

Math and Logic: Deduction and Speculation

Teacher's Notes

Subject: Mathematics

Topic: Deduction and speculation

Level: Pre-intermediate to upper-intermediate

Age group: 10-14

Learning objectives: to develop and encourage logical thinking

Preparation:

Photocopy one worksheet for every student. Each student needs a dictionary, so ask them to bring one for this lesson. If bringing a dictionary is a problem, then be ready to explain the words from Task 7 yourself.

Tips for solving the puzzle: if your students have difficulty with solving the puzzle, tell them that as each suspect made only *one* false statement, they have to look for the statements that must be true, and for the contradictions.

Answer: Jacob

Speculation:

1 The maid said (in her first statement) that she did not destroy the invention and (in her third statement) that the cook lied by saying she, the maid, did. Since only one of the three statements could be false, both of these must be true. Therefore, her second statement that the cook did it must be a lie. So, we know that both the maid and the cook are innocent.

2 The gardener said that the maid did it, and so we know that this statement is the gardener's one lie. Therefore, his statement, "I am innocent," is the truth.

3 The butler also asserted 'the maid did it', which, as we know, is a lie. So, his other two statements are true. And that means that he is innocent.

Who is left as a culprit? Jacob!

Your students might offer another logical chain, since this one is not the only way to deduce the truth.

Worksheet 1 – pre-reading task

1. What famous detectives do you know? Who is, in your opinion, the most famous detective in the whole world?
2. What did Sherlock Holmes call his famous method of revealing truth?
3. What verb is it derived from?
4. So, did Sherlock Holmes deduce or deduct? Actually, he was not very good at deducting figures, but he was extremely good at deducing facts.
5. Match the verb with the correct explanation:

deduce	to take away money, points, etc. from a total amount
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deduct	to form an opinion about something based on the information or evidence that is available
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6. Fill in the gaps with the correct verb (*deduce* or *deduct*)
 - a. We can _____ a lot from what people choose to buy.
 - b. Ten points will be _____ for a wrong answer.
 - c. Can we _____ from your silence that you do not approve?
 - d. The cost of the books will be _____ from your salary.

Compare your answers with a partner.

7. Look at these words and word combinations often used in detective stories:

COMMIT A CRIME

BE GUILTY

VANDALISM

DO THE DAMAGE

BE INNOCENT

A CULPRIT

SUSPECT

FIND SOMEBODY GUILTY/ NOT GUILTY

Work with your partner using a dictionary. Together you have to find the meanings of these words as quickly as possible. The first pair to finish is the winner.

8. Group these expressions into two columns:

- a. he is guilty
- b. he didn't do the damage
- c. he is innocent
- d. he committed the crime
- e. he did the damage
- f. he is not guilty

He did something bad	He didn't do anything bad

Speculation and Deduction

Read the puzzle and try to figure out who is the culprit. Explain your conclusion.

Mystery of a Destroyed Invention

One evening Sherlock Holmes and Dr Watson were sitting by the fireplace talking about the increasing crime rate in England. Suddenly their discussion was interrupted by a gentle knock at the door.

“There’s a Mrs. Crowfield to see you, Mr. Holmes. She says that she needs your help desperately,” said Mrs. Hudson.

“Will you show her in, please,” answered Holmes, throwing a significant glance at Mr. Watson.

The visitor turned out to be a young woman. She had an agitated look and started talking immediately as she rushed into the room. The woman asked the two men to come with her to her manor, which was a short ride north from London. Holmes and his friend could not refuse to help a lady so they quickly took everything they might need and went to the railway station.

On their way to the manor Mrs. Crowfield told the men about the crime that had been committed in their house. Someone had broken into her husband’s study and destroyed the invention he had been working on for the last several years. Mr. Crowfield turned out to be a scientist and when he had seen his work destroyed, he had had a heart attack, but luckily he was still alive and there was hope for recovery. Mrs. Crowfield couldn’t figure out what anybody had to gain by that hostile act. Was it just vandalism, done out of sheer spite?

Anyway, when Holmes arrived at the manor he discovered that there were 5 suspects:

1. Jacob, Mr. Crowfield’s brother
2. the butler
3. Mrs. Crowfield’s maid
4. the gardener
5. the cook.

Holmes questioned each subject. They each made three statements, two of which were true and one of which was false. And the guilty one was revealed. How quickly can you find the truth?

1. The butler said:

I am innocent.
I have never destroyed anything on purpose.
The maid did it.

2. Jacob said:

I did not do the damage.
The damage was done by someone who really hates my brother.
Nobody helped my brother in his work.

3. The gardener said:

I am innocent.
I never talk to the cook.

The maid is guilty.

4. The maid said:

I did not destroy the invention.

the cook did it.

the butler did not tell the truth when he said I did it.

5. The cook said:

I am innocent.

Mr. Jacob is guilty.

the gardener and I are old friends.