

MATHEMAGIC

- DICE AND CLOCK -



AMAZINGMATHS

Materials:

- Magic trick video
- 2 dice
- 1 clock

How to do the Magic Trick

Goal:

Find the value of the die thrown by the first spectator.

Preparation:

The magician does the trick with 2 spectators (named spectator A and spectator B). He gives them one die each and one clock for both.

Trick:

1. The magician stands with his back turned to both spectators. He never looks at what the spectators are doing.
2. The magician asks each spectator to throw his die and to memorize the result.
3. Spectator A places his finger on the clock at the value of the number on his die.
4. The magician asks spectator B to place his finger on spectator A's number.
5. Then, the magician asks spectator B to change his position on the clock by moving **clockwise**, doing the number of leaps that corresponds to his die's value.
6. The magician asks spectator B which number he has landed on.
7. The magician asks spectator B to place his finger back on spectator A's number. He does the same thing as in step 5, but this time **counterclockwise**.
8. The magician asks spectator B which number he has landed on.
9. The magician asks both spectators to stop touching the clock.
10. The magician turns around, looks at the clock and announces the result of spectator A's throw.



MATHEMATICAL EXPLANATION



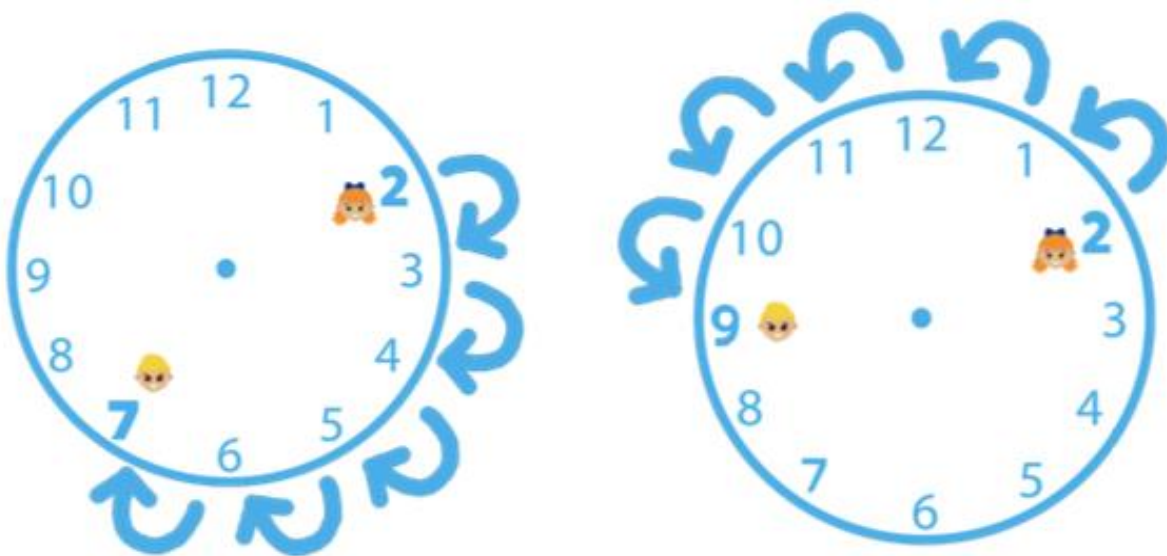
Why This Trick Works.

To facilitate the explanation, we will call spectator A Audrey and spectator B Bruno. The magician's goal is to find the value of Audrey's die.

The magician does not need to know Bruno's number to find Audrey's.

Audrey's number is exactly in between the 2 numbers that Bruno announces to the magician. Let's see why.

When Bruno moves from Audrey's number clockwise (the 2), he makes leaps of 1 and lands on the 7. Then, Bruno does another 5 leaps of 1 from the 2 counterclockwise to land on the 9. Thus, he makes the **same movement** on each side of Audrey's number.



Bruno announces to the magician that he has landed on the 7 and on the 9. To find Audrey's number, the magician simply has to figure out which number falls between 9 and 7, and then find the number that is on the other side of the clock, at the same distance as that number.



On the diagram, we see that there are two possible solutions: the 2 and the 8. However, the spectator has thrown a standard die. Thus, he has obtained a result between 1 and 6. The magician then knows that the number obtained by the spectator is 2.