

## The tell-tale key



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### Engage

This story is about Edna my lab technician. Besides being a good friend she is the best lab technician ever! And today we discovered that she could also be an amazing detective. They might even recruit her to CSI... Do you want to know why?

Edna is a very well organized person, and she always maintains the lab safety procedures and takes a very good care of her lab. Nothing escapes her eyes. You could say that the lab is her fortress.

Every morning she opens the lab, and makes sure everything is in order. She turns on the electronic devices and starts preparing the materials for tomorrow's experiments. At the end of the work day she never forgets to turn off all devices in fear of electric failure and to lock the closets containing hazardous materials. And she always double-checks that the door lab is closed before leaving.

This morning she was late to school, and because she is very punctual and never late, she had a strange and bad feeling. When she arrived in school and was just about to enter the lab she was shocked!!! She found the door open, the lights were on, the tools and materials were all a mess and the experiments she prepared for today were scattered on the floor. After checking no dangerous substances that may ignite are around, she ran to the phone and called the school's principal who after called the police.

Half an hour later, two police investigators arrived and began questioning poor shocked Edna. The policemen's questions made Edna feel uncomfortable – she felt that they were suspecting her. After investigating other employees, the police men started to explore the lab in search of evidence. Suddenly in all the chaos, just next to the materials for today's experiment they found an imprint of a black key on filter paper. Edna who was already exhausted from the investigation immediately recognized the special key's silhouette and screamed:

"It's all about the silver!!"

(In Hebrew, Spanish and French silver also translates as money)

She told the policemen she knows who broke into the lab.

The police investigators were confused and did not understand what silver (money) has to do with the break-in and how the key imprint appeared on the paper.

# The tell-tale key



## Explore



Your job is to help the police investigators understand what happened and to issue picture forensic report.

## Activity 1

Your job is to help the police investigators understand what happened and to issue picture forensic report.

### **Preliminary experiment:**

Read all the instruction before you start working

Make sure that u have all the equipment and materials

Arrange your observations in a chart.

### Materials and equipment:

- Petri dish
- Filter paper cut to the shape of the petri dish
- A vial containing solution A
- A vial containing solution B
- 2 Pasteur pipette
- An old key
- 4cm magnesium strip
- Bunsen burner
- Matches
- Clamp

### Procedure:

1. Make sure that the paper fits the Petri dish
2. Use a Pasteur pipette and Drip few drops of solution A on the paper until it is all soaked
3. Use another Pasteur pipette and Drip solution B. Write your observations.
4. Keep drizzling more from vial B until all the paper is covered evenly (it is crucial that the Petri dish will not contain extra fluids and avoid shaking the Petri dish).
5. Place the key on the filter paper.
6. Hold the magnesium with the clamp
7. Light the burner on and bring the magnesium to ignite.

**Make sure you don't look directly to the light. Practice your "side watch"**

8. Place the burning magnesium above the Petri dish until the end burning ends.

# The tell-tale key



9. Remove the key from the paper use gloves or the clamp.
10. Take the paper out carefully and leave it to dry.
11. Check the paper and write down your observations.

## Explain



### Activity 2

1. Make a detailed list of the observations you saw in Activity 1.
2. Compose five questions that you can ask from the observations.
3. Try to ask inquiry questions that checks the connection between two variables. Example: how does *the amount of sun light* affect *the growing of a plant*? Alternatively ask a question relating to what the best conditions are for getting a clear imprint.
4. Pick one inquiry question and write a scientific hypothesis for your question. What do you think will be the answer? Explain your hypothesis using relevant knowledge in chemistry. You can use information sources like text book and internet to write your assumption.

## Extend



1. Plan an experiment that will confirm or refute your hypothesis:
  - a. Define the dependent and the independent variables.
  - b. How will you measure your dependent variable?
  - c. How will you control and change your independent variable (you will have to perform the experiment in at least 3 different sets including a control set).
  - d. What are the constant factors/variables?
  - e. Write a detailed account of the stages of the experiment. Don't forget to relate to a control set. You may want to produce a graphic chart.
2. Make a detailed list of materials and equipment for your experiment.
3. Give the list you made to Edna.

Now you can perform the experiment after it has been approved by the teacher

4. Conduct the experiment as you planned above.
5. Make sure you keep a clear, detailed and accurate account of all observations. You may use your mobile device to document the observations.
6. Present your observations and results in an organized manner (table or illustration).
7. Try to process your results into a graph.

# The tell-tale key



8. Explain any trends in the results.
9. Analyze and explain the results you got based on relevant scientific knowledge

## Conclusion

10. Based on all your experimental results, what conclusions can you reach?
11. Relate to your hypothesis – were you able to accept or refute it?
12. In a group discussion:
  - a. In a critical way relate to your results (how accurate were they, what are the limitations, etc.)
  - b. In a critical way relate to the validity of your conclusions.
  - c. What changes would you make to the experiment (would you change the hypothesis or the experimental design?)
  - d. Write further questions arising from the whole lab.
13. In your opinion write why an imprint of the key was obtained.  
What were the conditions that led to the imprint appearing? What happened that morning?

## Evaluate



- Write a detailed lab report
- Write a separate report for the police explaining how the key imprint was obtained and how it helped them get to the culprit. This report should include photos.
- What did the lab technician mean when she shouted: "It's all about the silver (money)!!"