

Problem of the Week

Grade 7 and 8

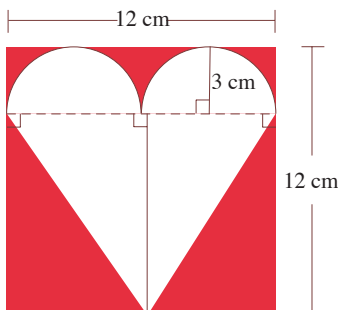
Be Mine Valentine Solution

Problem

A valentine is constructed by pasting two white semi-circles, each with radius 3 cm, and a white triangle onto a 12 cm square sheet of red paper. You are going to write your valentine a message in red ink on the white region of the card. Determine the total amount of area available for your special valentine greeting.

Solution

Place the given information on the diagram.



The total area for writing the message is the area of the two semi-circles plus the area of the white triangle.

Since there are two semi-circles of radius 3 cm, the total area is the same as the area of a full circle of radius 3 cm. The area of the two semi-circles is $\pi r^2 = \pi(3)^2 = 9\pi \text{ cm}^2$.

The height of the triangle is the length of the square minus the radius of the semi-circle. Therefore the height of the triangle is $12 - 3 = 9 \text{ cm}$. The base of the triangle is 12 cm, the width of the square. The area of the triangle is $\frac{1}{2} \text{base} \times \text{height} = \frac{1}{2}(12)(9) = 54 \text{ cm}^2$.

The total area for writing the message is $(9\pi + 54) \text{ cm}^2$. This area is approximately 82.3 cm^2 . Happy Valentine's Day.

