

AS Level Physics A
H156/01 Breadth in Physics

Question Set 13

1 This question is about **upthrust** and other forces acting on a sealed hollow tube in water.

One end of a string is attached to the bottom of the tube and the other end of the string is attached to the bottom of the container. The string exerts a downward force F on the tube.

At time $t = 0$, the tube is half submerged in the water, as shown in Fig. 23.1.

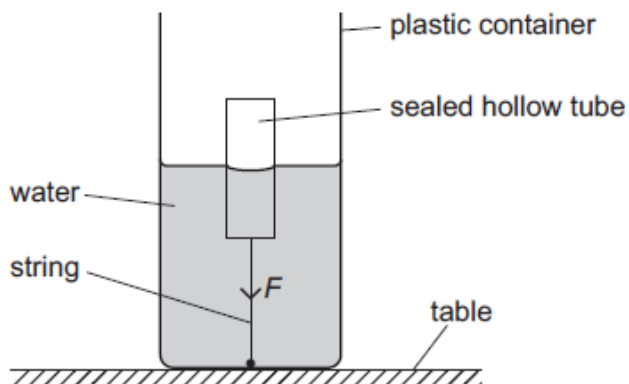


Fig. 23.1

The container is slowly filled with water at a constant rate until the container is full. Fig. 23.2 shows the graph of F against time t .

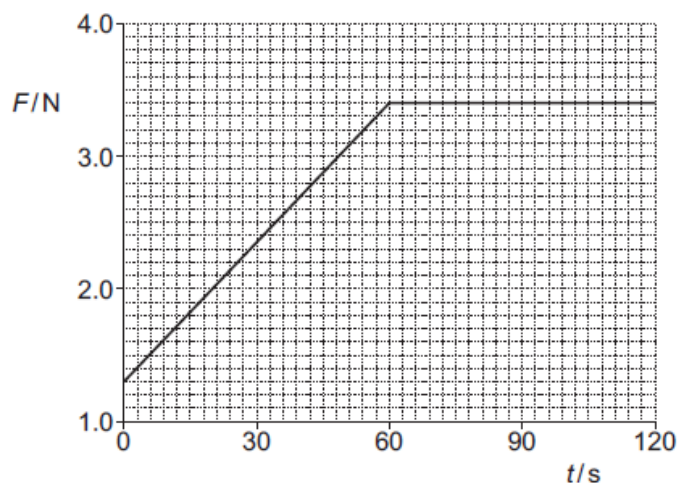


Fig. 23.2

(a) By considering the forces acting on the tube, explain the general shape of the graph shown in Fig. 23.2.

[3]

(b) The container is now full of water. The string is cut and the tube accelerates vertically upwards through the water. The weight of the tube is 0.80 N and the upthrust on the tube is 4.2 N.

Calculate the **initial** upward acceleration a of the tube.

$a =$ _____ m s^{-2}

[3]

- (c) State why the acceleration of the tube decreases as it travels vertically upwards through the water.

[1]

Total Marks for Question Set 13: 7

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