Q1. A 1000 μF capacitor, initially uncharged, is charged by a steady current of 50 μA. How long will it take for the potential difference across the capacitor to reach 2.5 V?

A 20 s

B 50 s

C 100 s

D 400 s

(Total 1 mark)

Q2. In experiments to pass a very high current through a gas, a bank of capacitors of total capacitance 50 μF is charged to 30 kV. If the bank of capacitors could be discharged completely in 5.0 m s what would be the mean power delivered?

A 22 kW

B 110 kW

C 4.5 MW

D 9.0 MW

(Total 1 mark)

Q3. A 400 μF capacitor is charged so that the voltage across its plates rises at a constant rate from 0 V to 4.0 V in 20 s. What current is being used to charge the capacitor?

A 5 μA

B 20 μA

C 40 μA

D 80 μA

(Total 1 mark)

Q4. A 1000 μF capacitor and a 10 μF capacitor are charged so that the potential difference across each of them is the same. The charge stored in the 1000 μF capacitor is Q_1 and the charge stored in the 10 μF capacitor is Q_2.

What is the ratio $\frac{Q_1}{Q_2}$?

A 100

B 10

C 1

D $\frac{1}{100}$

(Total 1 mark)

Q5. A 1.0 μF capacitor is charged by means of a **constant** current of 10 μA for 20 s. What is the energy finally stored in the capacitor?

A 4.0×10^{-4} J

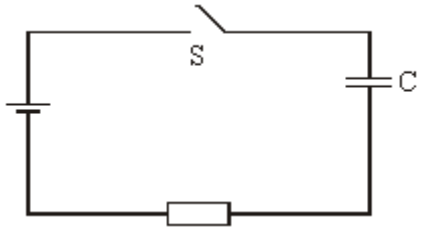
B 2.0×10^{-3} J

C 2.0×10^{-2} J

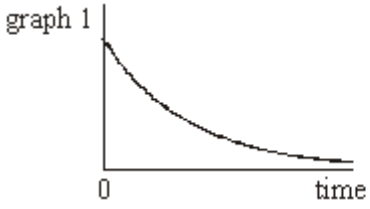
D 4.0×10^{-2} J

(Total 1 mark)

Q6. In the circuit shown, the capacitor C is charged to a potential difference *V* when the switch S is closed.



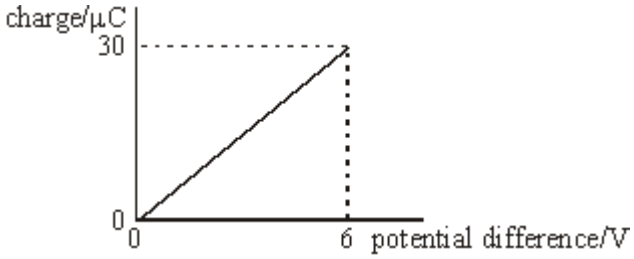
Which line, **A** to **D**, in the table gives a correct pair of graphs showing how the charge and current change with time after S is closed?



	charge	**current**
A	graph 1	graph 1
B	graph 1	graph 2
C	graph 2	graph 2
D	graph 2	graph 1

(Total 1 mark)

Q7. The graph shows how the charge stored by a capacitor varies with the potential difference across it as it is charged from a 6 V battery.



Which one of the following statements is **not** correct?

A The capacitance of the capacitor is 5.0 μF.

B When the potential difference is 2 V the charge stored is 10 μC.

C When the potential difference is 2 V the energy stored is 10 μJ.

D When the potential difference is 6 V the energy stored is 180 μJ.

(Total 1 mark)

Q8. A capacitor of capacitance *C* discharges through a resistor of resistance *R*.
Which one of the following statements is **not** true?

A The time constant will increase if *R* is increased.

B The time constant will decrease if *C* increased.

C After charging to the same voltage, the initial discharge current will increase if *R* is decreased.

D After charging to the same voltage, the initial discharge current will be unaffected if *C* is increased.

(Total 1 mark)

Q9. A 10 mF capacitor is charged to 10 V and then discharged completely through a small motor. During this process, the motor lifts a weight of mass 0.10 kg. If 10% of the energy stored in the capacitor is used to lift the weight, through what approximate height will the weight be lifted?

A 0.05 m

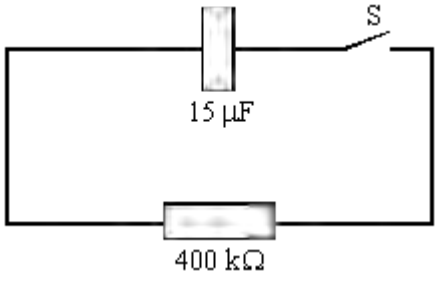
B 0.10 m

C 0.50 m

D 1.00 m

(Total 1 mark)

Q10. A capacitor of capacitance 15 μF is fully charged and the potential difference across its plates is 8.0 V. It is then connected into the circuit as shown.



The switch S is closed at time t = 0. Which one of the following statements is correct?

A The time constant of the circuit is 6.0 ms.

B The initial charge on the capacitor is 12 μC.

