

Density Testing

Casper Forensic Laboratory: Notebook

Interview with student Matt:

Matt says that he was carrying his metal work project in a large garbage bag at about 11am on the morning of the computer theft.

Evidence logged out for test:

Metal link found in garbage bag (Matt's evidence bag)

Metal link from chain securing computer (Computer laboratory 4 evidence bag)

Casper Forensic Laboratory Investigation:

Aim:

To identify whether two metals are the same type of metal by comparing their densities.

Equipment (in addition to the evidence):

- String
- 100mL measuring cylinder
- scales
- water
- calculator

Procedure

1. Find the mass of the metal from Matt's evidence bag.
2. Place exactly 50mL of water into the measuring cylinder.
3. Tie a piece of string to the metal link and lower it into the water in the measuring cylinder.
4. Record the new volume on the measuring cylinder and calculate the volume of the metal.
5. Calculate the density of the metal using the formula:

$$\text{Density (g/mL)} = \frac{\text{mass (g)}}{\text{Volume (mL)}}$$

Repeat steps 1-5 for the metal link from the chain securing the computer.

Results

Table 1: Densities of the metals.

Source of metal	Mass (g)	Volume (mL)	Density (g/mL)
Metal link from garbage bag			
Metal link from Computer Lab. 4			

Analysis of the results

In your opinion, did the metal link from Matt's garbage bag originate from the chain used to secure the stolen computer in Computer Laboratory 4? What evidence do you have to support your conclusion?

Explain how this investigation has increased your understanding of events in Computer Laboratory 4 on the day of the crime.

Do you need to update your Evidence Summary?

Suggested Answers – Density Testing

Results

The results for this experiment will vary depending on what types of metals are in the evidence bags. The metals should have different densities.

Analysis of the results

1. In your opinion, did the metal link from Matt's garbage bag originate from the chain used to secure the stolen computer in Computer Laboratory 4? What evidence do you have to support your conclusion?

Students should identify that the metal in Matt's evidence bag has a different density than the metal chain used to secure the computer in Computer Laboratory 4. Therefore, the link from Matt's garbage bag did not originate from the chain used to secure the stolen computer.

2. Explain how this investigation has increased your understanding of events in Computer Laboratory 4 on the day of the crime.

Idea: Matt did carry something metal in the garbage bag, however, there is no evidence that he carried part of the metal chain securing the computer in his garbage bag.

Evidence: Students should briefly describe the procedure for the investigation, and identify that as the density of the metals differed, the chain links must have been made of different substances.