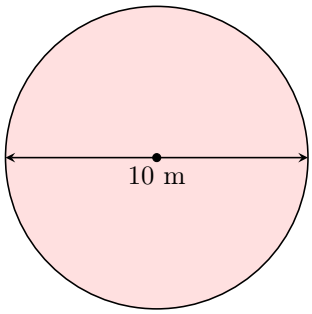
- The radius is half of the diameter.

$$\begin{aligned} r &= \frac{d}{2} \\ &= \frac{5}{2} \\ &= 2.5 \text{ m} \end{aligned}$$

- The area of the circle is

$$\begin{aligned} A &= \pi \times r \times r \\ &= \pi \times 2.5 \times 2.5 \\ &\approx 19.6 \text{ m}^2 \end{aligned}$$

Ex 18: Find the area of the figure (round to 1 decimal place)



$A \approx \boxed{78.5}$ m^2

Answer:

- The radius is half of the diameter.

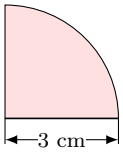
$$\begin{aligned} r &= \frac{d}{2} \\ &= \frac{10}{2} \\ &= 5 \text{ m} \end{aligned}$$

- The area of the circle is

$$\begin{aligned} A &= \pi \times r \times r \\ &= \pi \times 5 \times 5 \\ &\approx 78.5 \text{ m}^2 \end{aligned}$$

D.2 FINDING AREA OF CIRCULAR SECTORS

Ex 19: Find the area of the quarter circle: (Round to 1 decimal place)

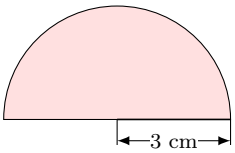


$$A = \boxed{7.1} \text{ cm}^2$$

Answer: The area of the quarter circle is:

$$\begin{aligned} A &= \frac{\text{angle}}{360} \times \pi \times \text{radius} \times \text{radius} \\ &= \frac{90}{360} \times \pi \times 3^2 \\ &= \frac{1}{4} \times \pi \times 9 \\ &\approx 7.1\,\text{cm}^2 \quad \text{(rounded to 1 decimal place)} \end{aligned}$$

Ex 20: Find the area of the half circle: (Round to 1 decimal place)

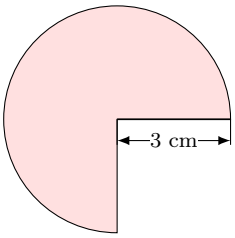


$$A = \boxed{14.1} \text{ cm}^2$$

Answer: The area of the half circle is:

$$\begin{aligned} A &= \frac{\text{angle}}{360} \times \pi \times \text{radius} \times \text{radius} \\ &= \frac{180}{360} \times \pi \times 3^2 \\ &= \frac{1}{2} \times \pi \times 9 \\ &\approx 14.1\,\text{cm}^2 \quad \text{(rounded to 1 decimal place)} \end{aligned}$$

Ex 21: Find the area of the three-quarter circle: (Round to 1 decimal place)

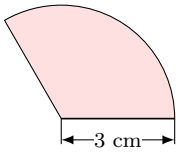


$$A = \boxed{21.2} \text{ cm}^2$$

Answer: The area of the three-quarter circle is:

$$\begin{aligned} A &= \frac{\text{angle}}{360} \times \pi \times \text{radius} \times \text{radius} \\ &= \frac{270}{360} \times \pi \times 3^2 \\ &= \frac{3}{4} \times \pi \times 9 \\ &\approx 21.2\,\text{cm}^2 \quad \text{(rounded to 1 decimal place)} \end{aligned}$$

Ex 22: Find the area of the one-third circle: (Round to 1 decimal place)



$$A = \boxed{9.4} \text{ cm}^2$$

Answer: The area of the one-third circle is:

$$\begin{aligned} A &= \frac{\text{angle}}{360} \times \pi \times \text{radius} \times \text{radius} \\ &= \frac{120}{360} \times \pi \times 3^2 \\ &= \frac{1}{3} \times \pi \times 9 \\ &\approx 9.4\,\text{cm}^2 \quad \text{(rounded to 1 decimal place)} \end{aligned}$$

E AREA FORMULAS

E.1 SOLVING PROBLEMS

Ex 23: A rectangular terrace is 8 m long and 5 m wide. The tiling costs 20 dollars per square meter.
What is the area of the terrace?

$$\boxed{40} \text{ m}^2$$

What is the cost to tile the terrace?

$$\boxed{800} \text{ dollars}$$

Answer:

- The area of the rectangular terrace is:

$$\begin{aligned} A &= \text{length} \times \text{width} \\ &= 8\,\text{m} \times 5\,\text{m} \\ &= 40\,\text{m}^2 \end{aligned}$$

