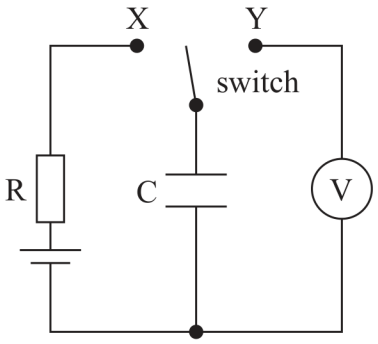
16 A student was investigating capacitors and set up the circuit shown.



The student planned to use the circuit to measure the potential difference V across the capacitor C as it was charged and discharged through the resistor R.

(a) Give two reasons why the circuit did not operate as intended.

(2)

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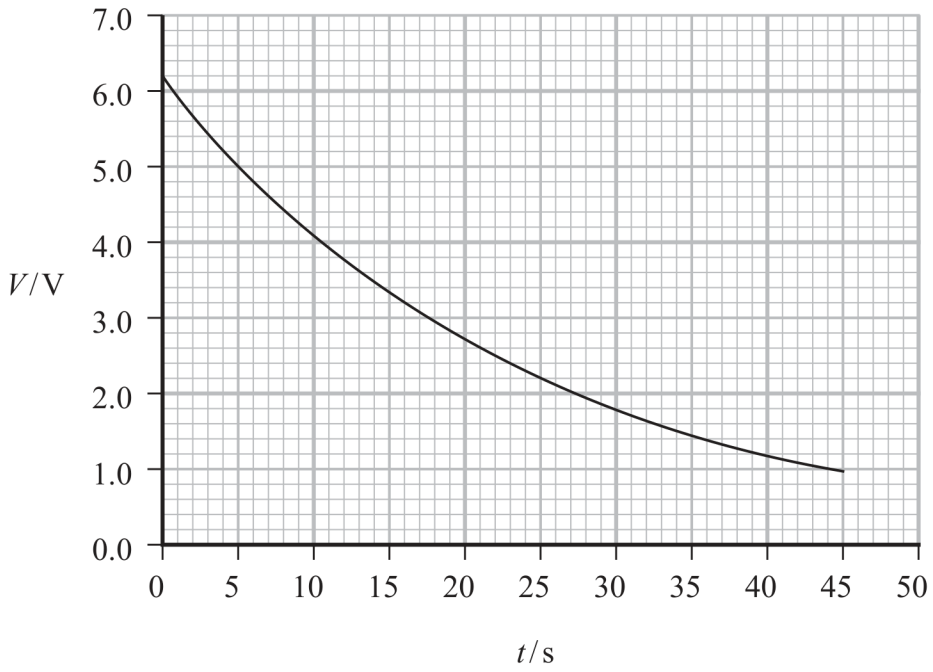
(b) The student moved the switch from position X to position Y at time $t = 0$ s.

The student recorded values of V as t increased and plotted the graph shown.



The capacitance of capacitor C was 2.2 μF.

(i) Determine the resistance in the circuit when the switch was at position Y.

(3)

Resistance = ...

(ii) Determine the average current in the circuit between $t = 0\,s$ and $t = 30\,s$.

(4)

Average current = ...

(iii) Calculate the energy dissipated by the current in the circuit between $t = 0\,s$ and $t = 30\,s$.

(3)

Energy dissipated = ...

(Total for Question 16 = 12 marks)