

AREA

A AREA UNITS

A.1 APPROPRIATE UNITS

MCQ 1: Choose the most appropriate unit of measure for the area of a bedroom.

- Square Meter
- Square Kilometer
- Square Centimeter

Solution: Since we measure the dimensions of the bedroom in meters, the most appropriate unit for the area is Square Meter.

MCQ 2: Choose the most appropriate unit of measure for the area of Hawaii Island.

- Square Meter
- Square Kilometer
- Square Centimeter

Solution: Since the area of Hawaii Island is very large, the most appropriate unit for the area is Square Kilometer. Hawaii Island has an area of approximately 10,432 square kilometers.

MCQ 3: Choose the most appropriate unit of measure for the area of a postage stamp.

- Square Meter
- Square Kilometer
- Square Centimeter

Solution: Since the dimensions of a postage stamp are very small, the most appropriate unit for the area is Square Centimeter. A typical postage stamp has an area of approximately 5 square centimeters.

MCQ 4: Choose the most appropriate unit of measure for the area of a classroom wall.

- Square Meter
- Square Kilometer
- Square Centimeter

Solution: Since we measure the dimensions of a classroom wall in meters, the most appropriate unit for the area is Square Meter. A typical classroom wall has an area of approximately 30 square meters.

A.2 CONVERTING

Ex 5: $24.5 \text{ m}^2 = \boxed{245000} \text{ cm}^2$

Solution:

- *Solution 1:*

$$\begin{aligned} 24.5 \text{ m}^2 &= 24.5 \times 10\,000 \text{ cm}^2 \\ &= 245\,000 \text{ cm}^2 \end{aligned}$$

- *Solution 2:*

km ²		ha		m ²		cm ²		mm ²	
				2	4.	5	0	0	0

$$24.5 \text{ m}^2 = 245\,000 \text{ cm}^2$$

Ex 6: $5\,000 \text{ cm}^2 = \boxed{0.5} \text{ m}^2$

Solution:

- *Solution 1:*

$$\begin{aligned} 5\,000 \text{ cm}^2 &= 5\,000 \div 10\,000 \text{ m}^2 \\ &= 0.5 \text{ m}^2 \end{aligned}$$

- *Solution 2:*

km ²		ha		m ²		cm ²		mm ²	
					0.	5	0	0	0

$$5\,000 \text{ cm}^2 = 0.5 \text{ m}^2$$

Ex 7: $0.25 \text{ cm}^2 = \boxed{25} \text{ mm}^2$

Solution:

- *Solution 1:*

$$\begin{aligned} 0.25 \text{ cm}^2 &= 0.25 \times 100 \text{ mm}^2 \\ &= 25 \text{ mm}^2 \end{aligned}$$

- *Solution 2:*

km ²		ha		m ²		cm ²		mm ²	
							0.		5

$$0.25 \text{ cm}^2 = 25 \text{ mm}^2$$

Ex 8: $534 \text{ mm}^2 = \boxed{5.34} \text{ cm}^2$

Solution:

- *Solution 1:*

$$\begin{aligned} 534 \text{ mm}^2 &= 534 \div 100 \text{ cm}^2 \\ &= 5.34 \text{ cm}^2 \end{aligned}$$

- *Solution 2:*

km ²		ha		m ²		cm ²		mm ²	
							5.	3	4

$$534 \text{ mm}^2 = 5.34 \text{ cm}^2$$

Ex 9: $3.5 \text{ ha} = \boxed{35000} \text{ m}^2$

Solution:

- *Solution 1:*

$$\begin{aligned} 3.5 \text{ ha} &= 24.5 \times 10\,000 \text{ m}^2 \\ &= 35\,000 \text{ m}^2 \end{aligned}$$

- *Solution 2:*

km ²	ha		m ²		cm ²	mm ²
	3. 5 0 0 0					

$$3.5 \text{ ha} = 35\,000 \text{ m}^2$$

Ex 10: $6\,000 \text{ m}^2 = \boxed{0.6} \text{ ha}$

Solution:

