

8 A student is conducting an experiment in a laboratory to investigate how quickly liquids cool to room temperature.

A beaker containing a hot liquid at an initial temperature of 75°C cools so that the temperature, $\theta^{\circ}\text{C}$, of the liquid at time t minutes can be modelled by the equation

$$\theta = 5(4 + \lambda e^{-kt})$$

where λ and k are constants.

After 2 minutes the temperature falls to 68°C .

8 (a) Find the temperature of the liquid after 15 minutes.

Give your answer to three significant figures.

[7 marks]

8 (b) (i) Find the room temperature of the laboratory, giving a reason for your answer.

[2 marks]

8 (b) (ii) Find the time taken in minutes for the liquid to cool to 1°C above the room temperature of the laboratory.

[2 marks]

8 (c) Explain why the model might need to be changed if the experiment was conducted in a different place.

[1 mark]