

**GCSE Physics B (Twenty First Century Science)**  
**J259/04** Depth in physics (Higher Tier)

**Question Set 13**

1 Marshmallows are spongy sweets that have tiny pockets of trapped air. Ling is using marshmallows to investigate the relationship between pressure and volume.

(a) Ling places a small marshmallow inside an air-filled plastic syringe. The open end of the syringe is blocked. The syringe has a millilitre (ml) scale.

The volume of the air inside the syringe is increased by moving the plunger to the left.

The temperature of the air inside the syringe remains constant.

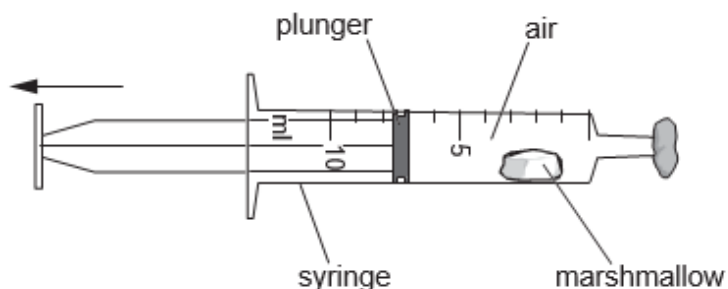


Fig. 4.1

(i) Explain why the marshmallow increases in size when the volume of air inside the syringe is increased. [2]

(ii) Ling makes the following hypothesis.

**Ling**  
The length of the marshmallow is directly proportional to the volume of the air in the syringe.

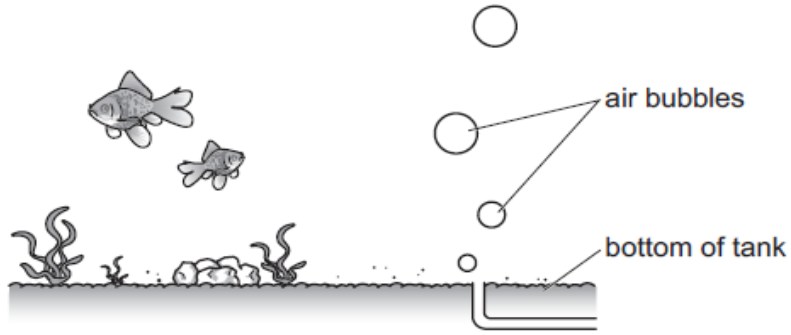


Explain how Ling can take measurements, and analyse the data to check her hypothesis. [3]

(b) Ling has a large fish tank.

Bubbles of air rise through the water from the bottom of the tank, as shown in Fig. 4.2.

The volume of a bubble of air **increases** as it rises to the surface of the water.



**Fig. 4.2**

Ling has the following information about an air bubble.

	<b>Volume of air bubble (mm<sup>3</sup>)</b>	<b>Pressure of air inside air bubble (Pa)</b>
<b>Air bubble at surface</b>	8.8	100 000
<b>Air bubble at bottom of tank</b>		110 000

Calculate the volume, in mm<sup>3</sup>, of the air bubble at the bottom of the tank.

Volume = ..... mm<sup>3</sup> **[3]**

**Total Marks for Question Set 13: 8**

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