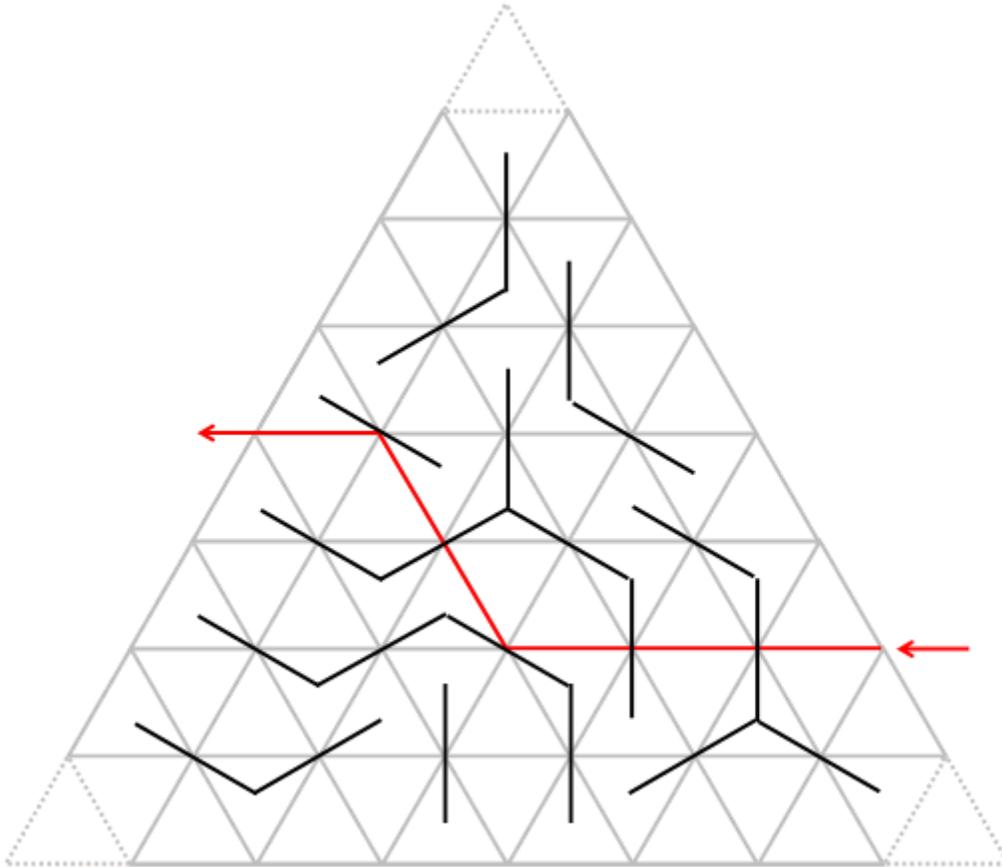


## Tri-Mirror

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Just like in the problem "Mirror, Mirror in the Box", a triangular box plays tricks with light. Mirrors reflect light beams that hit them obliquely - otherwise the light beams pass straight through the mirrors:



Just for interest, can you find a light beam path that is longer than 10 units?

### Game for 2 to 4 people:

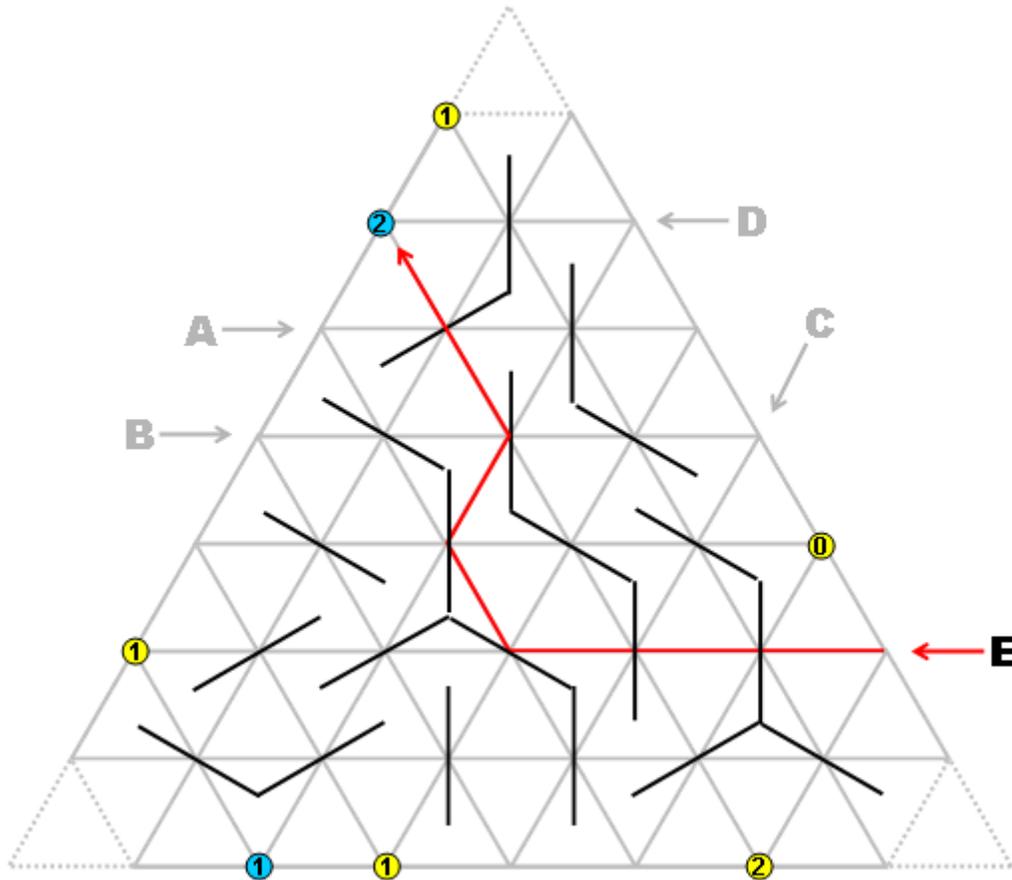
- Use the triangular box below (without the mirrors).
- Each player chooses a colour and takes 5 counters of that colour (labeled 0,1,1,1,2)
- 21 mirrors and 6 arrows are placed so that all players can reach them.

Players take turns. Each turn a player may play:

- 1) a mirror at an empty intersection on the interior of the box.
- 2) a counter face-down at a free intersection around the edge of the box.
- 3) a light beam arrow pointing into the box (at a free intersection around the edge of the box).

Play continues until the 21 interior intersections are filled with mirrors. Then each counter is then flipped face-up and each light beam is scored.

Scoring a light beam: See where it emerges and if there are any counters on that space, that player gets that many points times the distance that the light beam has traveled. The counters are not removed from the box because they might score again. Example: light beam arrow E scores 2 times 7 for blue because the light beam was 7 units long and hit blue's two counter.



Blue wins this game because E scores 14 and D scores 4 points for blue; A scores 3 points and C scores 8 points for yellow; B scores nothing. Final score: Blue 18; Yellow 11.

(Note: Neither light beams nor counters can be placed at the corners of the big triangle)

**Extensions:**

- What is the highest score possible for one light beam?

**The Math in This Problem:**

This investigation challenges puzzlers to work with light beams that are reflected off mirrors within a triangular box. Using the knowledge they have of geometry and angles, students must execute various routes based on the transformations made by oblique and non-oblique angles.

