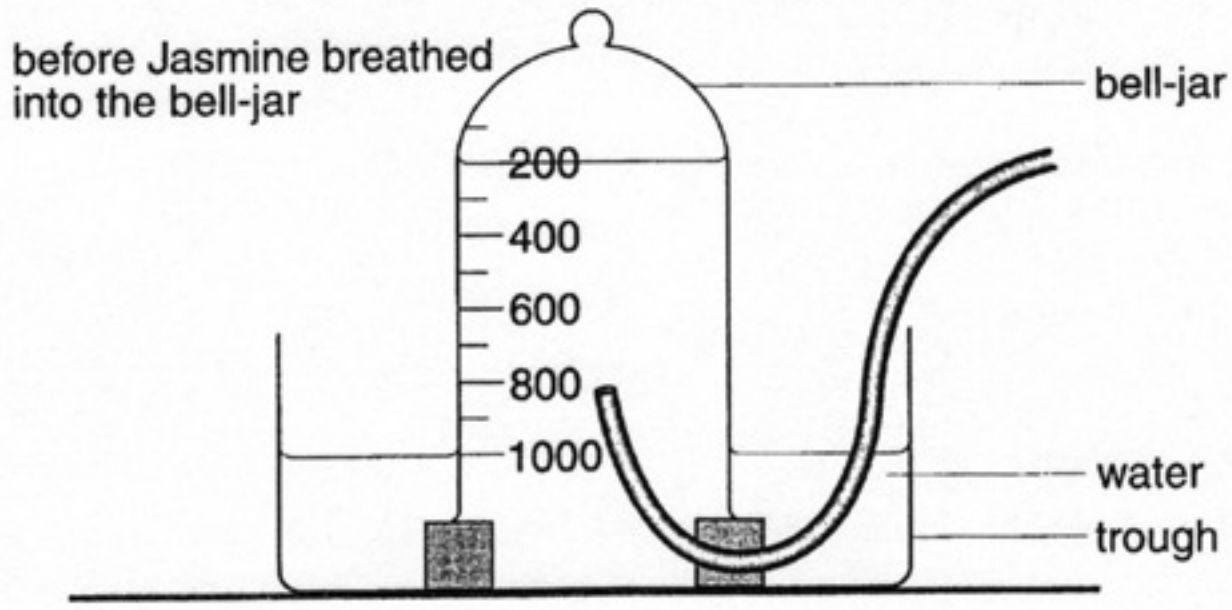
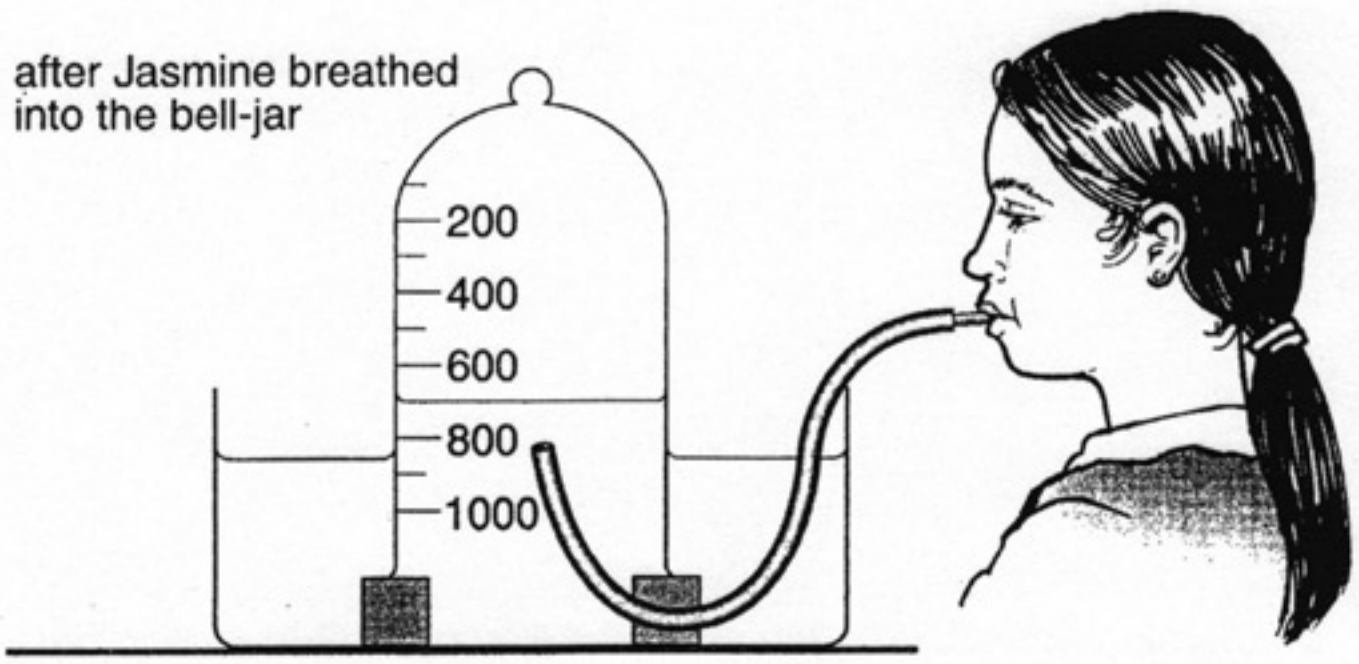
3. (a) Jasmine was trying to find out how much air she breathed out in one breath.
She poured water into a bell-jar and placed it upside down in a trough of water.
The bell-jar had a scale marked in cm^3.





