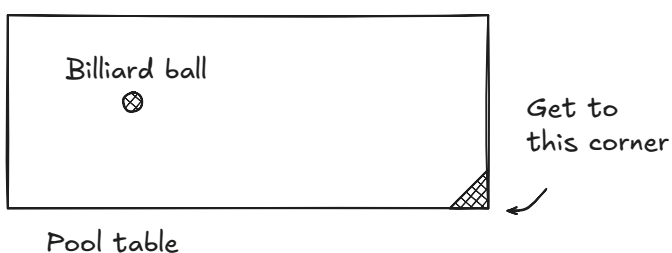# Lesson 2 — Reflection principle MW

Mirror

1. (a) Draw on the mirror an outline of your head. Then compare the size of this outline to your actual head.
   (b) How is (a) affected by your distance to the mirror?
   (c) Explain the phenomenon in (a). Hint: draw a diagram of you and the mirror and how light bounces from what you see to your eye.
   (d) How tall of a mirror do you need to buy to see your whole person? How high off the ground should this mirror be placed?

Billiards

Decide where to hit the billiard ball against one wall of the rectangular pool table to get it to the corner shown.

Billiard ball

Get to this corner

Pool table

Group questions

Repeatedly use the reflection principle to help answer the following questions. Assume that the billiard ball follows a straight line trajectory without the effects of spin, friction, etc.

2. Shoot a billiard ball at a $45°$ angle from the bottom left corner of a 3×2 pool table. After how many bounces will it hit a corner again? Which corner will be hit?

3. Shoot a billiard ball at a $45°$ angle from the bottom left corner of a 2×3 pool table. After how many bounces will it hit a corner again? Which corner will be hit?

4. Shoot a billiard ball at a $45°$ angle from the bottom left corner of a 2×6 pool table. After how many bounces will it hit a corner again?

5. A billiard ball is shot from the center of a square table. Describe how the ball can hit the north edge, east edge, south edge, and west edge of the table in that order.

6. Can a billiard ball shot on a 1×2 table first hit one shorter side, then one longer side, then the other longer side, and finally the other shorter side?

7. Can a billiard ball shot on a 1×2 table first hit one longer side, then the other longer side, then one shorter side, then the other shorter side? Hint: analyze the slope of the trajectory.