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

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Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

The table gives data about two types of low energy bulb.

Type of bulb	Power input in watts	Efficiency	Lifetime in hours	Cost of one bulb
Compact Fluorescent Lamp (CFL)	8	20%	10 000	£3.10
Light Emitting Diode (LED)	5		50 000	£29.85

(a) Both types of bulb produce the same useful power output.

(i) Calculate the useful power output of the CFL.

Show clearly how you work out your answer.

_____

_____

_____

Useful power output = _____ W

(2)

(ii) Calculate the efficiency of the LED bulb.

Show clearly how you work out your answer.

_____

_____

_____

Efficiency = _____

(1)

(b) LED bulbs are expensive. This is because of the large number of individual electronic LED chips needed to produce sufficient light from each bulb.

(i) Use the data in the table to evaluate the cost-effectiveness of an LED bulb compared to a CFL.

_____

_____

_____

_____

(2)

(ii) Scientists are developing brighter and more efficient LED chips than those currently used in LED bulbs.

Suggest **one** benefit of developing brighter and more efficient LED chips.

_____

_____

(1)

(Total 6 marks)

Q2.

(a) Solar energy is a *renewable* energy source used to generate electricity.

(i) What is meant by an energy source being *renewable?*

_____

_____

(1)

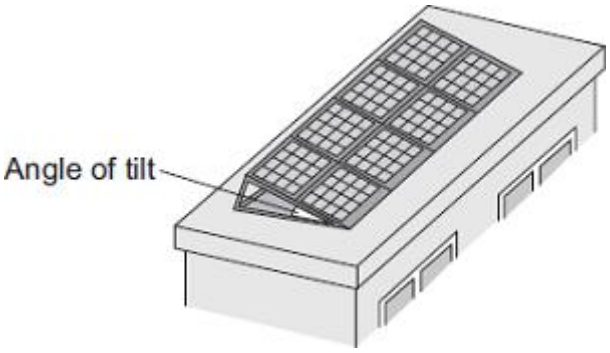
(ii) Name **two** other renewable energy sources used to generate electricity.

1. _____

2. _____

(1)

(b) A householder uses panels of solar cells to generate electricity for his home. The solar cells are tilted to receive the maximum energy input from the Sun.



The data in the table gives the average energy input each second (in J/s), to a 1 m^2 area of solar cells for different angles of tilt and different months of the year.

Month	Angle of tilt

	20°	30°	40°	50°
February	460	500	480	440
April	600	620	610	600
June	710	720	680	640
August	640	660	640	580
October	480	520	500	460
December	400	440	420	410

(i) Use the data in the table to describe how the average energy input to the solar cells depends on the angle of tilt.

_____

_____

_____

_____

(2)

(ii) The total area of the solar cell panels used by the householder is 5 m^2.

The efficiency of the solar cells is 0.18.

Calculate the average **maximum** electrical energy available from the solar cell panels each second in June.

Show clearly how you work out your answer.

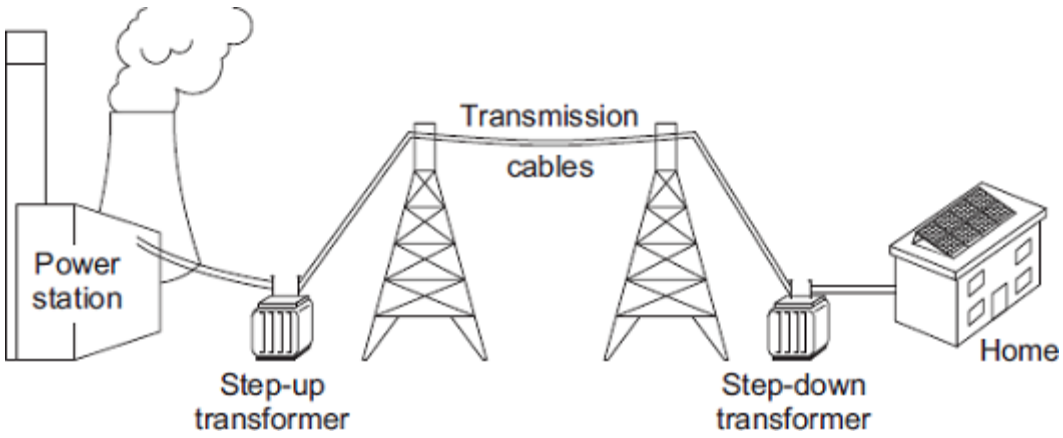
_____

_____

Maximum energy = _____ joules/second

(3)

(c) The diagram shows part of the National Grid.