(i) How much air did Jasmine breathe out?

1 mark

_____ cm^3

(ii) Air contains carbon dioxide, nitrogen, noble gases, oxygen and water vapour.

Give **three differences** between the composition of the air Jasmine breathed in and the air she breathed out.

Compared to the air she breathed in, the air she breathed out contained:

3 marks

1. _____

2. _____

3. _____

(c) He made a second thermometer which was identical to the first.
Why could he **not** use it to measure the temperature of some hot sugar syrup at 110°C?

1 mark

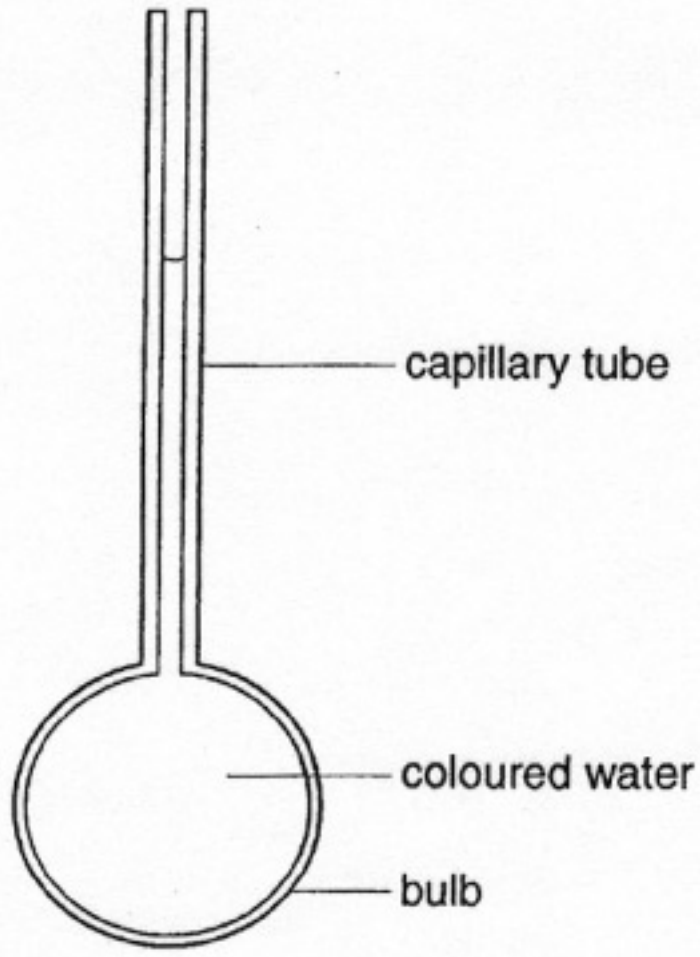
(d) Hassan took an identical thermometer at room temperature and placed the bulb in some water at about 60°C. He noticed that the water in the capillary tube dropped slightly before it started to rise.
Tick the box by the correct explanation for his observation.

1 mark

The volume of water in the thermometer decreased before the water expanded.	☐
The volume of the glass bulb increased before the water expanded.	☐
The volume of the glass bulb decreased before the water expanded.	☐
The volume of the glass bulb decreased before the glass expanded.	☐

maximum 5 marks

10. Hassan made a simple thermometer by blowing a bulb on the end of a glass capillary tube and filling it with coloured water.



