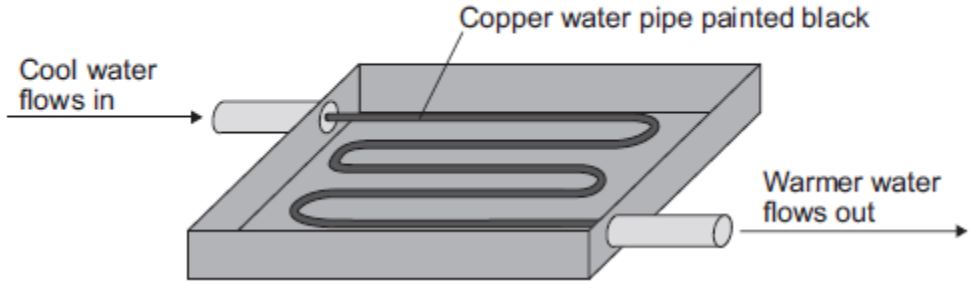
Name of the Student:_____
Max. Marks : 26 Marks **Time : 26 Minutes**

Q1.

(a) **Figure 1** shows a solar panel. Solar panels can be fitted to house roofs and used to heat water for domestic hot water systems.

Figure 1



Use **Figure 1** to explain how the design of the water pipe increases the rate of energy transfer from the Sun to the water.

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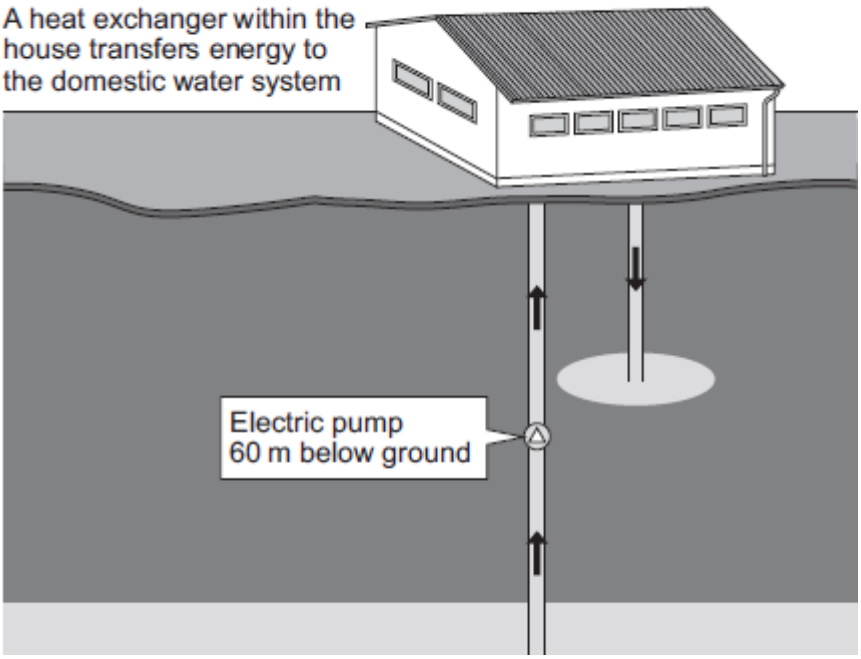
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(3)

(b) **Figure 2** shows a different method of heating water called a ground source heat pump. Two holes are drilled into the ground and fitted with pipes. Warm water is pumped up one pipe and waste water is returned to the ground through the other pipe. In the house, energy is transferred from the warm water by a heat exchanger.

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Figure 2



(i) Suggest **one** advantage of using this method of heating water rather than using solar panels.

_____

_____

(1)

(ii) A leaflet about a ground source heat pump states:

'Ground source heat pumps are 300 – 400% efficient. For each joule of mains electrical energy the pumps use, they transfer three to four times more energy from the water'.

Two students read the leaflet.

Student **A** says, 'It is incorrect to say that a device is 300 – 400% efficient'.

Student **B** says, 'The statement is correct'.

Both conclusions could be considered to be correct.

Explain why.

Student **A**'s conclusion _____

_____

_____

_____

_____

Student **B**'s conclusion _____

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(4)

(iii) Domestic water enters the heat exchanger at a temperature of 7.0 °C and leaves the heat exchanger at a temperature of 55 °C.

Each day 19 000 000 joules of energy are supplied to the water passing through the heat exchanger.

Calculate the mass of water that can be heated each day.

Choose the correct equation from the Physics Equations Sheet.

