Practice Question Set For GCSE
Subject : Physics
Paper-1 Topic: Energy (High Demand)

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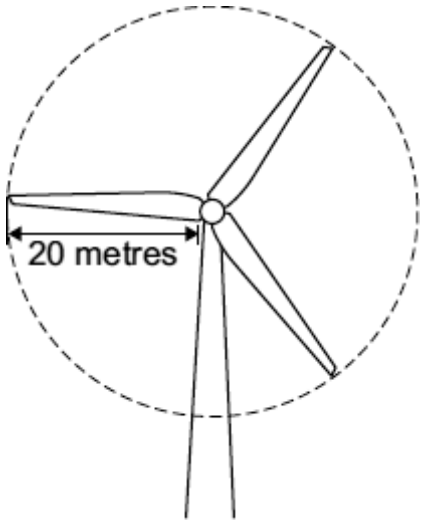
Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Q1.

The diagram shows a wind turbine.



(a) The blades of the turbine are 20 metres long. On average, 15 000 kg of air, moving at a speed of 12 m/s, hit the blades every second.

Calculate the kinetic energy of the air hitting the blades every second.

Show clearly how you work out your answer.

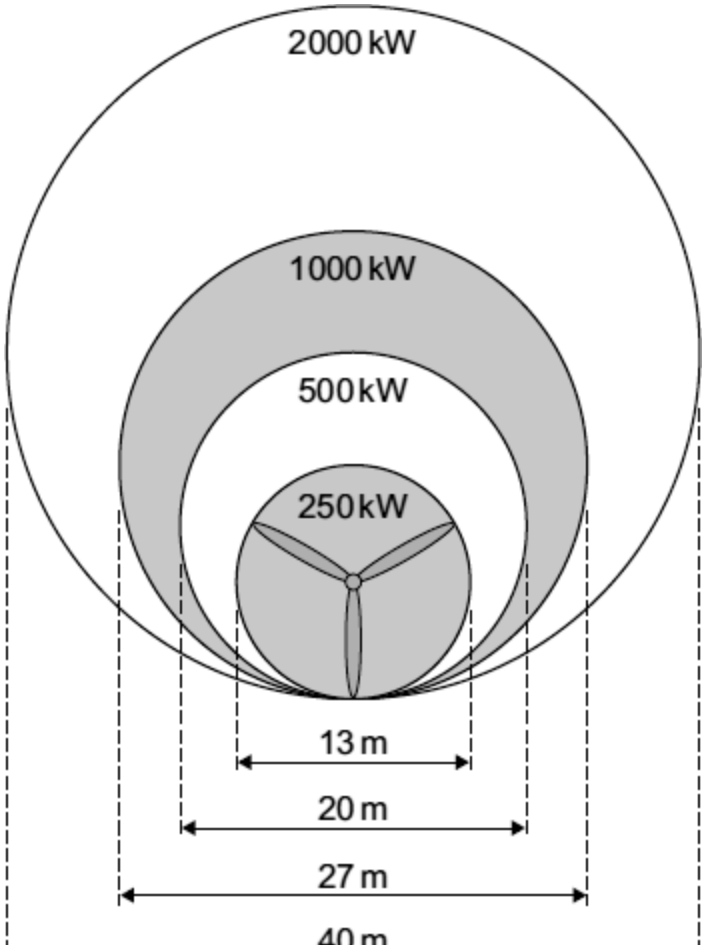
_____

_____

Kinetic energy = _____ J

(2)

(b) Part of the kinetic energy of the wind is transformed into electrical energy.
The diagram shows that, for the same wind speed, the power output of a turbine, in kilowatts, depends on the length of the turbine blades.



Give a reason why doubling the diameter of the blades more than doubles the power output of a turbine.

