

U8D2_T Perimeter and Area of Composite Figures

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U8D2_T
Perimeter...

U8D2 Warm Up:

Define perimeter. *The distance around the OUTSIDE of the shape.*

Define Area. *The space on the inside of a 2-D shape.*

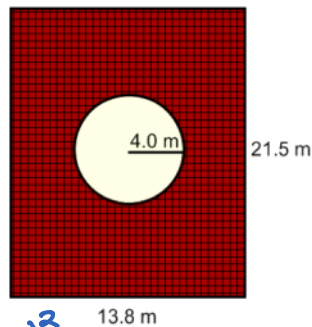
Perimeter and Area of Composite Figures

Often complex shapes can be divided into simple shapes to calculate perimeter and area.

Example 1. A circular swimming pool is to be bordered by interlocking brick as shown in the diagram.

- a) Determine the area to be covered by interlocking brick.

$$\begin{aligned} A &= A_{\square} - A_{\circ} \\ &= lw - \pi r^2 \\ &= (21.5)(13.8) - \pi(4.0)^2 \\ &\approx 296.7 - 50.3 \\ &= 246.4 \end{aligned}$$



\therefore the area to be bricked is 246.4 m^2 .

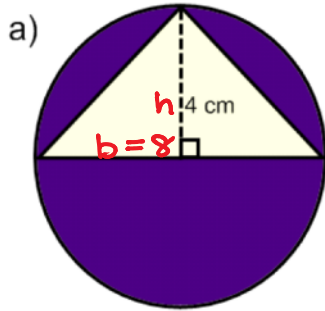
b) If the bricks are sold by the skid, and each skid has enough bricks to cover 9 m^2 , how many skids must be purchased?

$$246.4 \div 9$$
$$= 27.3\bar{7} \quad \leftarrow \text{cannot buy a partial skid so must bump it up}$$

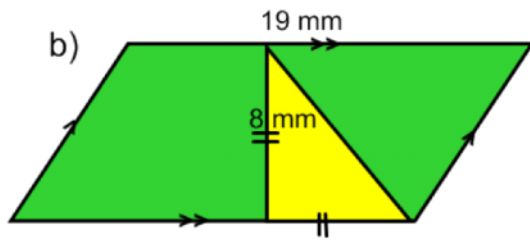
\therefore 28 skids must be purchased.

Example 2. Calculate the area of the shaded region.

$$r = 4$$



$$A = A_o - A_\Delta$$
$$= \pi r^2 - \frac{bh}{2}$$
$$= \pi(4)^2 - \frac{8(4)}{2}$$
$$= 16\pi - 16$$
$$\doteq \boxed{34.3 \text{ cm}^2}$$



$$A = A_{\square} - A_{\triangle}$$

$$= bh - \frac{bh}{2}$$

← b of \square is different from b of \triangle

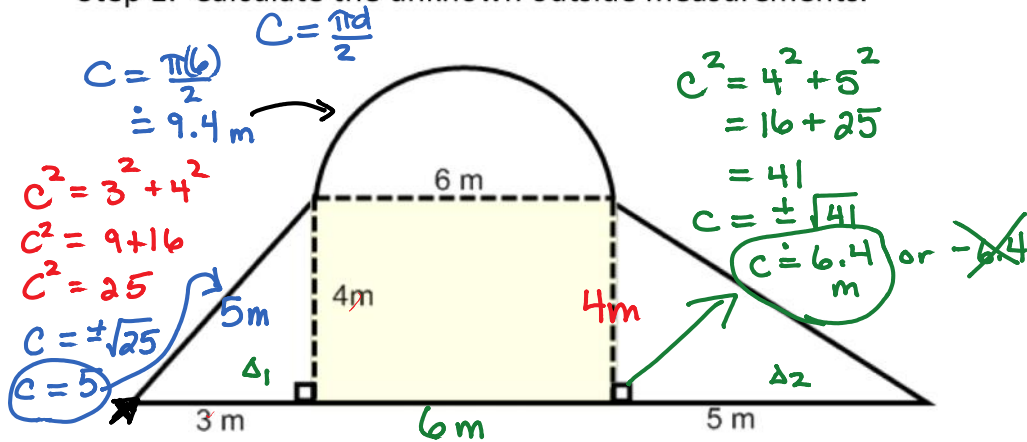
$$= 19(8) - \frac{8(8)}{2}$$

$$= 152 - 32$$

$$= \boxed{120 \text{ mm}^2}$$

Example 3. A restaurant is building an outdoor patio in the shape of the diagram below. The patio area will be made of interlocking paving stones with different stones along the border. The paving stones cost \$52.95/m². The border stones cost \$15.50/m. How much will the materials for the patio cost, including 13% taxes? Allow an additional 10% to account for stones that must be cut for the design.

