

Logic Problems. ¹

1. In the city of OZ, anyone 40 years or older always tells the truth and anyone under 40 never tells the truth. A census taker knocks on the married couple's door. The husband opens the door. 'I am the census taker,' says the visitor, 'and I need information about you and your wife. Which, if either of you, are under the age of 40?' 'We are both under 40!' said the husband angrily as he slammed the door. How did the census taker sort out the facts.

2. Lucy, Minnie, Nancy, and Opey ran a race. Each was asked how the race turned out. Their replies:
Lucy: Nancy won. Minnie was second.
Minnie: Nancy was second. Opey was third.
Nancy: Opey was last. Lucy was second.
If each girl made exactly one true statement, who won the race?

3. The three statements below are all true.
 1. Either A is not guilty or B is guilty.
 2. Either B is not guilty or C is not guilty.
 3. If A is guilty, then B and C are both guilty.Where does the guilt lie?

4. A says "*B* is a liar or *C* is a liar";
B says "*A* is a liar";
C says "*A* is a liar and *B* is a liar". Who is telling the truth?

5. What logical conclusion can be drawn from:
A says both *B* and *C* tell the truth;
B says *A* tells the truth;
C says *A* and *B* are both liars?

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6. Three men named Arnold, Brown, and Clark hold the positions of shipper, driver, and manager in a certain company.
 If Clark is the shipper, Brown is the driver.
 If Clark is the driver, Brown is the manager.
 If Brown is not the shipper, Arnold is the driver.
 If Arnold is the manager, Clark is the driver.
 Who held each of the positions?

7. The King is about to die. To determine who will succeed him as king, He sends messengers throughout the land seeking the three smartest people. Finally they are found. He gives them a task to see which one is the wisest. He tells them, "I will seat you in a triangle so that each of you faces the other two. After you are blindfolded I will paint a dot on each of your foreheads. Each dot will be red or green so that there can be any combination of red and green dots, for example, 1 red and 2 greens, or all red, etc. When I remove the blindfolds each of you must raise your hand if you see any green dots, i.e. 1 or 2 dots. As soon as you have figured out what color your own dot is, lower your hand and tell me." So he seats them, blindfolds them, and then paints a green dot on all three foreheads. When the blindfolds are removed, all three hands go up. After a long pause, one hand comes down and the man says, "Your majesty, I have a green dot." How did he know?

8. In each of four houses lives a family with a boy, a girl, and a pet rabbit. One child has mastered alphabetical order and listed all twelve names in the grid.

	1	2	3	4
Girl	Alice	Donna	Gail	Kelly
Boy	Brian	Eric	Harry	Larry
Rabbit	Cottontail	Flopsy	Jumper	Mopsy

It so happens that in this listing exactly one girl, one boy, and one rabbit is listed at the correct address. It is also known that neither Harry nor Brian lives at number 3, and neither Donna nor Jumper lives at number 1. Gail's house number is one less than Mopsy's house number and Brian's house number is one less than Cottontail's. Who lives where?

9. Six glasses are lined up in a row. The first three are filled with water, and the last three are empty. Your goal is to reposition them so that those with water alternate with those without water. The trouble is that you are allowed to move just one glass. Can you do it?

10. ‘You’re not ready to see this’ said Ms. Ahlin to her class of 33 students. ‘Close your eyes’, she commanded. All the boys and one-third of the girls closed their right eyes; all the girls and one-third of the boys closed their left eyes. How many students were able to get a peek, despite Ms. Ahlin’s request?
11. Before a soccer game between North and South, there were five predictions:
- (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 were made in total.

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

12. Five teams played in a competition and every team played each of the four other teams once. Each team received three points for a match it won, one point for a match it drew and no points for a match it lost. At the end of the competition the points were: Yellows 10, Reds 9, Greens 4, Blues 3 and Oranges 1. How many matches did the Greens win against the other four teams?
13. Mrs. Langtree was tutoring two of her students, Richard and Selina, after school. When she noticed that her yardstick was missing she knew that one of them had taken it. She also knew that one of them always told the truth and the other always lied but couldn’t remember who lied and who told the truth. She asked the students who had taken her yardstick and got these replies:
- Richard: Selina took the yardstick. Selina: The liar took the yardstick.
- Based on this information can she determine who told the truth and who took the yardstick?

14. Cody has five students in his class and each of them always tells the truth or always lies. Cody, frustrated, asks, "Isn't there anyone who won't lie to me?" He gets these replies:

Alicia: None of us are truth-tellers or all of us are truth-tellers.

Brandin: Exactly one of us is a truth-teller.

Candyce: Exactly two of us are truth-tellers.

Denice: Exactly three of us are truth-tellers.

Emily: Exactly four of us are truth-tellers.

Who are the liars?

15. In the land of Logicia, every citizen is either a truth-teller or a liar. One day Juanita encounters four citizens sitting together on a park bench. In an attempt to start a conversation she asks, "Which of you are truth-tellers?" They reply:

Kenneth: Everyone else is lying. Luann: At least two of us are truth-tellers. Maurice: Kenneth and Nellie aren't both telling the truth - at least one of them is lying. Nellie: Luann and Maurice aren't both lying - at least one of them is telling the truth.

