3 **(a)** Define *specific heat capacity*.

.....

.....

.....[2]

(b) A student carries out an experiment to determine the specific heat capacity of a liquid using the apparatus illustrated in Fig. 3.1.

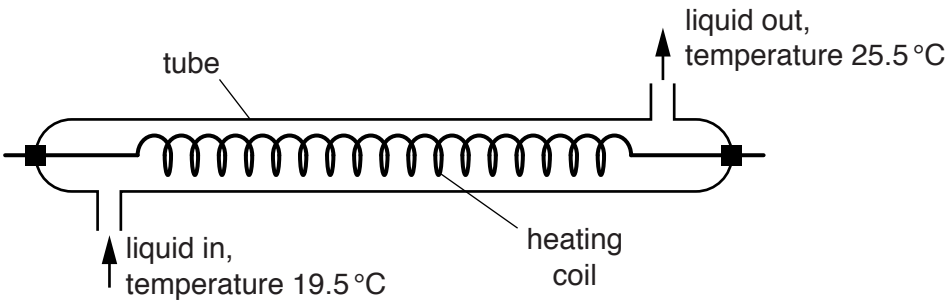

Fig. 3.1

Liquid enters the tube at a constant temperature of 19.5 °C and leaves the tube at a temperature of 25.5 °C. The mass of liquid flowing through the tube per unit time is m. Electrical power P is dissipated in the heating coil.

The student changes m and adjusts P until the final temperature of the liquid leaving the tube is 25.5 °C.

The data shown in Fig. 3.2 are obtained.

m/g s^{-1}	P/W
1.11	33.3
1.58	44.9

Fig. 3.2

(i) Suggest why the student obtains data for two values of m, rather than for one value.

.....

.....[1]

(ii) Calculate the specific heat capacity of the liquid.

Show your working.

specific heat capacity = ... $J\,kg^{-1}\,K^{-1}$ [3]

(c) When the heating coil in **(b)** dissipates 33.3W of power, the potential difference V across the coil is given by the expression

$$V = 27.0 \sin(395t).$$

The potential difference is measured in volts and the time t is measured in seconds.

Determine the resistance of the coil.

resistance = ...Ω [3]

[Total: 9]