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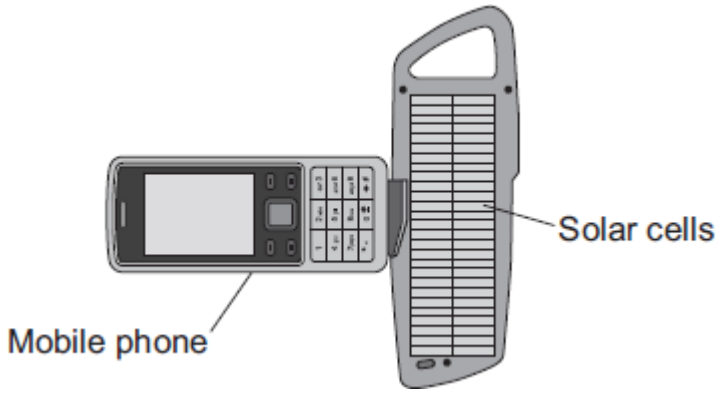
_____

(1)

(Total 3 marks)

Q2.

(a) The diagram shows a solar powered device being used to recharge a mobile phone.



On average, the solar cells produce 0.6 joules of electrical energy each second.
The solar cells have an efficiency of 0.15.

(i) Calculate the average energy input each second to the device.

Show clearly how you work out your answer.

_____

_____

Average energy input each second = _____ J/s

(2)

(ii) Draw a labelled Sankey diagram for the solar cells.
The diagram does **not** need to be drawn to scale.

(1)

(b) Scientists have developed a new type of solar cell with an efficiency of over 40 %.
The efficiency of the solar cell was confirmed independently by other scientists.

Suggest why it was important to confirm the efficiency independently.

_____

_____

(1)

(c) The electricity used in homes in the UK is normally generated in a fossil fuel power station.

Outline some of the advantages of using solar cells to generate this electricity.

_____

_____

_____

_____

(2)

(Total 6 marks)

Q3.

Over the next 15 years, some of the older nuclear power stations will be closed down, and the process of *decommissioning* will start. In the same period, several countries plan to build a number of new nuclear power stations.

(a) (i) What does it mean to *decommission* a nuclear power station?

_____

_____

(1)

(ii) How does *decommission*ing affect the overall cost of electricity generated using nuclear fuels?

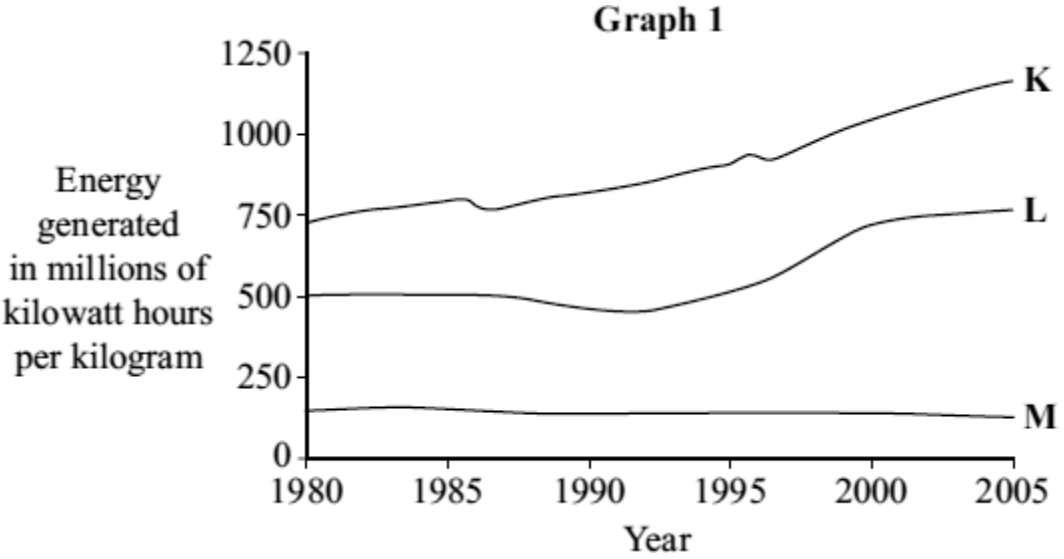
_____

_____

(1)

(b) Uranium is a fuel used in nuclear power stations to generate electricity.

Graph 1 compares how the electricity generated from one kilogram of nuclear fuel changed between 1980 and 2005 in three different types of nuclear power station.



(i) Compare the efficiency of the three types of power station, **K**, **L** and **M**, between 1980 and 2005.

