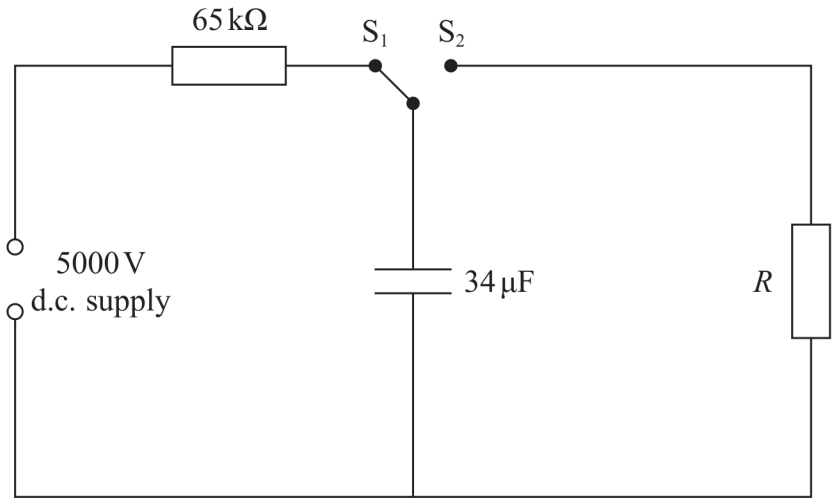
12 A defibrillator is a device that can restart a person's heart. The defibrillator applies an electric current to a person's heart for a short time.

The defibrillator uses a capacitor circuit. A person's body has an electrical resistance *R*.

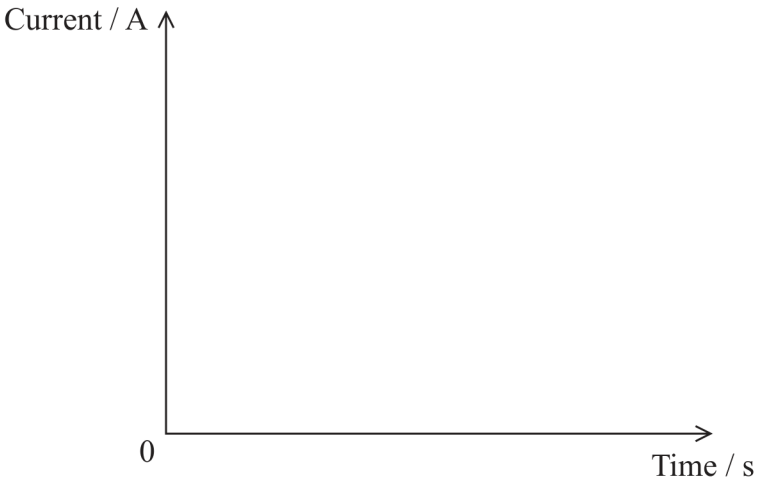
A simplified circuit diagram is shown.



(a) When the capacitor is completely discharged, the two-way switch is moved to position S_1 at time $t = 0$ s.

Complete the graph to show how the current varies with time until the capacitor is fully charged.

(4)



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(b) The capacitor in the defibrillator discharges when the switch is moved to position S_2.

The defibrillator is required to deliver a discharge current of at least 30 A for a time of 2.0 ms.

A typical person's body has an electrical resistance of 150 Ω.

Deduce whether the design of the defibrillator meets this requirement.

(4)

(Total for Question 12 = 8 marks)