C After a time equal to twice the time constant, the charge remaining on the capacitor is Q_0e^2, where Q_0 is the charge at time t = 0.

D After a time equal to the time constant, the potential difference across the capacitor is 2.9 V.

(Total 1 mark)

Q11. A 1 μF capacitor is charged using a constant current of 10 μA for 20 s. What is the energy finally stored by the capacitor?

A 2×10^{-3} J

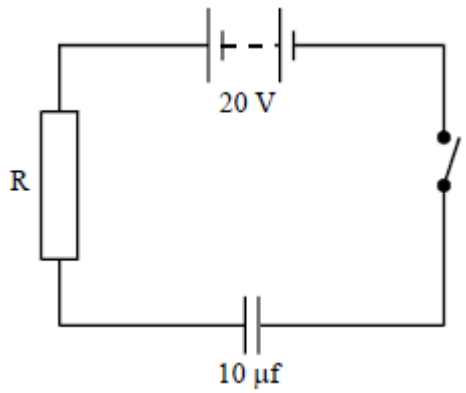
B 2×10^{-2} J

C 4×10^{-2} J

D 4×10^{-1} J

(Total 1 mark)

Q12.



A capacitor of capacitance 10 μF is fully charged through a resistor R to a p.d. of 20 V using the circuit shown. Which one of the following statements is **incorrect?**

A The p.d. across the capacitor is 20 V.

B The p.d. across the resistor is 0 V.

C The energy stored by the capacitor is 2 mJ.

D The total energy taken from the battery during the charging process is 2 mJ.

(Total 1 mark)

Q13. A capacitor of capacitance *C* stores an amount of energy *E* when the pd across it is *V*. Which line, **A** to **D**, gives the correct stored energy and pd when the charge is increased by 50%?

	energy	p.d.
A	1.5*E*	1.5*V*
B	2.25*E*	1.5*V*
C	1.5*E*	2.25*V*
D	2.25*E*	2.25*V*

(Total 1 mark)

Q14. In experiments to pass a very high current through a gas, a bank of capacitors of total capacitance 50 μF is charged to 30 kV. If the bank of capacitors could be discharged completely in 5.0 ms what would be the mean power delivered?

A 9.0 MW

B 4.5 MW

C 110 kW

D 22 kW

(Total 1 mark)

Q15. Which of the following does **not** give a value in seconds?

A capacitance × resistance

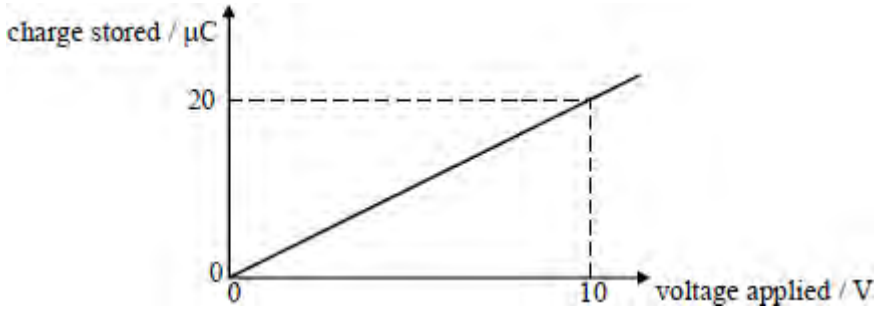
B $\frac{1}{\text{frequency}}$

C half-life

D $\frac{\text{power}}{\text{work}}$

(Total 1 mark)

Q16. The graph shows the charge stored in a capacitor as the voltage across it is varied.



The energy stored, in μJ, when the potential difference across the capacitor is 5 V, is

A 25

B 50

C 100

D 200

(Total 1 mark)

Q17. A capacitor is first charged through a resistor and then discharged through the same resistor.

The magnitude of which one of the following quantities varies with time in the same way during both charging and discharging?

A Energy stored

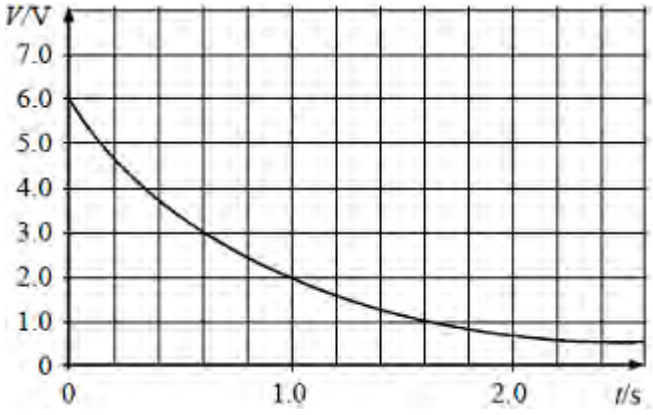
B Current

C Potential difference

D Charge

(Total 1 mark)

Q18. The graph shows the variation of potential difference V with time t across a 470 μF capacitor discharging through a resistor.



The resistance of the resistor is approximately

A 900 Ω

B 1300 Ω

C 1900 Ω

D 4700 Ω

(Total 1 mark)