

**Your task is to carry out an investigation to determine the value of an unknown capacitor by using the method of capacitor discharge.**

**Time Allowed:** You should spend up to **15 minutes** to answer part (a) during which time you will have access to the equipment but should not start to set it up or to start taking measurements until you have finished part (a). The total time for the task is **1¼ hours**.

You are provided with the following equipment

9 V d.c. power supply  
 Voltmeter (or multimeter set on d.c. voltage range)  
 Stopwatch  
 4 mm leads  
 Switch or switches  
 100 kΩ resistor  
 Unknown capacitor

The equation for the discharge of a capacitor is given by:

$$V = V_0 e^{\left(-\frac{t}{RC}\right)}$$

where  $V_0$  is the initial potential difference across the capacitor,  $V$  is the potential difference across the capacitor,  $C$ , after a time  $t$  and  $R$  is the value of the resistor.

- (a) (i) Draw a circuit diagram (or circuit diagrams) to show how you charge a capacitor and then discharge through the resistor  $R$ . [2]

*If you are unsure how to construct the circuit then ask your supervisor for information sheet 1(a). You will be deducted 2 marks for this.*

For supervisor's use only [Tick one box (✓)]	
Yes information sheet <b>needed</b>	
No information sheet <b>not</b> needed	