

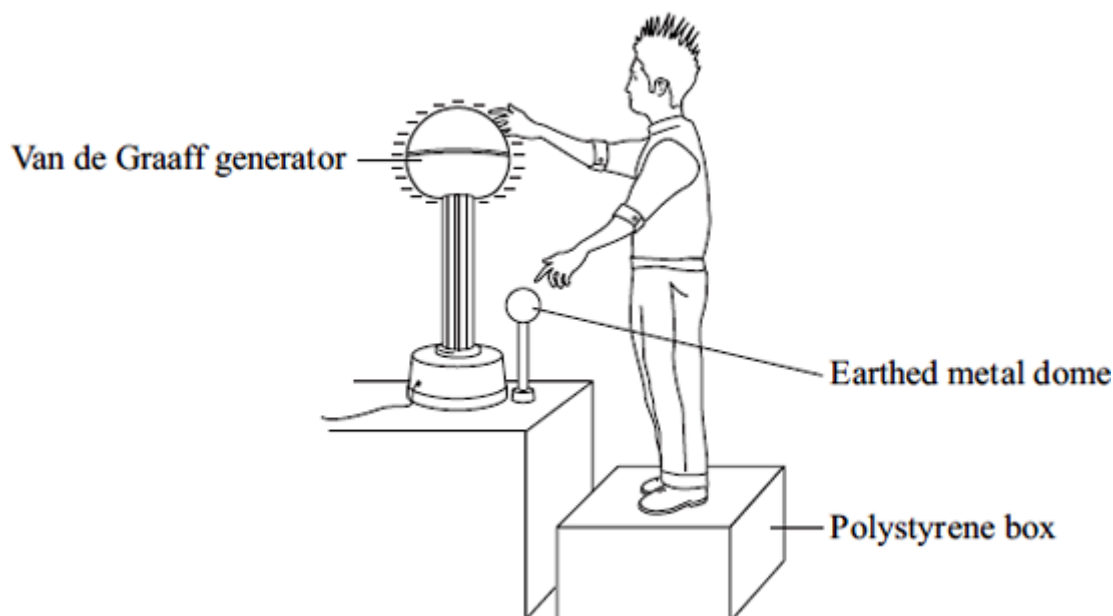
Name of the Student: _____

Max. Marks : 22 Marks

Time : 22 Minutes

Q1.

- (a) The diagram shows a student touching the metal dome of a Van de Graaff generator. When the generator is switched on, the metal dome becomes negatively charged.



Explain why the student's hair stands on end when the generator is switched on.

(2)

- (b) When the potential difference between the student and a nearby earthed metal dome reached 15 kV, a spark jumped between the student and the earthed dome. The spark transformed 30 mJ of energy into heat, light and sound. (1 mJ = 0.001 J)

Calculate the charge carried by the spark.

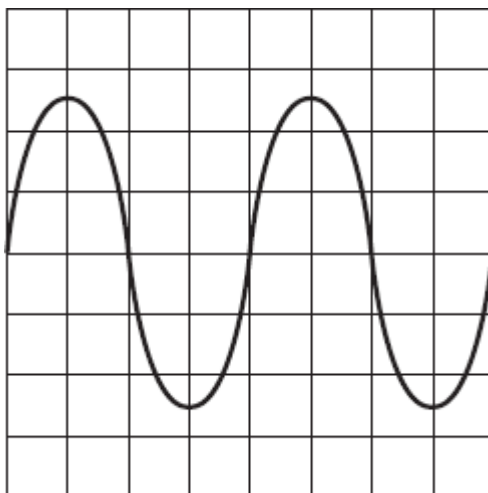
Charge transferred = _____ coulombs

(2)

- (c) What name is given to the rate of flow of charge?

Q2.

An oscilloscope is connected to an alternating current (a.c.) supply.
The diagram shows the trace produced on the oscilloscope screen.



Each horizontal division on the oscilloscope screen represents 0.002 s.

- (a) Calculate the frequency of the alternating current supply.

Show clearly how you work out your answer and give the unit.

Frequency = _____

(3)

- (b) What is the frequency of the a.c. mains electricity supply in the UK?

(1)

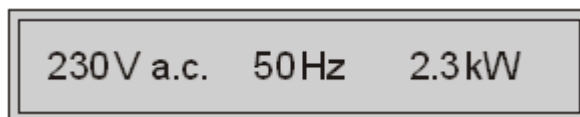
(Total 4 marks)

Q3.

- (a) Describe the difference between an alternating current (a.c.) and a direct current (d.c.).

(2)

- (b) The diagram shows the information plate on the bottom of an electric wallpaper steamer.



- (i) Calculate the current used by the steamer.

Show clearly how you work out your answer.

Current _____ A

(2)

- (ii) Which **one** of the following fuses should be used inside the plug of the steamer?

Draw a ring around your answer.

1 A

3 A

5 A

10 A

13 A

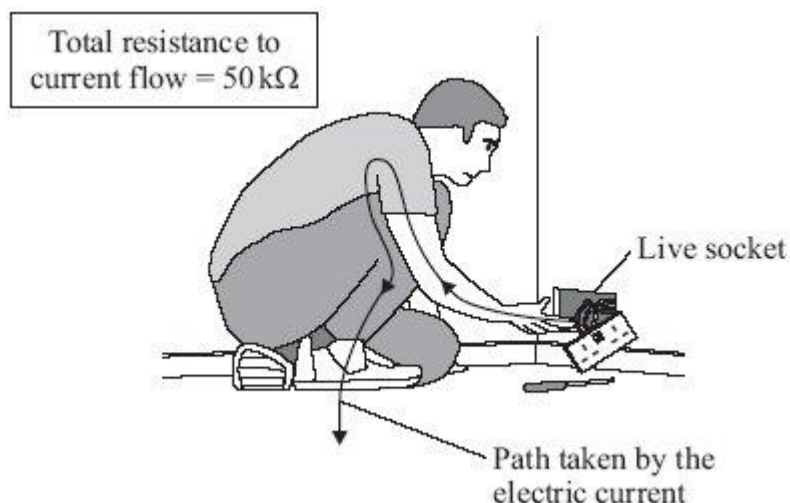
(1)

(Total 5 marks)

Q4.