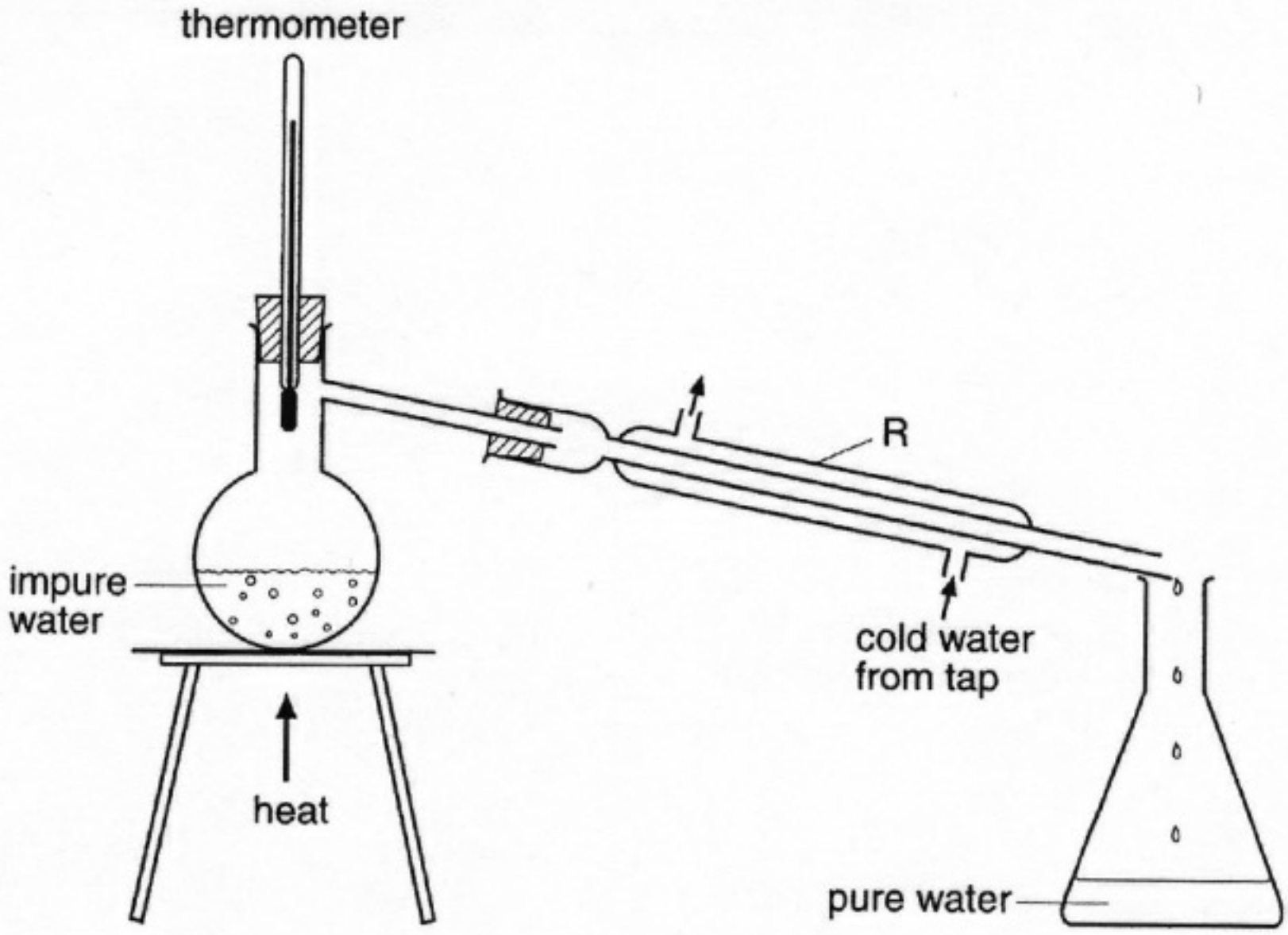
(a) When he warmed the bulb, the water expanded and rose up the tube. Explain, in terms of the water molecules, why this happened.

2 marks

(b) He wanted to measure the temperature in his freezer, so he left the thermometer in the freezer overnight. The next morning he found that the glass bulb of his thermometer had broken.
Suggest why this had happened.

1 mark

4. (a) The apparatus in the diagram below is used to obtain pure water from impure water.



(i) What temperature would the thermometer show?

1 mark

_____ °C

(ii) What is the function of the piece of apparatus labelled R?

1 mark

_____

_____

(iii) Give the name of the process which purifies water in this way.

1 mark

_____