Which of them are truth-tellers and which are liars?

16. Inspector Quincy of Logicia is called in to investigate the theft of Cody's horse. He rounds up six suspects and obtains these statements from them:

Rena: Umberto stole the horse. Samuel: Rena is a liar. A woman stole the horse. Tammy: Only one of your male suspects is a truth-teller. Umberto: A truth-telling man stole the horse. Vanessa: A liar stole the horse. William: Samuel or Vanessa stole the horse. Both of them are telling the truth.

Can Quincy solve the crime based on these statements?

17. Each statement is either True or False.

1 There is at least one false statement on this test.

2 Statement 4 is true.

3 There are at least two consecutive true statements on this test.

4 Exactly two of the next three statements are false.

5 Statements 1 and 2 are true.

6 There are at least two consecutive false statements on this test.

7 The next statement is false.

8 Exactly half of the odd-numbered statements on this test are true.

What are the correct answers on this test?

18. Find a ten-digit positive integer that has these properties: The left most digit is the number of times zero appears in the number, the next digit is the number of times one appears in the number, the next digit is the number of times two appears in the number, and so on until the last digit is the number of times nine appears in the number. Such a sequence is called self-referencing.
19. In a certain competition, each of six contestants competes in each of four events. For each event a judge awards points as follows: 10 points for first place, 6 points for second place, 3 points for third place and 1 point for fourth place. After the four events are completed the contestant with the highest point total is the winner. a) If there is no tie for first place what is the lowest possible score for the winner? b) If there is no tie for any place what is the lowest possible score for the winner?
20. Classmate Harry, Ignacio, Julia, Karen, and Leanne are comparing their heights. Place the students in order from tallest to shortest based on this information: The tallest student is a girl. Ignacio is shorter than all three girls. Harry is not the shortest student in the group. Leanne is not the tallest student in the group, but there are at least two students who are shorter than she is. Julia is the third-tallest student in the group.
21. Another True-False test written by a teacher with an odd sense of humor. Find the correct answers. This problem is due to Cody Patterson.
 - 1 Every even-numbered statement on this test is false.
 - 2 Statement 7 is true.
 - 3 There are three consecutive statements on this test, all of which are true.
 - 4 Statements 1 and 10 are either both true or both false.
 - 5 There are exactly five true statements on this test.
 - 6 There are more true statements on the test before this statement than there are after this statement.
 - 7 More than half of the first five statements are false.
 - 8 Statement 3 is false.
 - 9 Of statements 2, 4, and 8, at least one is true.

- 10 The sum of the numbers of all the true statements is at least 20, but no larger than 25.
22. In a certain village, there are 50 couples. As it turns out, everyone in the village is having an affair. This despite a particularly gruesome custom which requires a wife, upon discovering that her husband is having an affair, to kill him the following morning. Even more oddly, the women in the town talk quite freely about their activities! In fact they are all perfectly aware that any woman who is having an affair will tell EVERY other woman in the village except, of course, for the wife of the man with whom they are having the affair. Yet life there goes on quite peacefully since no woman can know for sure that her husband is actually having an affair. One day, a well revered wise man visits the village and announces that someone is having an affair. What happens after this?
23. **Camels and Bananas** A camel has to carry 3,000 bananas across a 1,000 mile dessert. There are two conditions:
1. The camel can only carry 1,000 bananas at a time.
 2. The camel eats one banana for each mile he travels. What is the maximum number of bananas that will reach the other side of the desert? What if you have three camels?
24. **Light Switches** A working light bulb is in a closed room with no windows. Outside the room, is a panel of three switches, one of which controls the light inside (up is on, down is off.) You may do anything you like to the three switches and then enter the room to inspect the light. After this, without any further experimentation, you must indicate which switch controls the light. What do you do?
25. Mr. Thomas has given a true-false test but lost the key. He scores students A , B and C , but need to score student D . What is D 's score?

	1	2	3	4	5	6	7	8	9	10	score
A	T	F	F	T	F	F	T	T	F	T	80
B	F	T	F	F	F	T	F	T	F	F	20
C	T	F	T	T	T	F	T	T	T	T	70
D	F	F	T	F	T	F	F	F	T	F	?

26. A machine was programmed to transmit a certain sequence of five digits, all zeros and ones, five times. One time it did it correctly; one time it did so with one mistake; one time it did so with two mistakes; one time it did so with three mistakes; one time it did so with four mistakes. The five transmissions are listed below. Which is the correct sequence? (A) 00001 (B) 00100 (C) 01100 (D) 10010 (E) 10011
27. Exactly one of the statements below is true. Which one is it?
- (a) All of the below
 - (b) None of the below
 - (c) One of the above
 - (d) All of the above
 - (e) None of the above
 - (f) None of the above
28. Thanks to KenKen for this. How many of these statements are true?
- 1 Exactly one of these statements is false.
 - 2 Exactly two of these statements are false.
 - 3 Exactly three of these statements are false.
 - 4 Exactly four of these statements are false.
 - 5 Exactly five of these statements are false.
 - 6 Exactly six of these statements are false.
 - 7 Exactly seven of these statements are false.
 - 8 Exactly eight of these statements are false.
 - 9 Exactly nine of these statements are false.
 - 10 All ten of these statements are false.