(i) Even though the householder uses solar cells to generate electricity for his home, the home stays connected to the National Grid.

Give **one** reason why the householder should stay connected to the National Grid.

_____

_____

(1)

(ii) The step-up transformer increases the efficiency of the National Grid.

Explain how.

_____

_____

_____

_____

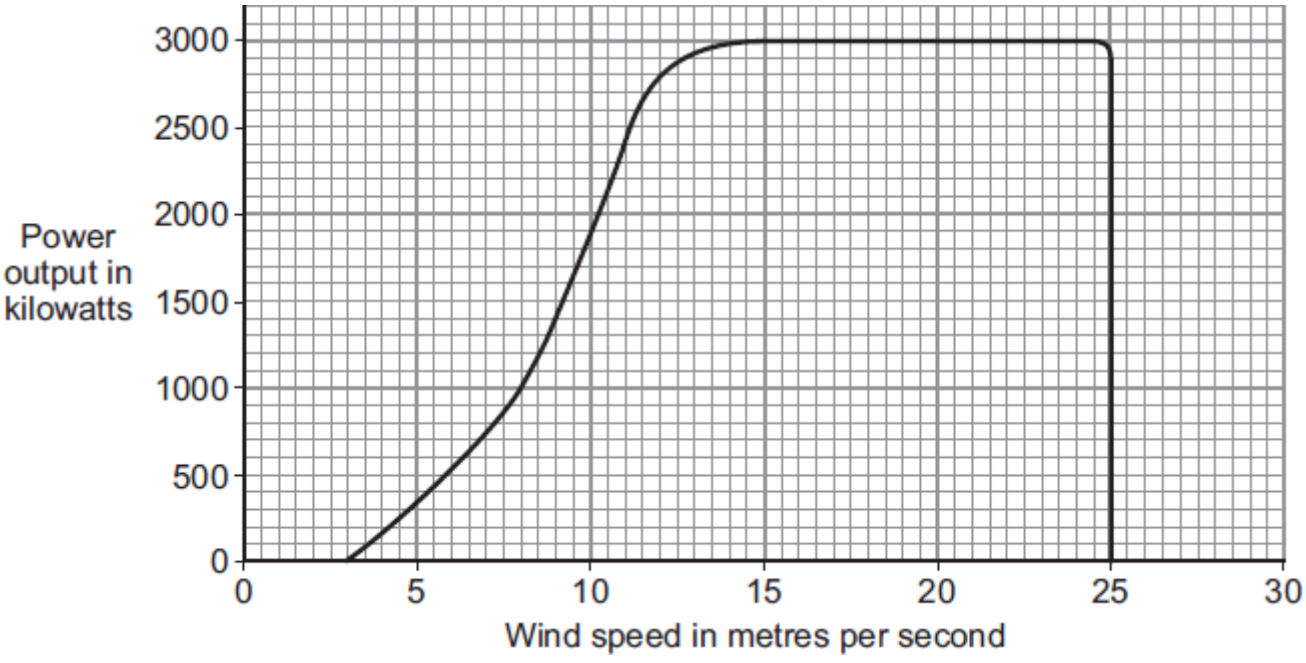
(2)

(Total 10 marks)

Q3.

The world's biggest offshore wind farm, built off the Kent coast, started generating electricity in September 2010.

(a) The graph shows how wind speed affects the power output from one of the wind turbines.



In one 4-hour period, the wind turbine transfers 5600 kilowatt-hours of electrical energy.

Use the data in the graph to calculate the average wind speed during this 4-hour period.

Show clearly how you work out your answer.

_____

_____

_____

_____

Average wind speed = _____ m/s

(3)

(b) The wind turbines are linked to the National Grid by underwater cables.

(i) What is the National Grid?

_____

_____

(1)

(ii) How is the National Grid designed to reduce energy losses during transmission?

_____

_____

_____

(1)

(c) Read this extract from a newspaper.

Power crisis as island basks in sunshine

The population of a small island off the coast of Scotland decided to generate all their electricity from water and wind. However, they did not predict having a long period of warm, dry weather. A combination of low water levels and hardly any wind has drastically reduced the output from the hydroelectric power station and wind turbines.

Explain **one** way in which the islanders could try to ensure that a similar power crisis does **not** happen in the future.

_____

_____

_____

_____

(2)

(Total 7 marks)