- *Solution 1:*

$$\begin{aligned} 6\,000 \text{ cm}^2 &= 6\,000 \div 10\,000 \text{ ha} \\ &= 0.6 \text{ ha} \end{aligned}$$

- *Solution 2:*

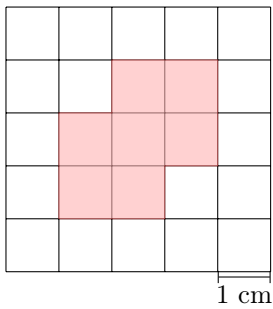
km ²	ha		m ²		cm ²	mm ²
	0. 6 0 0 0					

$$6\,000 \text{ cm}^2 = 0.6 \text{ ha}$$

B DEFINITION

B.1 COUNTING

Ex 11: Find the area of the red figure :

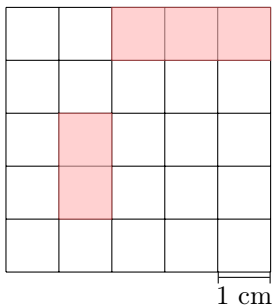


$$A = \boxed{7} \text{ cm}^2$$

Solution:

$$\begin{aligned} A &= 7 \times \blacksquare \\ &= 7 \times 1 \text{ cm}^2 \\ &= 7 \text{ cm}^2 \end{aligned}$$

Ex 12: Find the area of the red figure :

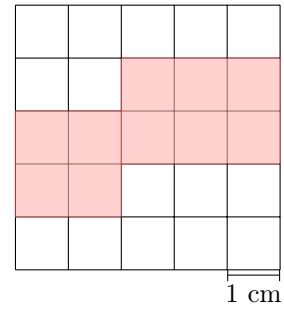


$$A = \boxed{5} \text{ cm}^2$$

Solution:

$$\begin{aligned} A &= 5 \times \blacksquare \\ &= 5 \times 1 \text{ cm}^2 \\ &= 5 \text{ cm}^2 \end{aligned}$$

Ex 13: Find the area of the red figure :

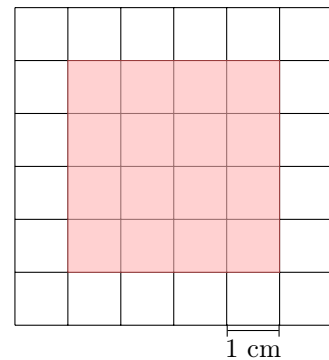


$$A = \boxed{10} \text{ cm}^2$$

Solution:

$$\begin{aligned} A &= 10 \times \blacksquare \\ &= 10 \times 1 \text{ cm}^2 \\ &= 10 \text{ cm}^2 \end{aligned}$$

Ex 14: Find the area of the red figure :



$$A = \boxed{16} \text{ cm}^2$$

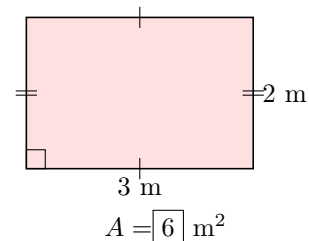
Solution:

$$\begin{aligned} A &= 16 \times \blacksquare \\ &= 16 \times 1 \text{ cm}^2 \\ &= 16 \text{ cm}^2 \end{aligned}$$

C AREA OF USUAL FIGURES

C.1 DIRECT APPLICATIONS

Ex 15: Find the area of the figure

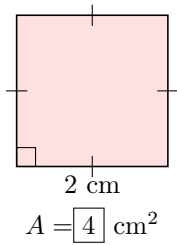


$$A = \boxed{6} \text{ m}^2$$

Solution:

$$\begin{aligned} A &= l \times L \\ &= 3 \text{ m} \times 2 \text{ m} \\ &= 6 \text{ m}^2 \end{aligned}$$