The diagram shows someone accidentally touching the live wire inside a dismantled 230 volt mains electricity socket.

A current flows through the person giving him an electric shock.



- (a) (i) Calculate the current that will flow through the person.

Show clearly how you work out your answer.

Current = _____ A

(2)

- (ii) Rubber is a good insulator.

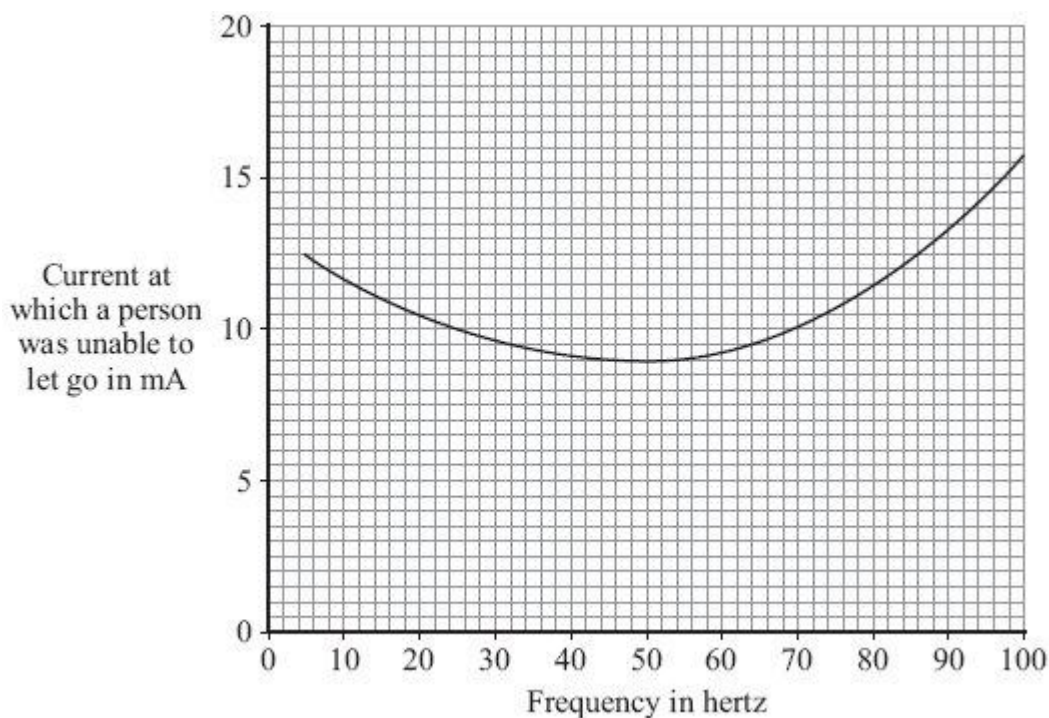
Explain why it is a good idea for electricians to wear rubber soled boots when working.

(2)

- (b) If the current flowing through a person is too high, the person cannot let go of the electrical source.

Different people were tested to see whether the ability to let go of an electrical source depended on the frequency of the current.

The results of the test are shown in the graph.



- (i) What is the frequency of the mains electricity supply in the UK?

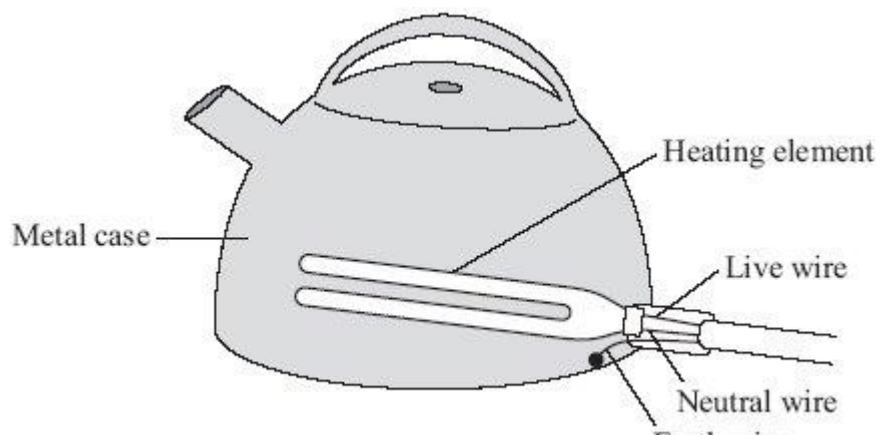
(1)

- (ii) From a safety point of view, is the frequency of the UK mains electricity supply suitable?

Give a reason for your answer.

(1)

- (c) The diagram shows how the electric supply cable is connected to an electric kettle. The earth wire is connected to the metal case of the kettle.



If a fault makes the metal case live, the earth wire and the fuse inside the plug protect anyone using the kettle from an electric shock.

Explain how.

(2)
(Total 8 marks)