Step 1: Calculate the unknown outside measurements.



$$P \doteq 5 + 9.4 + 6.4 + 5 + 6 + 3$$

$$P \doteq 34.8 \text{ m}$$

Step 2: Calculate the total perimeter and add an additional 10%. \rightarrow total 110%

$$\begin{aligned} 34.8 \times 110\% \\ = 34.8 \times 1.10 \\ \doteq 38.3 \text{ m} \end{aligned}$$

(OR) Find 10% and add it on to the 34.8m.

Step 3: Identify the simple shapes that make up the area. Calculate the area of each shape.

$$\begin{aligned} A &= A_{\Delta_1} + A_{\square} + A_{\Delta} + A_{\Delta_2} \\ &= \frac{bh}{2} + lw + \frac{\pi r^2}{2} + \frac{bh}{2} \end{aligned}$$

$$= \frac{bh}{2} + lw + \frac{\pi r^2}{2} + \frac{bh}{2}$$
$$= \frac{3(4)}{2} + (6)(4) + \frac{\pi(3)^2}{2} + \frac{5(4)}{2}$$

$$\doteq 6 + 24 + 14.14 + 10$$

$$\doteq 54.1 \text{ m}^2$$

Step 4: Calculate the total area and add 10% for waste.

$$\rightarrow 110\% \text{ of } 54.1 \text{ m}^2$$

$$= 1.1 \times 54.1$$

$$\doteq 59.5 \text{ m}^2$$

Step 5: Calculate the total cost before taxes.

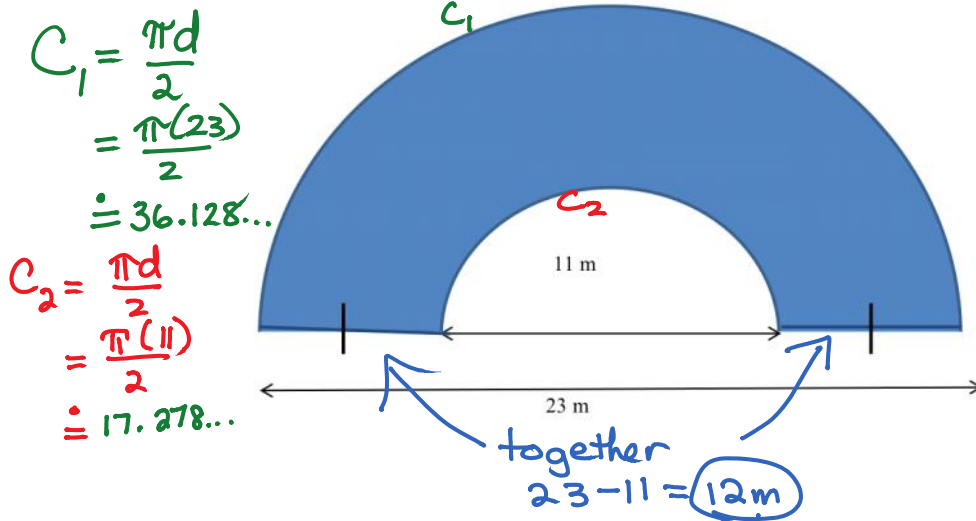
$$C = 38.3 \times 15.50 + 59.5 \times 52.95 \\ \doteq 3744.18$$

Step 6: Calculate the total cost including taxes. 113%.

$$\text{Total Cost} = 3744.18 \times 1.13 \\ \doteq 4230.92$$

\therefore the total cost is about \$4230.92.

Example 4: Calculate the perimeter of the shaded region.
Round your answer to one decimal place.



$$P = 36.128\dots + 12 + 17.278\dots$$

$$P \approx 65.4\text{ m}$$