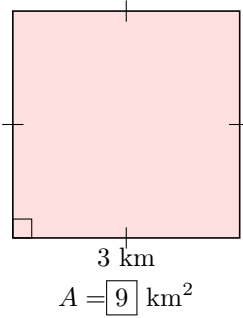
Ex 16: Find the area of the figure



Solution:

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

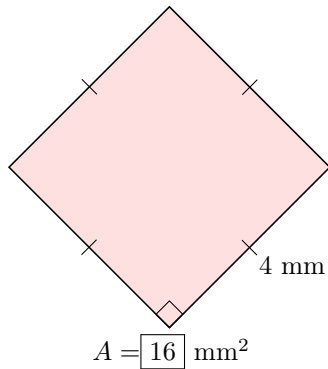
Ex 17: Find the area of the figure



Solution:

$$\begin{aligned} A &= s \times s \\ &= 3 \text{ km} \times 3 \text{ km} \\ &= 9 \text{ km}^2 \end{aligned}$$

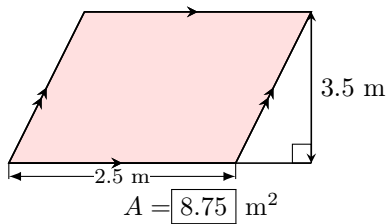
Ex 18: Find the area of the figure



Solution:

$$\begin{aligned} A &= s \times s \\ &= 4 \text{ mm} \times 4 \text{ mm} \\ &= 16 \text{ mm}^2 \end{aligned}$$

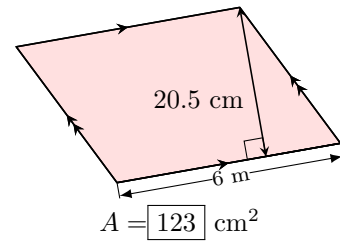
Ex 19: Find the area of the figure (you can use a calculator)



Solution:

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

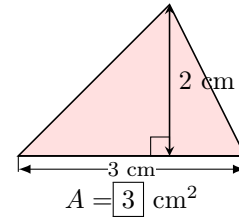
Ex 20: Find the area of the figure (you can use a calculator)



Solution:

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

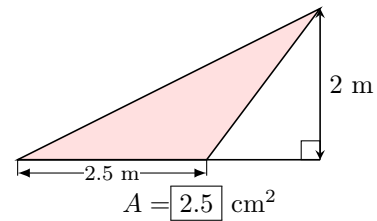
Ex 21: Find the area of the figure



Solution:

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

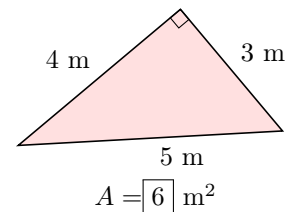
Ex 22: Find the area of the figure



Solution:

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

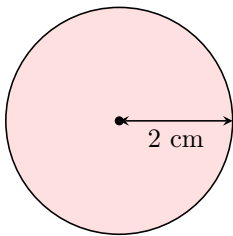
Ex 23: Find the area of the figure



Solution:

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

Ex 24: Use a calculator to find the area of the figure (round at 1 decimal place)

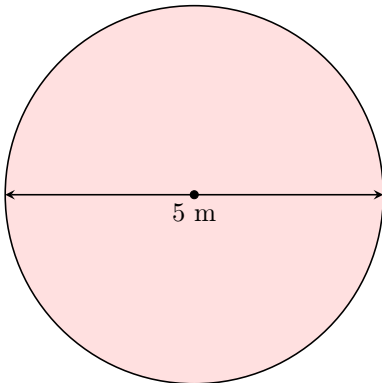


$$A \approx \boxed{12.6} \text{ cm}^2$$

Solution:

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

Ex 25: Use a calculator to find the area of the figure (round to 1 decimal place)



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

Solution:

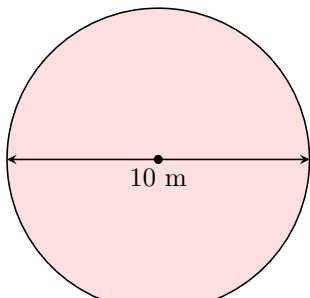
- The radius is half of the diameter.