When I was typing this, I accidentally typed 'none' when I meant 'nine'. How would that change the problem?

29. Cheryl has a birthday on one of the following: May 15, May 16, May 19, June 17, June 18, July 14, July 16, August 14, August 15, or August 17.

Albert and Bernard are friends of Cheryl. Cheryl tells Albert her birth month and she tells Bernard her birth day. Then the following conversation occurs.
Albert: I don't know Cheryl's birthday and I know Bernard does not know either.

Bernard: I didn't know it but now I do.

Albert: Now I also know it.

What is Cheryl's birthday.

30. Consider the sequence 1, 11, 21, 1211, 111221, 312211, 13112221, 1113213211, ...
What is the next entry in the sequence?

31. Fill in the blanks with digits so that each sentence becomes true.

The number of times the digit 0 appears in the puzzle is ____.

The number of times the digit 1 appears in the puzzle is ____.

The number of times the digit 2 appears in the puzzle is ____.

The number of times the digit 3 appears in the puzzle is ____.

The number of times the digit 4 appears in the puzzle is ____.

32. An even number of coins with an odd total value are arranged in a row. Each of two players alternate taking a coin from one end of the row or the other. Prove that the first player can guarantee getting a larger sum than his opponent.

33. Build an 8-digit number from two 1's, two 2's, two 3's and two 4's so that the 1's have one digit between them, the 2's have two digits between them, the 3's have three digits between them and the 4's have four digits between them. How many such numbers are there, and what is the largest one.?

34. Each statement below is either true or false. What is the sum of the numbers of the false statements.

1 At least one of statement 2,4, and 5 is true.

2 Statements 1 and 3 are both false.

3 Statements 2 and 4 are both true.

4 Statement 5 is false.

5 Exactly one of the statements 1,2,3, and 4 is false.

(a) From Jarvis in Houston: The only time incorrectly is spelled incorrectly is when its spelled correctly. Find the right punctuation.

TWENTY QUESTIONS by Don Woods

Instructions: - Answer all 20 questions (each with a letter from A to E). - Wherever a question refers to an answer or answers, it means YOUR answers, not some hypothetical "best" or "right" answers. - Your score is the number of questions whose answers are correct. - Your goal is to achieve as high a score as possible.

- (a) The first question whose answer is A is: (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
- (b) The next question with the same answer as this one is: (A) 4 (B) 6 (C) 8 (D) 10 (E) 12
- (c) The number of questions whose answer is D is: (A) 2 (B) 3 (C) 4 (D) 5 (E) 6
- (d) The answer to this question is the same as the answers to questions: (A) 6 and 13 (B) 11 and 16 (C) 7 and 20 (D) 1 and 15 (E) 9 and 12
- (e) The answer to question 14 is: (A) B (B) E (C) C (D) A (E) D
- (f) The answer to this question is: (A) A (B) B (C) C (D) D (E) none of the above
- (g) The answer that appears most often is: (A) A (B) B (C) C (D) D (E) E
- (h) Ignoring those that occur equally often, the answer that appears least often is: (A) A (B) B (C) C (D) D (E) E
- (i) The other questions with the same answer as this one, not counting any whose answers are wrong, have numbers whose sum is in the range: (A) 39 to 43, inclusive (B) 44 to 48, inclusive (C) 49 to 53, inclusive (D) 53 to 57, inclusive (E) 54 to 58, inclusive
- (j) The answer to question 17 is: (A) D (B) B (C) A (D) E (E) wrong
- (k) The only two consecutive questions with identical answers are questions: (A) 15 and 16 (B) 16 and 17 (C) 17 and 18 (D) 18 and 19 (E) 19 and 20
- (l) The number of OTHER questions with the same answer as this one is the same as the number of questions with answer: (A) B (B) C (C) D (D) E (E) none of the above
- (m) The number of questions whose answer is E is: (A) 5 (B) 4 (C) 3 (D) 2 (E) 1
- (n) No one answer appears exactly: (A) two times (B) three times (C) four times (D) five times (E) none of the above

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- (o) The only odd-numbered question with answer A is: (A) 7 (B) 9 (C) 11 (D) 13 (E) 15
- (p) The answer to question 8 is the same as the answer to question: (A) 3 (B) 7 (C) 13 (D) 18 (E) 20
- (q) The answer to question 10 is: (A) C (B) D (C) B (D) A (E) correct
- (r) The number of prime-numbered questions whose answers are vowels is: (A) a prime number (B) a square number (C) an odd number (D) an even number (E) zero
- (s) The last question whose answer is B is: (A) 14 (B) 15 (C) 16 (D) 17 (E) 18
- (t) The maximum score that can be achieved on this test is: (A) 18 (B) 19 (C) 20 (D) indeterminate (E) achievable only by getting this question wrong

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