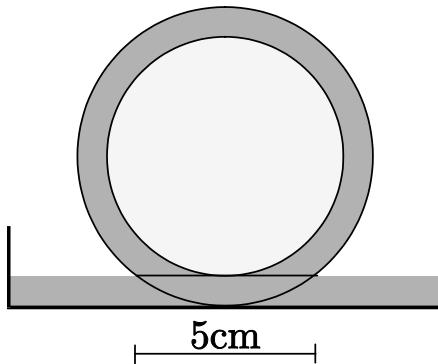


Problem of the Week

Proposed by Bernardo Ábrego and Silvia Fernández.

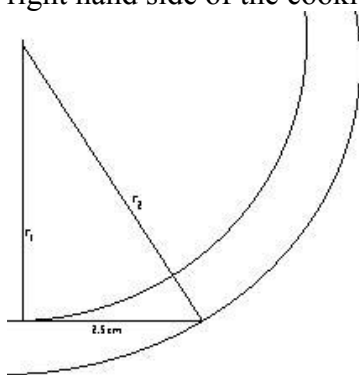
January 31-February 7



A vanilla cookie is dipped into liquid chocolate and then turned around so that an outside ring of the cookie becomes covered with chocolate. Find the area of the chocolate ring if the length of the segment in the figure is 5cm.

Solution by Humberto Raya.

Suppose that r_1 is the radius of the inner circle and that r_2 is the radius of the outer circle of the cookie. We would have the following picture if we were looking at the bottom right hand side of the cookie.



The area of the ring of chocolate is equal to the total area of the cookie minus the area of the inner circle:

$$A(\text{ring}) = A(\text{total}) - A(\text{inner circle}) = \pi(r_2)^2 - \pi(r_1)^2 = \pi[(r_2)^2 - (r_1)^2].$$

From the picture we can see that a right triangle is formed with lengths r_1 , r_2 , and 2.5 cm. We have the following equation by the Pythagorean theorem: $(r_1)^2 + 2.5^2 = (r_2)^2$ and so $(r_2)^2 - (r_1)^2 = 2.5^2$. It follows that the area of the ring with chocolate is

$$A(\text{ring}) = \pi[(r_2)^2 - (r_1)^2] = \pi[2.5^2] = 6.25\pi \text{ cm}^2.$$