

Logic puzzles.

Knights, Knaves, and Tourists.

There is an island far, far away, whose inhabitants are quite unusual. Some of them never tell a lie, and others never say a true statement. Those who never lie call themselves knights, and those who never tell the truth are known as knaves. Even though they have different personalities, knights and knaves cannot be told apart by appearance: they wear the same type of clothes, and have the same haircuts.

Sometimes tourists visit this island. The tourists are regular people: sometimes they tell the truth, and sometimes they lie.

1. While visiting the Island of Knights and Knaves, you meet a boy who tells you that he is a knave. Does he live on the island or is he a tourist?
2. Two island boys, Sam and Bob, are introducing themselves to you. Sam says, “At least one of us is a knave.” Can you figure out who is what?
3. While visiting the Island, you meet a group of three islanders: Tom, George, and Betty. You ask each of them the same question: “How many knights are in your group?” Tom replies, “None.” George says, “One.” Can you figure out from these answers how many of them are knights, and who they are?
4. You come to a party to which knights, knaves, and tourists were invited. Every single person at this party tells you that there is at least one knave in the room. How many knights and knaves are actually at this party?
5. Twenty inhabitants of the Island of Knights and Knaves are spending an evening at the beach. At some point, each person says to all the others, “You are all knaves!” How many knaves are there at the beach?
6. Of the three friends, Ben, Cen, and Den, one is a knight, one is a knave, and one is a tourist. When asked: “What is Cen?” the three friends replied as follows.
Ben: “Cen is a knave.”
Cen: “I’m a tourist.”
Den: “Cen is a knight.”
Who is what?

7. Seven islanders, each either a knight or a knave, are sitting around a table, and each of them says: "One of my two neighbors is a knight and the other is a knave." Who is sitting at the table?
8. A long time ago on the Island of Knights and Knaves there lived three friends, all mighty warriors. Their names were Ronald, Donald, and Archibald. One of them was a knight, and two were knaves. The friends kept their affiliations secret. One of their great deeds was a battle with a terrible dragon that was terrorizing the kingdom. Not much is known about this battle except that the dragon was killed by a knight. In a recently discovered old letter, Ronald states that Archibald had killed the dragon. Can you tell us who actually killed the dragon?
9. On the Island of Knights and Knaves, you are approached by three people, Jim, Jon and Joe. Jim says, "at least one of the following is true, that Joe is a knave or that I am a knight." Jon says, "Jim could claim that I am a knave." Joe says, "neither Jim nor Jon are knights." Who is a knight and who is a knave?
10. While visiting the Island of Knights and Knaves, a traveler met three islanders and asked each one of them: "How many of the other two islanders are knights?" The first one said: "None." The second one said: "One." What did the third one say?
11. Each of the four islanders, Bim, Tim, Kim, and Sim, is either a knight or a knave. We have overheard the following conversation.
 Bim said to Tim: "You are a knave!"
 Tim said to Kim: "You are a knave!"
 Kim said to Sim: "They're both knaves. And you are a knave, too."
 Are there any knights in this group? If so, who are they?
12. On the Island of Knights and Knaves, some inhabitants claim that an even number of knights live on the island, while the rest claim that there is an odd number of knaves on the island. Is it possible that the population of the island is an odd number?
13. On the Island of Knights and Knaves, you come across three people. One wears blue, one wears red, and one wears green. You know that one is a knight, one is a knave, and one is a tourist. "Who is the tourist?" you ask. The man wearing blue says, "That man in red is the tourist." The man wearing red says, "No, the man in green is the tourist." The man wearing green says, "No, the man in red is in fact the tourist." Who is the tourist? Who is the knight and who is the knave?

Various puzzles about true and false statements.

1. Pete's cat always sneezes 24 hours prior to a rainstorm. Today his cat sneezed. "It will rain tomorrow," thought Pete. Is he right?
2. Three friends with the last names Brown, Black, and Red got together one day. One of them, who had black hair, pointed out: "One of us has brown hair, one has black hair, and one has red hair, but none our last names corresponds to his hair color." "You are right," said Brown. What color hair does each of the friends have?
3. Four men are taken to police headquarters following a bank robbery. The police are certain that one of the men is guilty, but they don't know for sure which one did it. Here's what the four men had to say for themselves:
Alan: "Bill did it."
Bill: "Don did it."
Charlie: "I didn't do it."
Don: "Bill lied when he said I did it."
If only one of the four statements is true, who is the guilty man?
4. Tweedledee and Tweedledum look alike. Tweedledee always lies on Mondays, Tuesdays, and Wednesdays, and always says the truth on the other days. Tweedledum always lies on Thursdays, Fridays, and Saturdays, and always says the truth on the other days. Suppose you meet them and they make the following statements A and B. Determine who said what and which day of the week it is.
A: I will lie tomorrow.
B: I lied yesterday and I will lie tomorrow.
5. Before a soccer game between North and South, five predictions were made:
 - (a) There won't be a draw.
 - (b) North will score against South.
 - (c) North will win.
 - (d) North won't lose.
 - (e) Three goals will be made, in total.

