

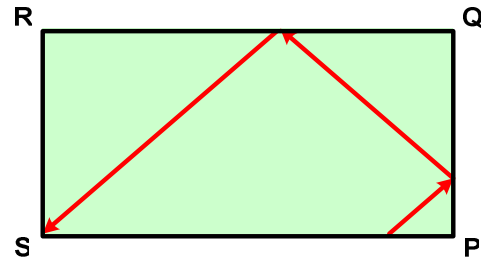
More Pool

10 February 2019

Jim Stevenson

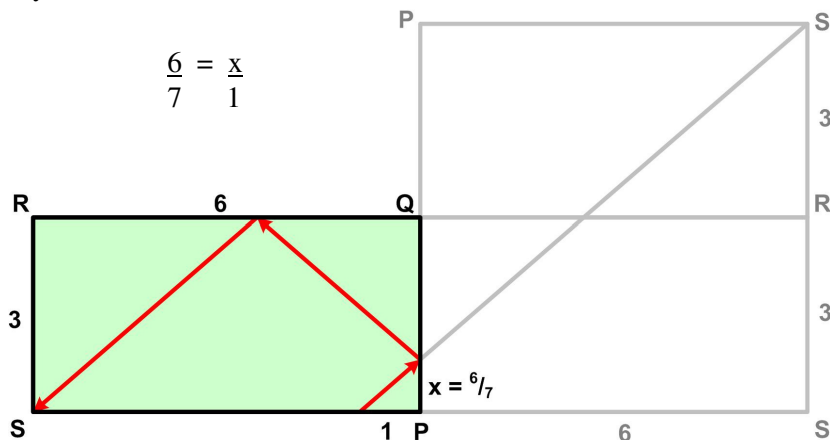
This is another UKMT Senior Challenge problem, this time from 2006.

A toy pool table is 6 feet long and 3 feet wide. It has pockets at each of the four corners P, Q, R, and S. When a ball hits a side of the table, it bounces off the side at the same angle as it hit that side. A ball, initially 1 foot to the left of pocket P, is hit from the side SP towards the side PQ as shown. How many feet from P does the ball hit side PQ if it lands in pocket S after two bounces?



My Solution

Using the technique from the Pool Party problem, the solution becomes easy. We just add the reflected images of the pool table for which the reflected bounces of the pool ball become a straight line directly to the pocket at S. This forms a triangle which allows us to use similar triangles to find the answer, namely,



So the distance up the side PQ is $\frac{6}{7}$ of a foot.

UKMT Solution

I thought it might be interesting to compare my solution to the one given by the UKMT Challenge. It is virtually the same, but looks more complicated.

“The route of the ball is $A \rightarrow B \rightarrow C \rightarrow S$. The diagram also shows point D, the reflection of point A in PQ, and point E, the reflection of point S in QR. As the ball bounces off a side at the same angle at which it hits that side, points D, B, C, E lie in a straight line. Triangles DPB and DSE are similar since both are right-angled and they have a common angle D. So $BP/PD = ES/SD = 6/7$. Hence $BP = 6/7$.”