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

- The area of 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 26: Use a calculator to find the area of the figure (round to 1 decimal place)



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

Solution:

- The radius is half of the diameter.

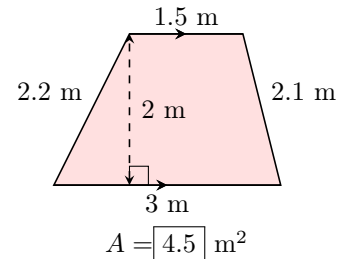
$$\begin{aligned} r &= \frac{d}{2} \\ &= \frac{10}{2} \\ &= 5 \text{ m} \end{aligned}$$

- The area of the circle is

$$\begin{aligned} A &= \pi \times r \times r \\ &= \pi \times 5 \times 5 \\ &= 78.5398 \text{ m}^2 \\ &\approx 78.5 \text{ m}^2 \end{aligned}$$

C.2 TRAPEZIUM

Ex 27: Use a calculator to find the area of the figure (round to 1 decimal place)

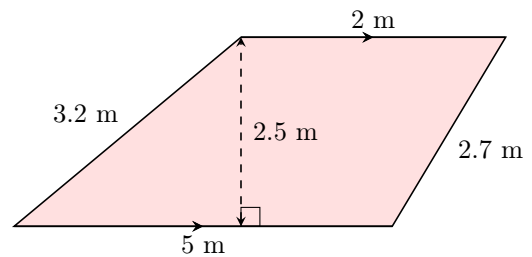


$$A = \boxed{4.5} \text{ m}^2$$

Solution: The area of the trapezium is

$$\begin{aligned} A &= \frac{a+b}{2} \times h \\ &= \frac{3+1.5}{2} \times 2 \\ &= 4.5 \text{ m}^2 \end{aligned}$$

Ex 28: Use a calculator to find the area of the figure (round to 1 decimal place)

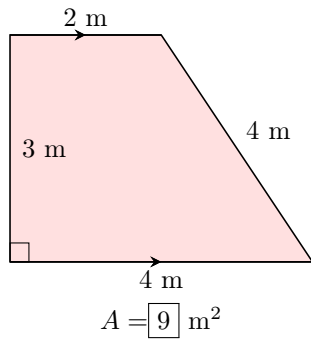


$$A = \boxed{8.75} \text{ m}^2$$

Solution: The area of the trapezium is

$$\begin{aligned} A &= \frac{a+b}{2} \times h \\ &= \frac{5+2}{2} \times 2.5 \\ &= 8.75 \text{ m}^2 \end{aligned}$$

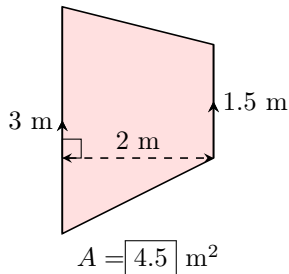
Ex 29: Use a calculator to find the area of the figure (round to 1 decimal place)



Solution: The area of the trapezium is

$$\begin{aligned} A &= \frac{a+b}{2} \times h \\ &= \frac{4+2}{2} \times 3 \\ &= 9 \text{ m}^2 \end{aligned}$$

Ex 30: Use a calculator to find the area of the figure (round to 1 decimal place)



Solution: The area of the trapezium is

$$\begin{aligned} A &= \frac{a+b}{2} \times h \\ &= \frac{3+1.5}{2} \times 2 \\ &= 4.5 \text{ m}^2 \end{aligned}$$

C.3 WORD PROBLEMS

Ex 31: A rectangular terrace is 8 m long and 5 m wide. Find the area of the terrace and the cost to tile it if the tiling costs 20 dollars per square meter.

