

Name of the Student: _____

Max. Marks : 27 Marks

Time : 27 Minutes

Q1.

Nuclear fuels and fossil fuels are non-renewable energy sources.

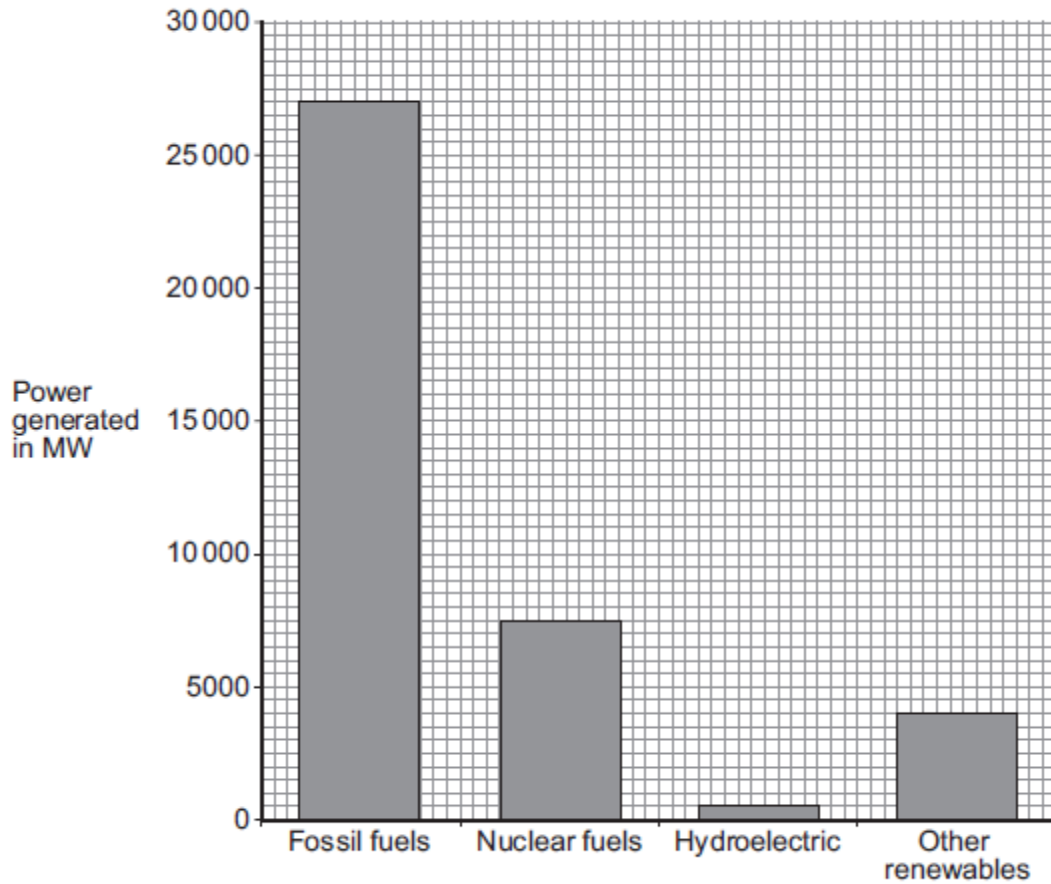
- (a) Power stations generate electrical power.

Describe the similarities and differences between generating power using nuclear fuels and using fossil fuels.

(4)

- (b) **Figure 1** shows the power generated using different energy sources in the UK.

Figure 1



- (i) Nuclear fuels are less readily available, and more expensive, than fossil fuels.

Suggest **two** other reasons why nuclear fuels are used **less** than fossil fuels to generate power.