- The cost to tile the terrace is calculated by:

$$\begin{aligned} \text{Cost} &= \text{Area} \times \text{cost per m}^2 \\ &= 40\,\text{m}^2 \times 20\,\text{dollars per m}^2 \\ &= 800\,\text{dollars} \end{aligned}$$

Ex 24: A triangular garden has a base of 12 m and a height of 8 m. The cost to plant grass is 5 dollars per square meter.
What is the area of the garden?

$$\boxed{48} \text{ m}^2$$

What is the cost to plant grass in the garden?

$$\boxed{240} \text{ dollars}$$

Answer:

- The area of the triangular garden is:

$$\begin{aligned} A &= \frac{\text{base} \times \text{height}}{2} \\ &= \frac{12\,\text{m} \times 8\,\text{m}}{2} \\ &= 48\,\text{m}^2 \end{aligned}$$

- The cost to plant grass in the garden is calculated by:

$$\begin{aligned}\text{Cost} &= \text{Area} \times \text{cost per m}^2 \\ &= 48\,\text{m}^2 \times 5\,\text{dollars per m}^2 \\ &= 240\,\text{dollars}\end{aligned}$$

Ex 25: A rectangular wall is 8 m long and 5 m high. The cost to paint the wall is 20 dollars per square meter.
What is the area of the wall?

$\boxed{40}$ m^2

What is the cost to paint the wall?

$\boxed{800}$ dollars

Answer:

- The area of the rectangular wall is:

$$\begin{aligned}A &= \text{length} \times \text{height} \\ &= 8\,\text{m} \times 5\,\text{m} \\ &= 40\,\text{m}^2\end{aligned}$$

- The cost to paint the wall is calculated by:

$$\begin{aligned}\text{Cost} &= \text{Area} \times \text{cost per m}^2 \\ &= 40\,\text{m}^2 \times 20\,\text{dollars per m}^2 \\ &= 800\,\text{dollars}\end{aligned}$$

Ex 26: A triangular roof has a base of 10 m and a height of 6 m. The cost to cover the roof with wood is 15 dollars per square meter.
What is the area of the roof?

$\boxed{30}$ m^2

What is the cost to cover the roof with wood?

$\boxed{450}$ dollars

Answer:

- The area of the triangular roof is:

$$\begin{aligned}A &= \frac{\text{base} \times \text{height}}{2} \\ &= \frac{10\,\text{m} \times 6\,\text{m}}{2} \\ &= 30\,\text{m}^2\end{aligned}$$

- The cost to cover the roof with wood is calculated by:

$$\begin{aligned}\text{Cost} &= \text{Area} \times \text{cost per m}^2 \\ &= 30\,\text{m}^2 \times 15\,\text{dollars per m}^2 \\ &= 450\,\text{dollars}\end{aligned}$$

Ex 27: A circular garden has a radius of 4 m. The cost to plant flowers is 10 dollars per square meter.
What is the area of the garden? (Round to the nearest integer)

$\boxed{50}$ m^2

What is the cost to plant flowers in the garden? (Round to the nearest tenth)

$\boxed{500}$ dollars

Answer:

- The area of the circular garden is:

$$\begin{aligned}A &= \pi \times \text{radius} \times \text{radius} \\ &= \pi \times 4\,\text{m} \times 4\,\text{m} \\ &= 16\pi\,\text{m}^2 \\ &\approx 50.27\,\text{m}^2 \\ &\approx 50\,\text{m}^2 \quad \text{(rounded to the nearest integer)}\end{aligned}$$

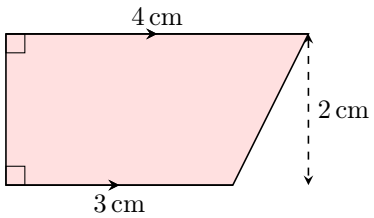
- The cost to plant flowers in the garden is calculated using the exact area:

$$\begin{aligned}\text{Cost} &= \text{Area} \times \text{cost per m}^2 \\ &= 16\pi\,\text{m}^2 \times 10\,\text{dollars per m}^2 \\ &\approx 502.65\,\text{dollars} \\ &\approx 500\,\text{dollars} \quad \text{(rounded to the nearest tenth)}\end{aligned}$$

F AREA OF COMPOSITE FIGURES

F.1 FINDING AREAS OF COMPOSITE FIGURES

Ex 28: Find the area of the figure:

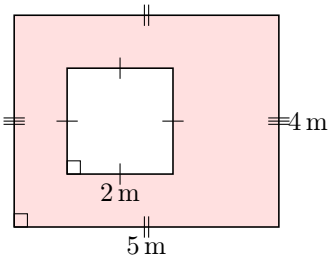


$A = \boxed{7}$ cm^2

Answer: The area of the figure is calculated by subtracting the area of the triangle from the area of the rectangle:

