Truth-Tellers and Liars

250

Truth-tellers and Liars Logic Puzzles

- Most Common Setup:
  - You're on an island where each inhabitant is a truth-teller (knight) or a liar (knave).
  - We use knights and knaves since they are one syllabus

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  - You're given some information about some people
  - You need to determine whether each person is a knight or a knave.
  - In some cases, it may be impossible to determine what everyone is, or the situation may be impossible.
- In some problems, you will also have normals/randoms
  - These are people that can tell both truths and lies

Puzzle #1

- Alice and Bob are residents of the island of knaves and knights
- Bob says: “We are both knaves”
- Who is a knave and who is a knight?

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- Ans: Alice is a knight
  Bob is a knave

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- Bob says: “We are both knaves”
- Who is a knave and who is a knight?
- Ans: Alice is a knight
  - Bob is a knave
    - Bob’s statement cannot be true
    - A knave admitting to being a knave would be the same as a liar telling the truth that "I am a liar"
- This is known as the liar paradox

Puzzle #2

- Charlie and Dean are residents of the island of knaves and knights
- Charlie says: “We are of different kinds”
- Dean says: “We are the same kind”
- Who is a knave and who is a knight?

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  - Ans: Charlie is a knight
    Dean is a knave

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- Charlie says: “We are of different kinds”
- Dean says: “We are the same kind”
- Who is a knave and who is a knight?
  - Ans: Charlie is a knight
    Dean is a knave
  - The two statements are contradictory
  - One has to be a knight and the other a knave
  - Since that is exactly what Charlie said, Charlie must be the knight

Puzzle #3

- You meet a single person named Ethan
- You want to know if they are a knave or a knight
- You may ask them a single question
- What question do you ask them?

Puzzle #3

- You meet a single person named Ethan
- You want to know if they are a knave or a knight
- You may ask them a single question
- What question do you ask them?
  - Ans: “Are you a teapot?”
  - If they respond yes : They are a knave
  - If they respond no: They are a knight

Puzzle #4- Most Famous Rendition

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- Freya is standing in front of the left road
- Gabby is standing in front of the right road
- One of them is a knight and the other a knave, but you don't know 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?

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  - Ans: Ask one: “If I asked you if your bridge would lead me to my death, what would you say?”

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- 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?
  - Ans: Ask each: “If I asked you if your bridge would lead me to my death, what would you say?”
  - The knave will be forced to lie about the lie they would tell and would then answer with a double negative
  - Both knight and knave will give the correct answer.

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  - Ans: Ask each: “Would *the other person* tell me that *your* door leads to Freedom?”

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  - Ans: Ask each: “Would *the other person* tell me that *your* door leads to Freedom?”
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  - Both knight and knave will give the correct answer.

Puzzle #5: Goodman’s 1931 Variant

- Three inhabitants Hugo, Iris, James meet some day
- Hugo says either “I am a knight” or “I am a knave”, we don't which
- Iris says “Hugo said, ‘I am a knave’”
- Iris says “James is a knave”
- James says “Hugo is knight”
- Who is a knave and who is a knight?

Puzzle #5: Goodman’s 1931 Variant

- Three inhabitants Hugo, Iris, James meet some day
- Hugo says either “I am a knight” or “I am a knave”, we don't which
- Iris says “Hugo said, ‘I am a knave’”
- Iris says “James is a knave”
- James says “Hugo is knight”
- Who is a knave and who is a knight?
  - Ans: Hugo is a knight
    Iris is a knave
    James is a knight

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- Iris says “Hugo said, ‘I am a knave’”
- Iris says “James is a knave”
- James says “Hugo is knight”
- Who is a knave and who is a knight?
  - Ans: Hugo is a knight
    Iris is a knave
    James is a knight
  - Since a knave always lies, they cannot admit their own identity, so Hugo could not have admitted to being a knave
  - This means that Iris must be a knave
  - Iris’s allegation directed at James must be false, so Hugo and James must be knights

Puzzle #6

- You meet Kenny, Lily, and Max who are all different classes
- Kenny, Lily, and Max are either a knight, a knave, or a normal (Remember: normals can tell lies or truths)
- Kenny, Lily, and Max know who each of the other two people are

Puzzle #6

- You meet Kenny, Lily, and Max who are all different classes
- Kenny, Lily, and Max are either a knight, a knave, or a normal (Remember: normals can tell lies or truths)
- Kenny, Lily, and Max know who each of the other two people are
- Kenny says “I am the knight,”
- Lily says “I am the knave,”
- Max says “Lily is the knight.”
- Who is the knight, the knave, and the normal?

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- Kenny, Lily, and Max are either a knight, a knave, or a normal (Remember: normals can tell lies or truths)
- Kenny, Lily, and Max know who each of the other two people are
- Kenny says “I am the knight,”
- Lily says “I am the knave,”
- Max says “Lily is the knight.”
- Who is the knight, the knave, and the normal?
- Ans: Kenny is a knight
  Lily is the normal
  Max is the knave

Puzzle #7

- Kenny says “I am the knight,”
- Lily says “Kenny is telling the truth,”
- Max says “I am the normal”
- Who is the knight, the knave, and the normal?

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- Kenny says “I am the knight,”
- Lily says “Kenny is telling the truth,”
- Max says “I am the normal”
- Who is the knight, the knave, and the normal?
- Ans: Kenny is a knight
  Lily is the normal
  Max is the knave

Puzzle #8

- Kenny says “I am the knight,”
- Lily says “I am the knight,”
- Max says “I am the knight”
- Who is the knight, the knave, and the normal?

Puzzle #8

- Kenny says “I am the knight,”
- Lily says “I am the knight,”
- Max says “I am the knight”
- Who is the knight, the knave, and the normal?
- Ans: Any of the three can be the knight, knave, and normal

Puzzle #8

- Kenny says “I am not the normal,”
- Lily says “I am not the normal,”
- Max says “I am not the normal”
- Who is the knight, the knave, and the normal?

Puzzle #8

- Kenny says “I am not the normal,”
- Lily says “I am not the normal,”
- Max says “I am not the normal”
- Who is the knight, the knave, and the normal?
- Ans: No solutions

The Hardest Logic Puzzle Ever

Three gods Athena, Apollo, and Hermes are called, in no particular order, True, False, and Random.

True always speaks truly, False always speaks falsely, but whether Random speaks truly or falsely is a completely random matter.

Your task is to determine the identities of Athena, Apollo, and Hermes by asking three yes–no questions; each question must be put to exactly one god.

The gods understand English, but will answer all questions in their own language, in which the words for yes and no are *da* and *ja*, in some order.

You do not know which word means which.