Logical Card Test

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This is a logical puzzle[1] from Muhammad Zain Sarwar on Puzzle Sphere.

Real Psychological Puzzle that will Test your Logical Thinking

Only 10% of Participants gave the Right Answer!

Imagine in front of you there are four cards placed on a desk. Each card has a number on one side and a color on the other. The visible faces of the cards show the following:

- **3**
- **8**
- **Red**
- **Brown**

You are given a rule to verify:

"Every card that shows an even number on one side, then the opposite side must be red."

Puzzle Statement

Your task is to determine which cards you *must* flip over to check whether this rule is being followed or not.

This question was part of a real psychological experiment.

(I emphasized the "must" in the puzzle statement in order to limit the number of cards flipped to the minimum.)

Solution

As stated, we only need to consider cards *showing* an even number, and that is only the 8 card. We need to check that the other side is red to confirm the rule.

I have a few comments. Since I don't subscribe to these types of sites, I don't know what the proposed solution is. I suspect this it not what Sarwar meant, and that is confirmed by the following.

Comment 1 — Different Problem

Sarwar begins his solution, before it disappears behind a wall, with:

The rule can be written as:

*If a card has an **even number**, then the other side **must be red**.*

[1] 21 March 2025 (https://medium.com/puzzle-sphere/real-psychological-puzzle-that-will-test-your-logical-thinking-bc145ff90a9d)

This is a different problem, since it is stating that if a card *has* an even number on one side, *even if it is not showing*, then the other side must be red. So we now must consider more cards than those *showing* even numbers.

We only need to consider one more card: the brown one. If there is an even number on its other side, then the rule is broken, otherwise the rule is confirmed. It doesn't matter what is on the other side of the 3 card or the red card; that will not have any effect on the validity of the rule.

What is going on here is the logic behind the *implication* $P \Rightarrow Q$, "if P is true, then Q is true". We have discussed this at length in other posts.[2] One property of the implication is that it is logically equivalent to the contrapositive $\sim Q \Rightarrow \sim P$, "If Q is false, then P is false". So if one side of a card is brown (not red) then the other side must be odd (not even). So that is why we must check the brown card.

If one side of the card is odd (not even), then it doesn't matter what the other side is. The only thing that matters is *if* one side is *even*, *then* the other side *must* be *red*, for the implication to hold. And if one side of the card is red, it doesn't matter what the other side is. The only thing that matters is *if* one side is *not red*, *then* the other side must *not* be *even*. That is, $P \Rightarrow Q$ is logically equivalent to $\sim(P \wedge \sim Q) \equiv \sim(\sim Q \wedge \sim\sim P)$: we can never have P true and Q false.

So I feel the original problem statement is ambiguous and not rigorously posed. He should have used his second version in the original statement.

Comment 2 — Condescending Attitude

I have noticed in a lot of Puzzle Sphere problems, as well as other problems posed on the internet, a condescending or intimidating attitude. Even Presh Talwalkar slips into this feeling every now and then with such introductions as a (challenging) problem is solvable by 5th graders in China. Many problems posed on the internet, such as this one above, claim only a small percentage of people can get it right.

Of course, only a small percentage of people are trained in mathematics, and many of these problems require a facility that has often faded with lack of use over the years. That is not an indication that people are stupid or that math can only be handled by the few. Furthermore, as the discussion above indicates, there are some subtleties in the logic that are not often discussed in elementary math classes.

And finally, if you are going to be snarky in a math problem, you better get it right and not make errors or be muddled in your presentation.

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[2] The basics of symbolic logic for statements is discussed in "Pointing Fingers" (http://josmfs.net/2020/09/19/pointing-fingers/) and a more detailed discussion of the implication and its logical equivalences is given in "Pinocchio's Hats" (https://josmfs.net/2022/07/09/pinocchios-hats/).