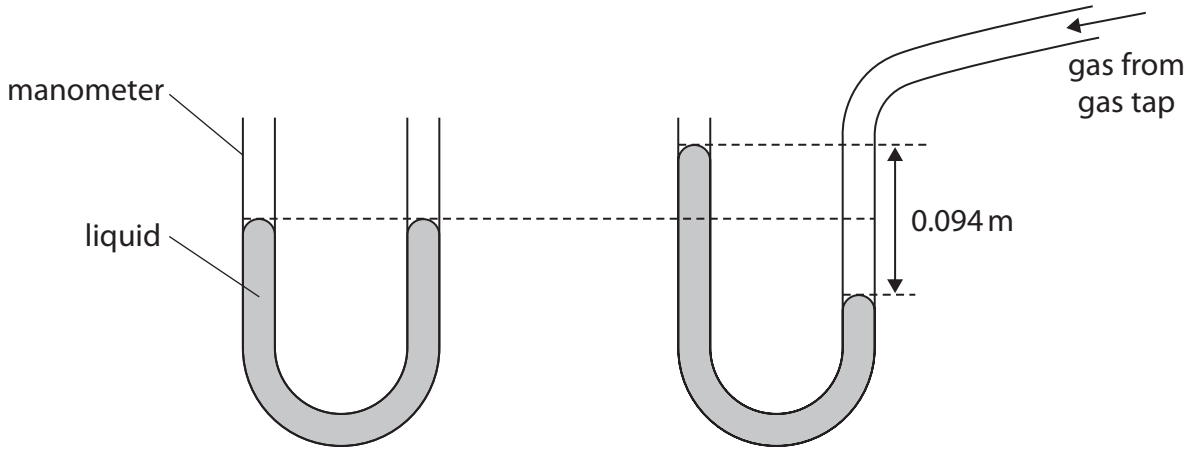
9 A manometer is a device that can be used to measure the pressure difference between gas from a gas tap and the atmosphere.

When a gas tap is connected to the manometer, the liquid in the manometer moves due to the additional pressure of the gas.



Before connecting gas tap After connecting gas tap

(a) The pressure difference is linked to the difference in height of the two surfaces of the liquid by the formula

$$\text{pressure difference} = \text{density} \times g \times \text{height difference}$$

The height difference between the two surfaces is 0.094 m.

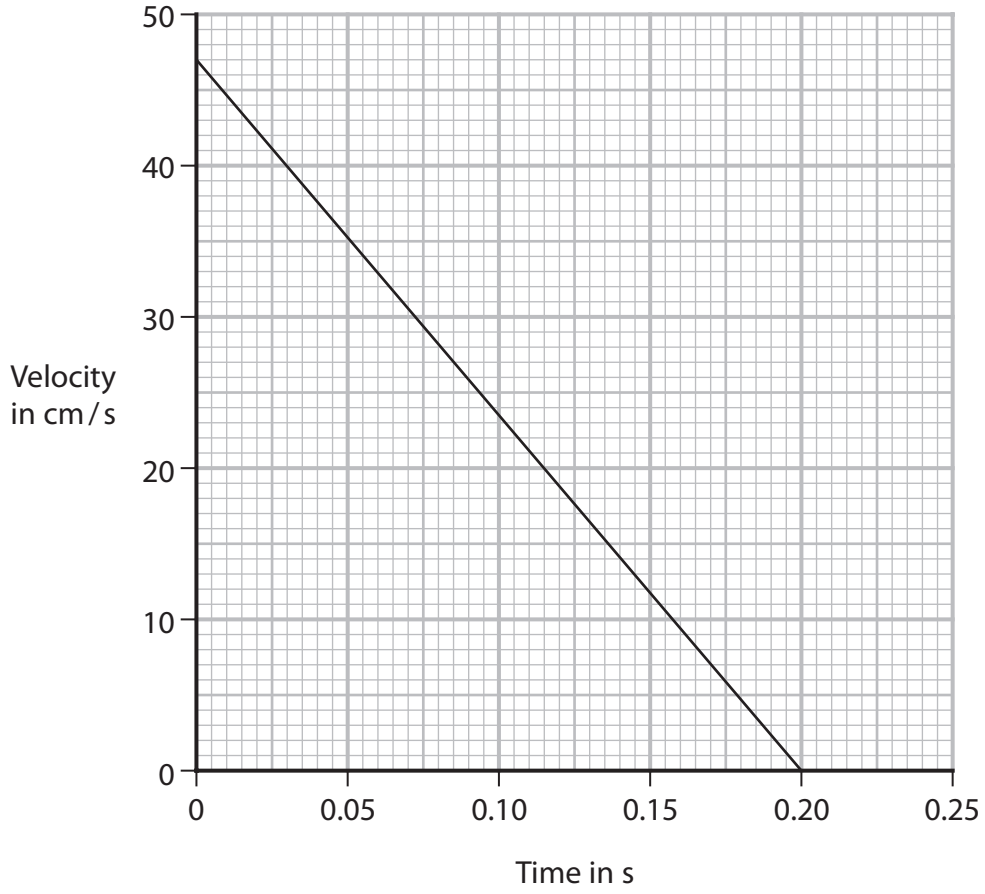
Calculate the pressure difference between the gas from the gas tap and the atmosphere.

[for liquid, density = 14 000 kg / m^3]

(2)

pressure difference = ... Pa

(b) The graph shows how the velocity of the surface of the liquid changes with time from when the gas tap is opened to when the water level stops moving.



(i) Use the graph to show that the distance travelled by the surface of the liquid is 4.7 cm.

(3)

(ii) Calculate the acceleration of the surface of the liquid.

(3)

acceleration = ... cm / s^2

(c) Explain how the gas pressure changes if the temperature of the gas increases.

You should use ideas about particles in your answer.

(3)

(Total for Question 9 = 11 marks)