A student carried out an investigation into the decay of grass. He placed 200g of grass into each of three thermos flasks. All flasks had air holes in the lids.

The thermos flasks are good insulators of heat.

The diagram shows the conditions in each of the thermos flasks.

A temperature sensor, connected to a display, was placed into each flask.

Graph 1 shows the results given by the processor and display after monitoring the temperature through the temperature sensors over 5 days.

Give one advantage and one disadvantage of using temperature sensors connected to a processor and a display to record and display the results. [2 marks]

Advantage Accurate readings/a person not needed to measure the temperature/graph drawn automatically/easy to read the information/quicker to process data. [1]

Disadvantage Expensive/needs to be set up/needs technical knowledge. [1]
1 (a) (ii) Compare the changes in temperature between Flask 2 and Flask 3 over the five days [4 marks]

Flask 2 temperature rises slowly/only a little or by 1°C [1]

whereas flask 3 temperature rises by more or 7°C. [1]

Flask 3 has a steeper increase from day 4. [1]

Flask 2 has no steep increase [1]

Both start at the same temperature or at 21°C [1]

Flask 2 stays the same / almost the same for the last three days or day 3 to 5 [1]

1 (a) (iii) Explain the changes in the temperature for Flask 3 from day 1 to day 5. [3 marks]

Microbes/microorganisms decay or rot the grass [1]

Microbes/microorganisms respire or carry out respiration [1]

Respiration releases heat [1]

Moisture needed or moisture increases growth of microbes/microorganisms [1]

More heat produced over time because microbes reproduce/divide/grow [1]

1 (a) (iv) The temperature for Flask 1 changed very little.

Suggest why. [1 mark]

Microbes/microorganisms killed (by disinfectant) [1]

1 (b) (i) The following advice was given on a garden compost bin.

1. Fill with organic waste (waste food, peelings, plant material).

2. Keep air holes clear.

3. Turn the waste material regularly.

What is the reason for carrying out instruction number 3? [2 marks]

Mix the microbes with the waste [1]

To release heat or so it doesn’t get too hot [1]

Allow air to get to waste [1]

(Total 12 marks)