$$A = 40 \text{ m}^2 \text{ and cost} = 800 \text{ dollars}$$

Solution: To find the area of the rectangular terrace, we use the formula for the area of a rectangle:

$$A = \text{length} \times \text{width}$$

Given:

- Length of the terrace, $L = 8 \text{ m}$
- Width of the terrace, $W = 5 \text{ m}$

Calculating the area:

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

The cost to tile the terrace is calculated by multiplying the area by the cost per square meter:

$$\text{Cost} = A \times 20 \text{ dollars per square meter}$$

Calculating the cost:

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

Therefore, the area of the terrace is 40 m^2 and the cost to tile it is 800 dollars.

Ex 32: A triangular garden has a base of 12 m and a height of 8 m. Find the area of the garden and the cost to plant grass if the cost is 5 dollars per square meter.

$$A = 48 \text{ m}^2 \text{ and cost} = 240 \text{ dollars}$$

Solution: To find the area of the triangular garden, we use the formula for the area of a triangle:

$$A = \frac{\text{base} \times \text{height}}{2}$$

Given:

- Base of the garden, $B = 12 \text{ m}$
- Height of the garden, $H = 8 \text{ m}$

Calculating the area:

$$\begin{aligned} A &= \frac{12 \text{ m} \times 8 \text{ m}}{2} \\ &= \frac{96 \text{ m}^2}{2} \\ &= 48 \text{ m}^2 \end{aligned}$$

The cost to plant grass in the garden is calculated by multiplying the area by the cost per square meter:

$$\text{Cost} = A \times 5 \text{ dollars per square meter}$$

Calculating the cost:

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

Therefore, the area of the garden is 48 m^2 and the cost to plant grass is 240 dollars.

Ex 33: A rectangular wall is 8 m long and 5 m high. Find the area of the wall and the cost to paint it if the paint costs 20 dollars per square meter.

$$A = 40 \text{ m}^2 \text{ and cost} = 800 \text{ dollars}$$

Solution: To find the area of the rectangular wall, we use the formula for the area of a rectangle:

$$A = \text{length} \times \text{height}$$

Given:

- Length of the wall, $L = 8 \text{ m}$
- Height of the wall, $H = 5 \text{ m}$

Calculating the area:

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

The cost to paint the wall is calculated by multiplying the area by the cost per square meter:

$$\text{Cost} = A \times 20 \text{ dollars per square meter}$$

Calculating the cost:

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

Therefore, the area of the wall is 40 m^2 and the cost to paint it is 800 dollars.

Ex 34: A triangular roof has a base of 10 m and a height of 6 m. Find the area of the roof and the cost to cover it with wood if the wood costs 15 dollars per square meter.

$$A = \boxed{30} \text{ m}^2 \text{ and cost} = \boxed{450} \text{ dollars}$$

Solution: To find the area of the triangular roof, we use the formula for the area of a triangle:

$$A = \frac{\text{base} \times \text{height}}{2}$$

Given:

- Base of the roof, $B = 10 \text{ m}$
- Height of the roof, $H = 6 \text{ m}$

Calculating the area:

$$\begin{aligned} A &= \frac{10 \text{ m} \times 6 \text{ m}}{2} \\ &= \frac{60 \text{ m}^2}{2} \\ &= 30 \text{ m}^2 \end{aligned}$$

The cost to cover the roof with wood is calculated by multiplying the area by the cost per square meter:

$$\text{Cost} = A \times 15 \text{ dollars per square meter}$$

Calculating the cost:

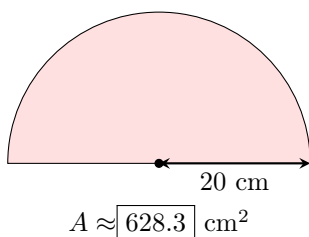
$$\begin{aligned} \text{Cost} &= 30 \text{ m}^2 \times 15 \text{ dollars per square meter} \\ &= 450 \text{ dollars} \end{aligned}$$

Therefore, the area of the roof is 30 m^2 and the cost to cover it with wood is 450 dollars.