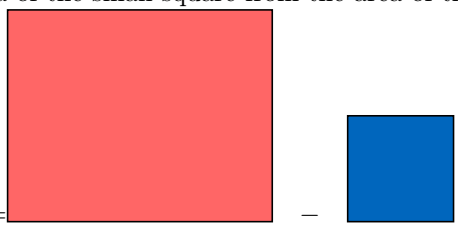
$$\begin{aligned}A &= \text{area of rectangle} - \text{area of triangle} \\ &= (4 \times 2) - \frac{1 \times 2}{2} \\ &= 8 - 1 \\ &= 7\,\text{cm}^2\end{aligned}$$

Ex 29: Find the area of the figure:



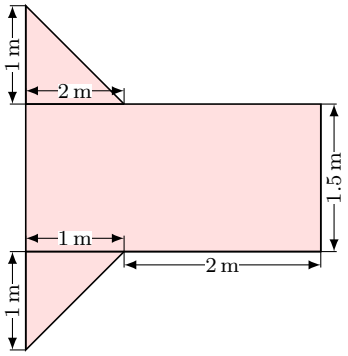
$A =$ 16 m^2

Answer: The area of the figure is calculated by subtracting the area of the small square from the area of the large rectangle:

$A =$  $-$

$$\begin{aligned} A &= \text{area of large rectangle} - \text{area of small square} \\ &= (5 \times 4) - (2 \times 2) \\ &= 20 - 4 \\ &= 16\,\text{m}^2 \end{aligned}$$

Ex 30: Find the area of the figure:

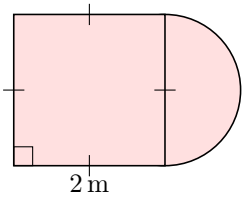


$A =$ 4 m^2

Answer: The area of the figure is calculated by adding the area of the rectangle and the areas of the two triangles:

$$\begin{aligned} A &= \text{area of rectangle} + 2 \times \text{area of triangle} \\ &= (2 \times 1.5) + 2 \times \frac{1 \times 1}{2} \\ &= 3 + 1 \\ &= 4\,\text{m}^2 \end{aligned}$$

Ex 31: Calculate the area of the figure:

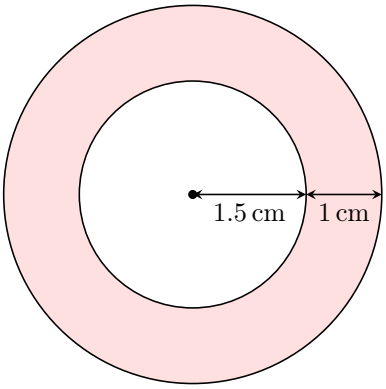


$A =$ 5.57 m^2 (round to 2 decimal places)

Answer: The area of the figure is calculated by adding the area of the square and the area of the semi-circle:

$$\begin{aligned} A &= \text{area of square} + \text{area of semi-circle} \\ &= (2 \times 2) + \frac{1}{2} \times \pi \times 1 \times 1 \\ &\approx 5.57\,\text{m}^2 \end{aligned}$$

Ex 32: Calculate the area of the figure: (Round to 2 decimal places)

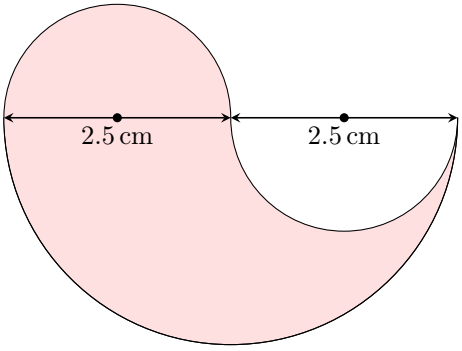


$A =$ 12.56 cm^2

Answer: The area of the figure is calculated by subtracting the area of the small circle from the area of the large circle:

$$\begin{aligned} A &= \text{area of large circle} - \text{area of small circle} \\ &= (\pi \times 2.5 \times 2.5) - (\pi \times 1.5 \times 1.5) \\ &= 6.25\pi - 2.25\pi \\ &= 4\pi \\ &\approx 12.56\,\text{cm}^2 \quad \text{(rounded to 2 decimal places)} \end{aligned}$$

Ex 33: Calculate the area of the figure: (Round to 2 decimal places)



$A =$ 9.82 cm^2

Answer: The area of the figure is the area of the large semi-circle (since the small semi-circles cancel each other out):

$$\begin{aligned} A &= \text{area of large semi-circle} - \text{area of small semi-circle} + \text{area of sm} \\ &= \text{area of large semi-circle} \\ &= \frac{1}{2} \times \pi \times 2.5 \times 2.5 \\ &\approx 9.82\,\text{cm}^2 \quad \text{(rounded to 2 decimal places)} \end{aligned}$$