Specific heat capacity of water = 4200 J / kg °C.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

Mass of water = _____ kg

(4)

(Total 12 marks)

Q2.

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.

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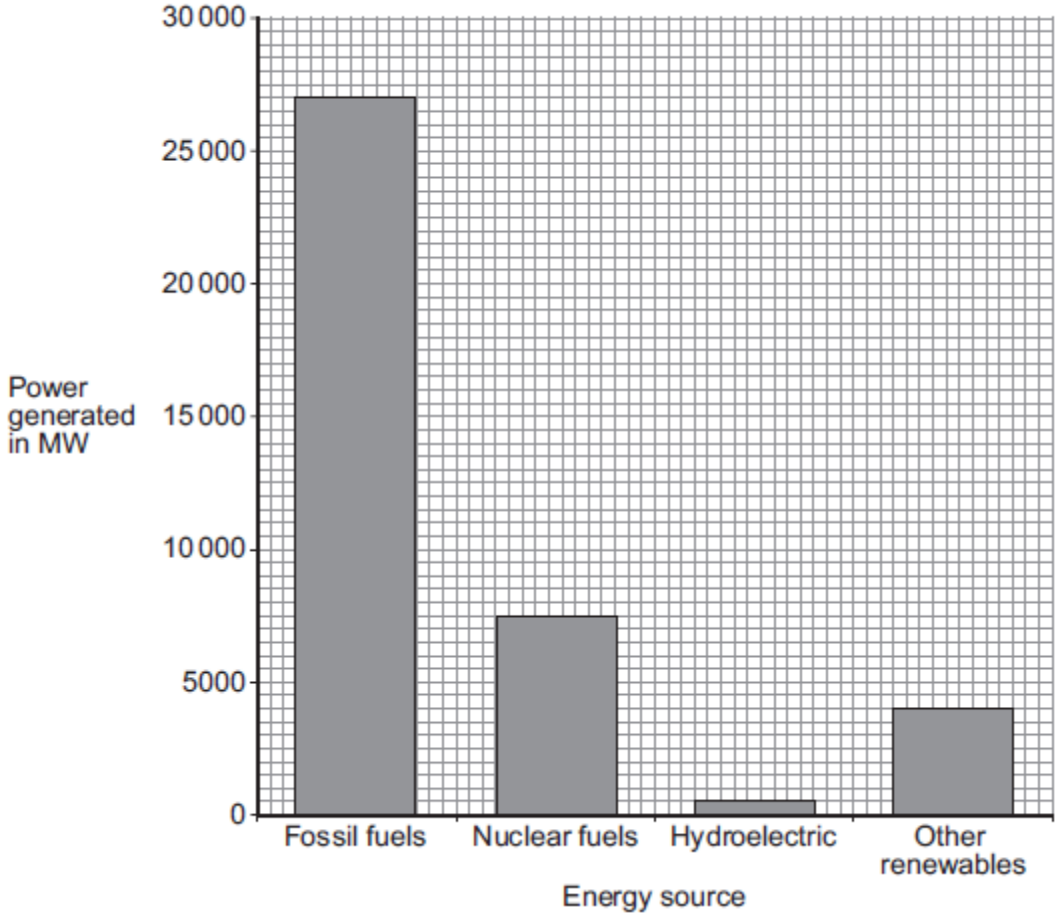
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(4)

(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.

_____

_____

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(2)

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

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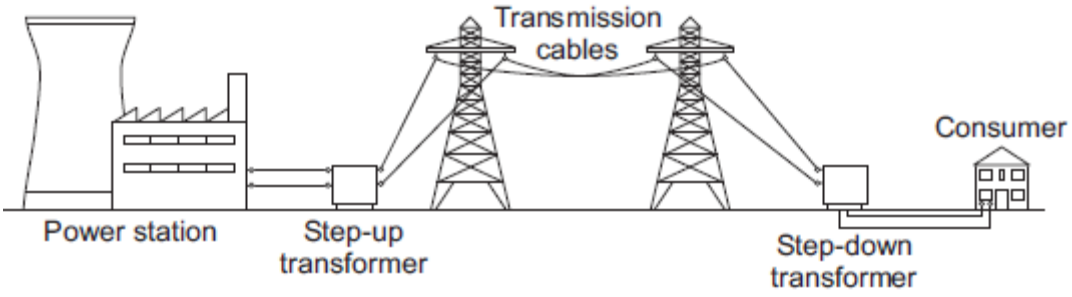
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(2)

(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.

_____

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_____

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_____

(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.

_____

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(3)

(Total 14 marks)

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