After the match, it was noted that exactly three of these predictions turned out to be true. What was the final score?

6. Of the four statements given below about a natural number n , two are true and two are false.
- n is divisible by 5
 - n is divisible by 11
 - n is divisible by 55
 - n is less than 10

What is n ?

7. One boy always tells the truth on Thursdays and Fridays, always tells the truth on Tuesdays, and randomly tells the truth or lies on other days of the week. On seven consecutive days he was asked what his name was, and on the first six days he gave the following answers in this order: John, Bob, John, Bob, Peter, Bob. What did he answer on the seventh day?
8. Three athletes, Kan, Ga, and Roo, took part in a marathon race. Before the race, four spectators discussed the athletes' chances. The first said: "Either Kan or Ga will win." The second said: "If Ga comes in second, then Roo will win." The third said: "If Ga comes in third, then Kan will not win." The fourth said: "Either Ga or Roo will come in second." It turned out that Kan, Ga, and Roo were the top three athletes in the race, and all four statements were true. In what order did they finish?
9. A magical kingdom is inhabited by dragons with six, seven, and eight heads. Those with 7 heads always lie, and those with 6 or 8 heads always tell the truth. One day four dragons met. The blue dragon said, "Together we have 28 heads." The green dragon said, "Together we have 27 heads." The Yellow dragon said, "Together we have 26 heads." Finally, the red dragon said, "Together we have 25 heads." How many heads did all these dragons have?
10. If an octopus has an even number of legs, it always tells the truth, but if it has an odd number of legs, it always lies. One day a green octopus said to a blue one, "I have eight legs. You only have six."
"I have eight legs. You have just seven," indignantly replied the blue octopus.
"The blue octopus really does have eight legs," agreed the purple octopus. "I have nine," added he.
A striped octopus joined in, saying, "None of you have eight legs. I'm the only one who does!"
Which of these octopuses actually has eight legs?

Guessing numbers.

1. Alice wrote two consecutive natural (positive integer) numbers on two pieces of paper, and gave one to Bob and one to Crystal. They don't know who got the smaller number and who got the larger number. Bob said right away: "I know your number." What are the two numbers?
2. Alice wrote two consecutive natural numbers on two pieces of paper, and gave one to Bob and one to Crystal. They don't know who got the smaller number and who got the larger number. Then we hear the following dialog between them.
Bob says: "I don't know your number."
Crystal replies: "Now I know your number!"
What are the two numbers?
3. Alice wrote two consecutive natural numbers on two pieces of paper, and gave one to Bob and one to Crystal. They don't know who got the smaller number and who got the larger number. Then we hear the following dialog between them.
Bob says: "I don't know your number."
Crystal replies: "I don't know your number either."
Bob says: "I still don't know your number."
Crystal exclaims: "Now I know your number! It is a divisor of 30."
What are the two numbers?

Knights, Knaves, and and their language.

We now visit another island in the archipelago of knights and knaves. On this island, there are no tourists, only knights who always tell the truth, and knaves who always lie. But these knights and knaves are of an older clan, and they do not speak English. They understand English perfectly well, but will only respond with “da” and “ja.” These words mean “yes” and “no,” but which is which, you do not know.

1. You meet a local man. You want to know the meanings of “ja” and “da.” How can you find this out with just one question?
2. You meet a local. You may ask one yes/no question. He will respond with “da” or “ja,” but you do not know which means “yes” and which means “no.” How can you find out if he is a knight or knave with just one question?
3. On the island of knights and knaves, you approach a fork in the road. A person stands before you, either a knight or a knave. You know that one road leads to freedom, and the other to certain death. You may ask the person one questions, to which he will respond either “ja” or “da.” How can you determine the path to freedom?