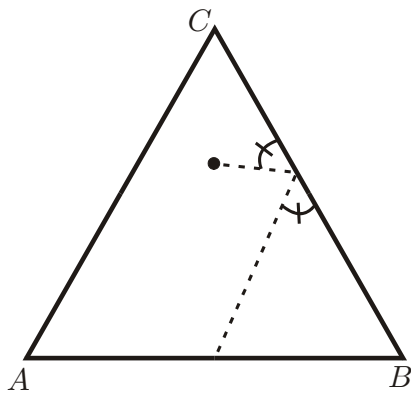


Problem of the Week

Proposed by Bernardo Ábrego and Silvia Fernández.

October 18-25



Consider a billiard table in the shape of an equilateral triangle. Each of the sides of the table is 40 inches long and the corners are labeled A , B , and C . A billiard ball, represented by a single point, is placed in the midpoint of side AB . The ball is hit so that it first bounces on side BC . Determine which point on side BC the ball must first hit in order to come back to its initial position at the time of the fifth bounce. Explain your answer.

Additional questions for possible projects.

1. Which point on side BC must we hit in order to come back to the initial position at the time of the n^{th} bounce. Is there always a solution? If so, how many different solutions are there?
2. For which numbers n above will the ball never pass through the same spot twice? (except for the start and end)
3. Work questions 1 and 2 if the starting point is an arbitrary point in the side AB .
4. What about other shapes for the 'billiard table'? say a regular pentagon.