D AREA OF COMPOSITE FIGURES

D.1 PART OF CIRCLES

Ex 35: Use a calculator to find the area of the figure (round to 1 decimal place)



Solution:

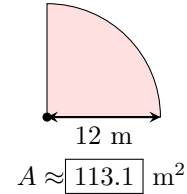
- The radius is:

$$r = 20 \text{ cm}$$

- The area of the half-circle is

$$\begin{aligned} A &= \frac{\pi \times r \times r}{2} \\ &= \frac{\pi \times 20 \text{ cm} \times 20 \text{ cm}}{2} \\ &\approx 628.3 \text{ cm}^2 \end{aligned}$$

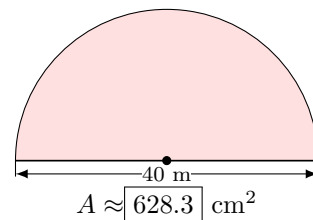
Ex 36: Use a calculator to find the area of the figure (round at 1 decimal place)



Solution:

$$\begin{aligned} A &= \text{Area of quarter of the circle} \\ &= \frac{\pi \times r \times r}{4} \\ &= \frac{\pi \times 12 \text{ m} \times 12 \text{ m}}{4} \\ &\approx 113.1 \text{ m}^2 \end{aligned}$$

Ex 37: Use a calculator to find the area of the figure (round to 1 decimal place)



Solution:

- The radius is half of the diameter.

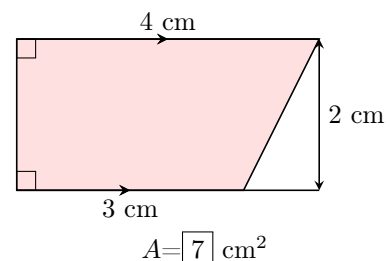
$$\begin{aligned} r &= \frac{d}{2} \\ &= \frac{40}{2} \\ &= 20 \text{ m} \end{aligned}$$

- The area of the half-circle is

$$\begin{aligned} A &= \frac{\pi \times r \times r}{2} \\ &= \frac{\pi \times 20 \text{ cm} \times 20 \text{ cm}}{2} \\ &\approx 628.3 \text{ cm}^2 \end{aligned}$$

D.2 ADD OR SUB

Ex 38: Find the area of the figure

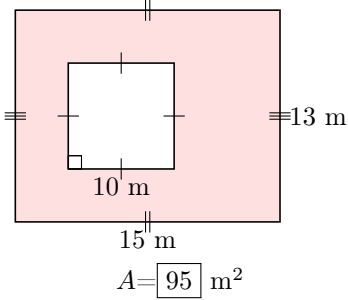


Solution:



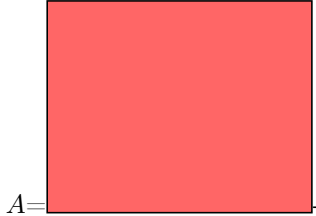
$$\begin{aligned}
 A &= \text{area of rectangle} - \text{area of triangle} \\
 &= 4 \times 2 - \frac{1 \times 2}{2} \\
 &= 7 \text{ cm}^2
 \end{aligned}$$

Ex 39: Find the area of the figure



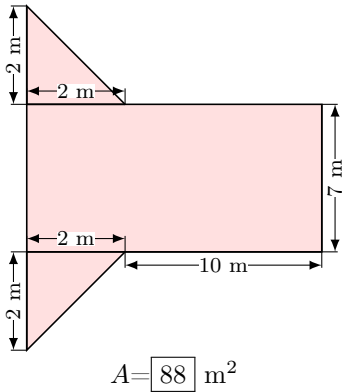
$$A = 95 \text{ m}^2$$

Solution:



$$\begin{aligned}
 A &= \text{area of big rectangle} - \text{area of small square} \\
 &= 15 \times 13 - 10 \times 10 \\
 &= 95 \text{ m}^2
 \end{aligned}$$

