***Logic Puzzles***

**Q.**

As a reward for saving his daughter from pirates, the King has given you the opportunity to win a treasure hidden inside one of three trunks. The two trunks that do not hold the treasure are empty. To win, you must select the correct trunk.

- Trunk 1 is inscribed with the message: This trunk is empty.

-Trunk 2 is inscribed with the message: This trunk is empty.

-Trunk 3 is inscribed with the message: The treasure is in Trunk 2.

The Queen (who \*\*never lies\*\*) tells you that \*\*only one\*\* of these inscriptions is true, while the other two are false.

Which trunk should you select to win the treasure?

**Solution:**

We need to determine which trunk contains the treasure by checking which scenario satisfies the condition that only one inscription is true while the other two are false.

Let’s analyze each possibility:

Case 1: Assume the treasure is in Trunk 1 (p₁ = True)

- Trunk 1’s message: “This trunk is empty.” → False (since the treasure is here).

- Trunk 2’s message: “This trunk is empty.” → True (since Trunk 2 is empty).

- Trunk 3’s message: “The treasure is in Trunk 2. → \*\*False\*\* (since it’s in Trunk 1).

Result: Only one true message (Trunk 2), matching the Queen’s condition.

Case 2: Assume the treasure is in Trunk 2 (p₂ = True)

- Trunk 1’s message: “This trunk is empty.” → True (Trunk 1 is empty).

- Trunk 2’s message: “This trunk is empty.” → False (treasure is here).

- Trunk 3’s message: “The treasure is in Trunk 2.” → True (correct).

Result:Two true messages (Trunk 1 & Trunk 3), which violates the Queen’s condition.

Case 3: Assume the treasure is in Trunk 3 (p₃ = True)

- Trunk 1’s message: “This trunk is empty.” → True (Trunk 1 is empty).

- Trunk 2’s message: “This trunk is empty.” →True (Trunk 2 is empty).

- Trunk 3’s message: “The treasure is in Trunk 2.” → False (it’s in Trunk 3).

ResultTwo true messages (Trunk 1 & Trunk 2), which again violates the Queen’s condition.

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Conclusion:

The only scenario where exactly one inscription is true is when the treasure is in Trunk 1.

Answer: Choose Trunk 1 to win the treasure.

**Q.**

In [Sm78] Smullyan posed many puzzles about an island that has two kinds of inhabitants,

knights, who always tell the truth, and their opposites, knaves, who always lie. You encounter

twopeople A and B. What are A and B if A says “B is a knight” and B says “The two of us are opposite types”?

**Solution:**

The Island of Knights and Knaves: A Logical Puzzle

Setting the Scene:

Imagine a mysterious island where every inhabitant is either:

- A Knight (always tells the truth)

- A Knave (always lies)

You encounter two islanders, A and B, who make the following statements:

- A declares: "B is a knight."

- B claims: "The two of us are opposite types."

The Puzzle: Determine who is a knight and who is a knave.

Solving the Riddle Step by Step

Approach:

We'll examine both possibilities for A (knight or knave) and see which scenario holds logically.

Scenario 1: Suppose A is a Knight (Truth-Teller)

1. If A is a knight, then his statement "B is a knight" must be true.

- Therefore, B is also a knight.

2. Now examine B's statement: "We are opposite types."

- If B is a knight, his statement must be true.

- But if both A and B are knights, they are the same type - not opposites.

- This creates a contradiction because a knight cannot lie.

Conclusion: Our initial assumption that A is a knight must be false.

Scenario 2: Suppose A is a Knave (Liar)

1. If A is a knave, then his statement "B is a knight" must be false.

- Therefore, B is actually a knave.

2. Now examine B's statement: "We are opposite types."

- Since B is a knave, his statement must be false.

- The opposite of his claim would be "We are the same type."

- Indeed, both A and B are knaves - so they are the same type.

- This aligns perfectly with B being a knave.

Conclusion: This scenario holds without any contradictions.

Final Answer

- A is a knave (liar)

- B is a knave (liar)

Verification:

- A (knave) lies when saying B is a knight - correct, since B is actually a knave.

- B (knave) lies when claiming they're opposites - correct, since they're both knaves.

Why This Makes Sense

This puzzle beautifully demonstrates how:

1. Assuming one possibility leads to a contradiction

2. The alternative holds consistently

3. The solution emerges through careful elimination

Key Insight: When both islanders are knaves:

- Their false statements actually reveal the truth about their nature

- The lies cancel out to point to the correct solution