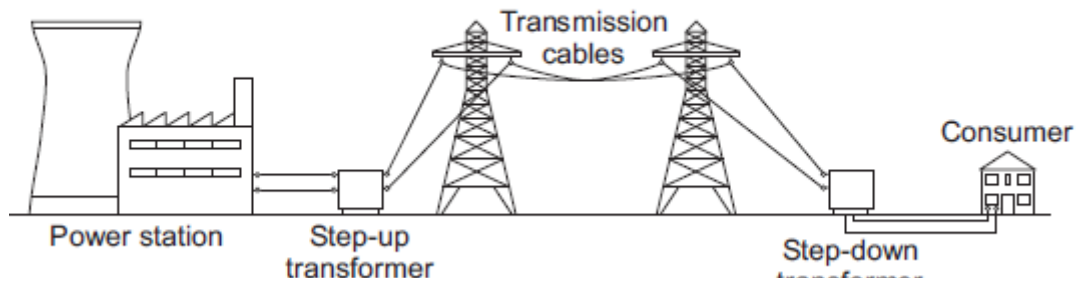
(2)

- (ii) Suggest **two** reasons why the proportion of power generated using fossil fuels might decrease in the future.

(2)

- (c) **Figure 2** shows how power is distributed from a power station and transmitted along the National Grid.

Figure 2



Explain why step-up transformers are included in the National Grid.

(3)

- (d) Shale gas is natural gas trapped in rocks. The shale gas can be extracted by a process called fracking. The shale gas can then be used as a fuel.

Part of a news report on fracking is shown below.

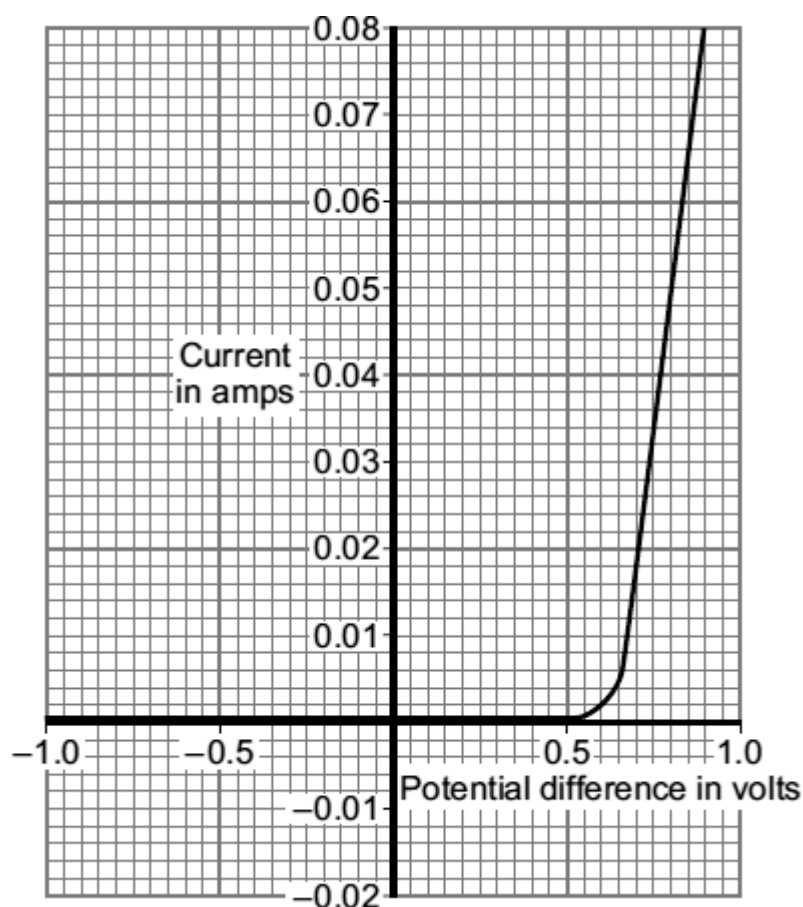
Fracking is a process used to extract shale gas from difficult-to-reach places. Fracking will provide more shale gas, so gas prices may go down. If shale gas was used in power stations, less carbon dioxide would be produced than if coal was used in power stations.

Many possible fracking sites are close to built-up areas. Some local people are opposed to fracking. A lot of water needs to be transported to the fracking site. The process of fracking uses chemicals known to cause cancer and these chemicals may escape and contaminate the water supply. Some local people also worry that fracking may cause small earth tremors. These people say fracking is discouraging energy companies from investing money in renewable sources of energy.

