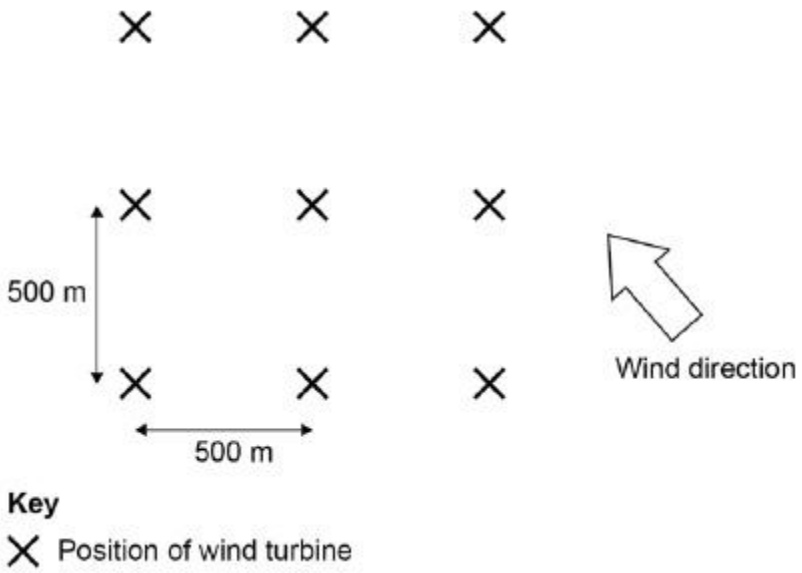
Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

The wind turbines in a wind farm must have a minimum distance of 500 m between them for maximum efficiency.

The diagram shows the position of nine wind turbines in a wind farm.



(a) Suggest **one** way in which the layout of this wind farm ensures maximum efficiency when the wind direction changes.

_____

_____

_____

(1)

The average mass of air passing through the blades of one wind turbine is 51 000 kg per second.

The density of air is 1.2 kg / m^3

(b) Write down the equation that links density, mass and volume.

_____

(1)

(c) Calculate the volume of air passing through the blades of one wind turbine in one second.

Give the unit.

Give your answer to 2 significant figures.

_____

_____

_____

_____

_____

_____

Volume in one second = _____ Unit _____

(5)

(d) The average power output from one of the wind turbines in the diagram is 1.6×10^6 W

The average power output of a nuclear power station is 2.4×10^9 W

Calculate the number of wind turbines needed to generate power equal to one nuclear power station.

_____

_____

_____

Number of wind turbines = _____

(2)

(e) The UK requires a minimum electrical power of 2.5×10^{10} W at any time.

Give **two** reasons why wind turbines alone are unlikely to be used to meet this requirement.

1. _____

_____

2. _____

_____

(2)

(Total 11 marks)

Q2.

The specific heat capacity of aluminium can be determined by experiment.

(a) Draw a labelled diagram showing how the apparatus used to determine the specific heat capacity of aluminium should be arranged.

(3)

(b) Describe how you could use the apparatus you drew in part (a) to determine the specific heat capacity of aluminium.

(6)

(c) Methods used to determine the specific heat capacity of aluminium may give a value greater than the actual value.

Explain why.

_____

_____

_____

_____

_____

_____

_____

_____

(2)
(Total 11 marks)