

Épreuve de section européenne

Knights and knaves

Knights and Knaves is a type of logic puzzle. On a fictional island, all inhabitants are either knights, who always tell the truth, and knaves, who always lie. The puzzle involves a visitor to the island who meets small groups of inhabitants. Usually the aim is for the visitor to deduce the inhabitants' type from their statements. Here are 3 examples:

John and Bill are residents of the islands of Knights and knaves.

- **Puzzle 1:**

John says: "We are both knaves"
Who is what?

- **Puzzle 2:**

John: "We are the same kind"
Bill: "We are of different kinds"
Who is who?

- **Puzzle 3:**

John and Bill are standing at a crossroad. You know that one of them is a knight and the other a knave, but you don't know which is which. You also know that one road leads to Death, and the other leads to Freedom. By asking one yes/no question, can you determine the road to Freedom?

Solution to puzzle 1: John is a knave and Bill is a knight. John's statement can't be true, because nobody can admit to being a knave (this is the Liar's paradox).

Solution to puzzle 2: John is a knave and Bill is a knight.

Solution to puzzle 3: You should ask one of them: "Will the other man tell me that your path leads to freedom?". If the man says "No", then the path does lead to freedom, if he says "Yes", then it does not.

Adapted from "*Knights and knaves*", Wikipedia

Questions

1. Explain why nobody on the island can admit to being a knave.
2. Use this fact to prove that John is a knave and Bill a knight in puzzle 1.
3. (a) In puzzle 2, why can't John and Bill be of the same kind?
(b) Can you use this fact to prove that Bill must be the knight?
4. Explain the proposed solution to puzzle 3.