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

Mark Schemes

Q1.

(a) any **three** from:

- gas can be switched on (and off) quickly but nuclear cannot
  gas has a short start-up time alone is insufficient
- gas can be used to meet surges in demand
  accept specific times from graph, anything from 1700 to 2200
- gas can contribute to / meet the base load
- nuclear provides base load
  or
  nuclear is used to generate all of the time

3

(b) Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking guidance, and apply a 'best-fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1-2 marks)
There is a brief description of one advantage **or** disadvantage of using either biogas or wind
or
makes a conclusion with a reason.

Level 2 (3-4 marks)
There is a description of some advantages **and / or** disadvantages for biogas **and / or** wind
or
there is a direct comparison between the two systems **and** at least one advantage / disadvantage
or
a detailed evaluation of one system only with a conclusion.

Level 3 (5-6 marks)
There is a clear and detailed comparison of the two systems.

There must be a clear conclusion of which system would be best with at least one comparative reason given for the choice made.

Examples of the points made in the response
extra information

Biogas

- renewable
- energy resource is free
- reliable energy source
  accept works all of the time
- does not depend on the weather
- uses up (animal) waste products
- concentrated energy source
- cheaper (to buy and install)
  accept once only
- shorter payback-time (than wind)
- adds carbon dioxide to the atmosphere
  when waste burns it produces carbon dioxide is insufficient
- contributes to the greenhouse effect
  or
  contributes to global warming
- no transport cost for fuels

Wind turbine

- renewable
- energy resource is free
- not reliable
- depends on the weather / wind
- will be times when not enough electricity generated for the farm's needs
- dilute energy source
- longer payback-time (than biogas)
- more expensive (to buy and install)
  accept once only
- does not produce any carbon dioxide
  accept does not pollute air
  accept pollutant gases for carbon dioxide
  produces visual or noise pollution is insufficient
  harmful gases is insufficient

6

[9]

Q2.

(a) (i) 70

accept ± half a square
(69.8 to 70.2)

1

(ii) 15

*accept 14.6 to 15.4 for **2** marks*
*allow for **1** mark 70 − 55*
ecf from (b)(i) ± half a square

2

(iii) C

1

biggest drop in temperature during a given time
accept it has the steepest gradient this is a dependent

1

(iv) starting at 70 °C and below graph for C
must be a curve up to at least 8 minutes

1

(v) because 20 °C is room temperature
accept same temperature as surroundings

1

(b) (i) 6720

*correct answer with or without working gains **3** marks*
*6 720 000 gains **2** marks*
*correct substitution of E = 0.2 × 4200 × 8 gains **2** marks*
*correct substitution of E = 200 × 4200 × 8 gains **1** mark*

3

(ii) the fastest particles have enough energy
accept molecules for particles

1

to escape from the surface of the water

1

therefore the mean energy of the remaining particles decreases
accept speed for energy

1

the lower the mean energy of particles the lower the temperature (of the water)
accept speed for energy

1

[14]