

RAM Maths Circle

August 17, 2025

Nagpur

Introduction

In this class, we explored the basics of propositional logic, the study of statements that can be either true or false. We began with an informal discussion on what logic means and how it connects to reasoning and strategy in games like chess or tic-tac-toe. A proposition was defined as a statement with a definite truth value, illustrated with examples such as “A square is a quadrilateral” (true) and “The sun rises from the north” (false). We then introduced logical operations like AND, OR, followed by puzzles such as the Lady or the Tiger and Knights and Knaves to apply these concepts. The session emphasized how logic structures reasoning and helps solve problems systematically.

Questions

1. The Lady and the Tiger Puzzle

There are two doors, each leading to a different room. Each room may contain either a lady or a tiger. On the doors, the following propositions are written:

- On Door A: “At least one of these rooms contains a lady.”
- On Door B: “A tiger is in the other room.”

Both statements are propositions, meaning each is either true or false. Your task is to determine which room contains the lady.

Hint: Consider the statements as true or false and test for consistency. Let P = “Room A contains a lady” and Q = “Room B contains a lady.” Translate the statements into propositional logic using P and Q , and then deduce the solution.

2. The Knights and Knaves Puzzle

On the island of Knights and Knaves, every inhabitant is either a *Knight* or a *Knave*.

- Knights always tell the truth.
- Knaves always lie.

You meet two islanders: **Mike** and **Edward**. Edward makes the following statement:

“Mike is a knight or I am a knave.”

Determine who is the Knight and who is the Knave. ““

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Task for Students

1. Try the Knights and Knave problem with 6 people as per the given question in homework