Use information from the news report and your own knowledge to suggest, with reasons, why some local people are opposed to fracking.

Q2.

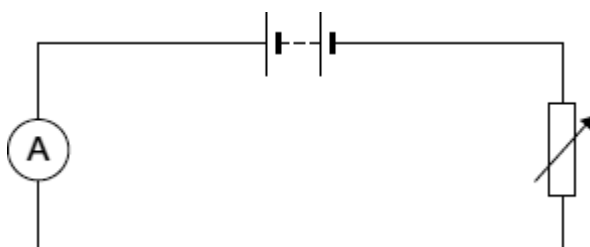
The current-potential difference graph for one type of electrical component is drawn below.



- (a) What is the component?

(1)

- (b) Complete the diagram to show a circuit that can be used to obtain the data needed to plot the graph. Use the correct circuit symbol for each component that you add to the diagram.



(2)

- (c) (i) What is the current through the component when the potential difference across the component is 0.8 volts?

Current _____ amps

(1)

- (ii) Calculate the resistance of the component when the potential difference across it is 0.8 volts.

Show clearly how you work out your answer.

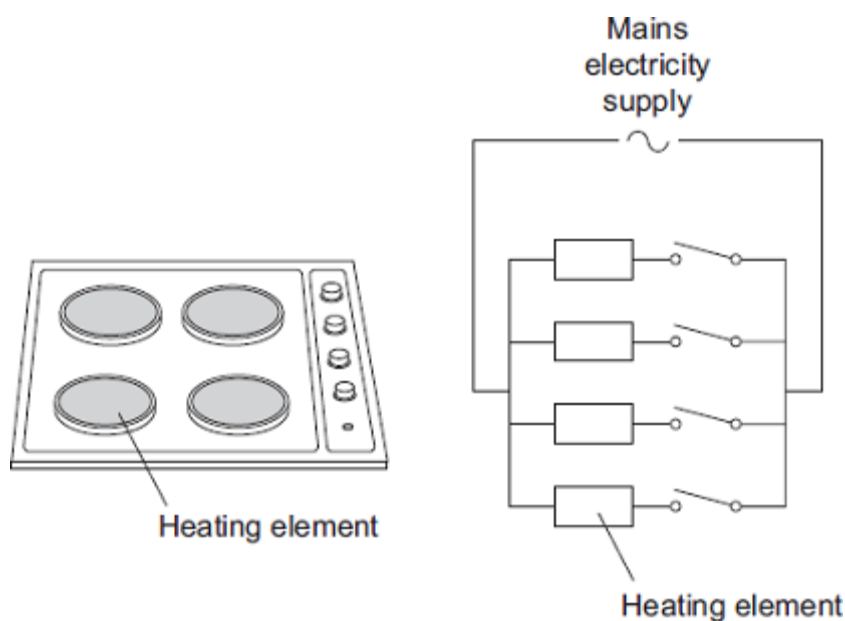
Resistance = _____ Ω

(2)

(Total 6 marks)

Q3.

The picture shows an electric cooker hob. The simplified circuit diagram shows how the four heating elements connect to the mains electricity supply. The heating elements are identical.



When all four heating elements are switched on at full power the hob draws a current of 26 A from the 230 V mains electricity supply.

- (a) Calculate the resistance of one heating element when the hob is switched on at full power.

Give your answer to 2 significant figures.

Resistance = _____ Ω

(3)

- (b) The table gives the maximum current that can safely pass through copper wires of different cross-sectional area.

Cross-sectional area in mm ²	Maximum safe current in amps
1.0	11.5
2.5	20.0
4.0	27.0
6.0	34.0

The power sockets in a home are wired to the mains electricity supply using cables containing 2.5 mm² copper wires. Most electrical appliances are connected to the mains electricity supply by plugging them into a standard power socket.

It would **not** be safe to connect the electric cooker hob to the mains electricity supply by plugging it into a standard power socket.

Why?

(2)

- (c) Mains electricity is an alternating current supply. Batteries supply a direct current.

What is the difference between an alternating current and a direct current?

(2)

(Total 7 marks)