Take home problems:

1. Turn the fish around by moving only 3 matches without overlapping:

![Fish Diagram](image1)

2. Move 2 matches to get only 4 squares:

![4 Squares Diagram](image2)

3. Remove a square by moving only 3 matches to be left with only 4 squares:

![Removal Diagram](image3)

4. A square can be turned into an equilateral triangle by cutting into 4 pieces and rearranging as follows:

![Square to Triangle](image4)
Find a way to cut up an octagon into pieces and rearrange them to get a square. How few can you use? **Challenge:** It can be done using only 5 pieces!

A grasshopper jumps on the road, left or right. He jumps 1 inch, then 2 inches, 3... and his last jump is 10 inches. Is it possible that he ends up exactly where he started?

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Let \( S_n = 1^2 + 2^2 + ... + N^2 \) be the sum of the first \( n \) squares. Show that \( 6S_n = N(N + 1)(2N + 1) \) by “stacking corners” in a rectangular solid of dimensions \( N \times (N + 1) \times (2N + 1) \).

You have 2 fuses. Each burns in exactly one hour. But, the rate is uneven, and you don’t know how long it takes to burn \( \frac{1}{2}, \frac{3}{4}, \) etc. of the fuse. Can you make a timer that burns exactly 45 minutes?