_____

_____

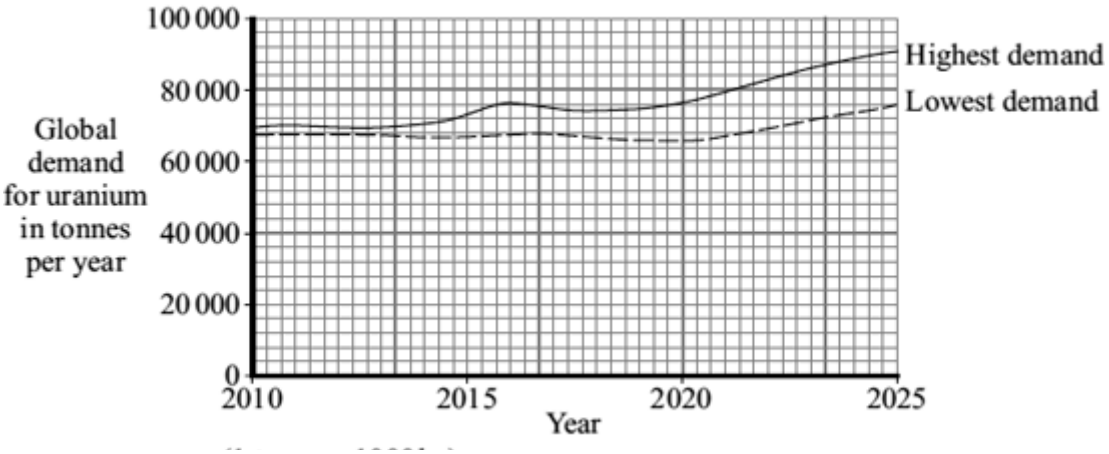
_____

_____

(2)

Graph 2 shows two different predictions for the global growth in uranium demand over the next few years.

Graph 2



(ii) Suggest reasons why it is **not** possible to predict accurately how much uranium will be needed in 2025.

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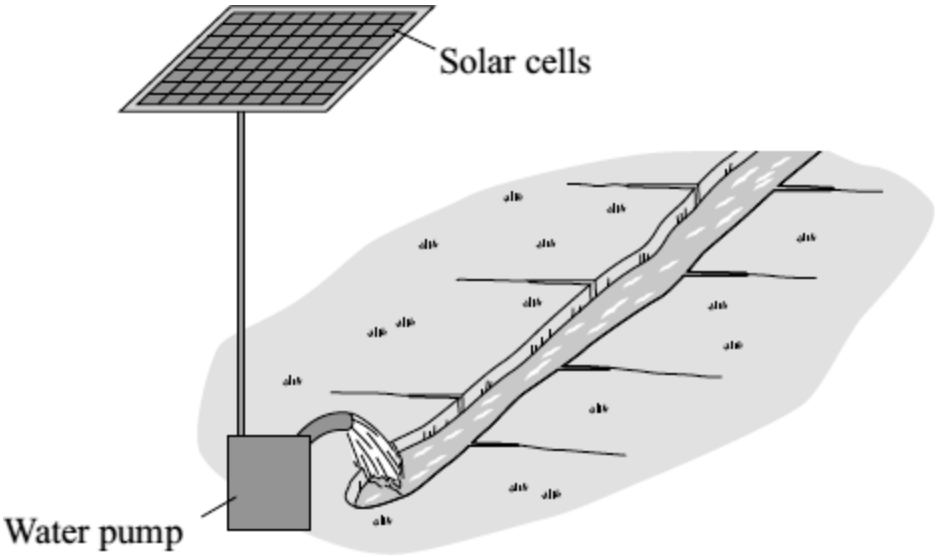
(2)

(Total 6 marks)

Q4.

The farmers in a village in India use solar powered water pumps to irrigate the fields.



On average, a one square metre panel of solar cells receives 5 kWh of energy from the Sun each day.
The solar cells have an efficiency of 0.15

(a) (i) Calculate the electrical energy available from a one square metre panel of solar cells.

Show clearly how you work out your answer.

_____

_____

Electrical energy = _____ kWh

(2)

(ii) On average, each solar water pump uses 1.5 kWh of energy each day.

Calculate the area of solar cells required by one solar water pump.

Area = _____ square metres

(1)

(b) Give **one** reason why the area of solar cells needed will probably be greater than the answer to part (a)(ii).

_____

_____

(1)

(Total 4 marks)