Ex 40: Find the area of the figure

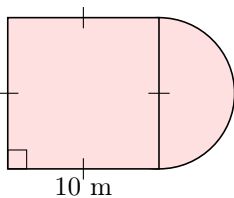


$$A = 88 \text{ m}^2$$

Solution: $A = \text{area of rectangle} + 2 \times \text{area of triangle}$

$$\begin{aligned}
 &= 12 \times 7 + 2 \times \frac{2 \times 2}{2} \\
 &= 88 \text{ m}^2
 \end{aligned}$$

MCQ 41: Choose the correct formula to calculate the the area of the figure



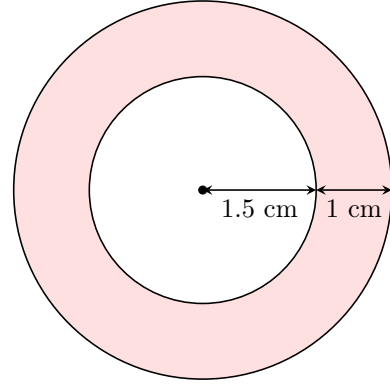
$$\square A = 10 \times 10 + \pi \times 5 \times 5$$

- $A = 10 \times 10 + \frac{\pi \times 5 \times 5}{2}$
- $A = 10 \times 10 + \frac{\pi \times 10 \times 10}{2}$
- $A = 10 \times 10 + \pi \times 10 \times 10$

Solution: $A = \text{area of square} + \text{area of semi-circle}$

$$\begin{aligned}
 &= 10 \times 10 + \frac{\pi \times 5 \times 5}{2} \\
 &\approx 139.3 \text{ cm}^2
 \end{aligned}$$

MCQ 42: Choose the correct formula to calculate the the area of the figure

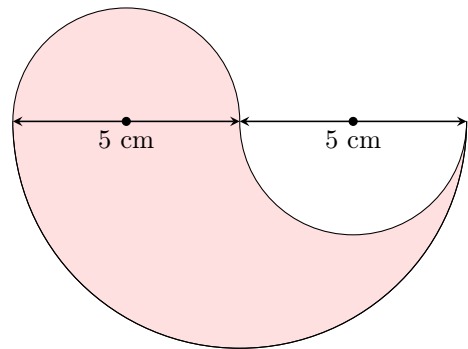


- $A = 2 \times \pi \times 2.5$
- $A = \pi \times 1.5 \times 1.5 - \pi \times 1 \times 1$
- $A = \pi \times 2.5 \times 2.5$
- $A = \pi \times 2.5 \times 2.5 - \pi \times 1.5 \times 1.5$

Solution: $A = \text{area of large circle} - \text{area of small circle}$

$$\begin{aligned}
 &= \pi \times 2.5 \times 2.5 - \pi \times 1.5 \times 1.5 \\
 &\approx 12.6 \text{ cm}^2
 \end{aligned}$$

MCQ 43: Choose the correct formula to calculate the the area of the figure



- $A = \frac{\pi \times 5 \times 5}{2}$
- $A = \pi \times 5 \times 5$
- $A = \frac{\pi \times 5 \times 5}{2} + \frac{\pi \times 2.5 \times 2.5}{2}$
- $A = \pi \times 2.5 \times 2.5$

Solution: $A = \text{Area of large semi-circle} - \text{Area of small semi-circle}$

$$\begin{aligned}
 &+ \text{Area of small semi-circle} \\
 &= \text{Area of large semi-circle} \\
 &= \frac{\pi \times 5 \times 5}{2} \\
 &\approx 39.3 \text{ cm}^2
 \end{aligned}$$

