

*Bishop's Conservatory Secondary School*

*Form 5 Mock Exams 2009*

*Biology Paper 1*

Name: \_\_\_\_\_

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Subject: Biology  
Paper Number: 1  
Date: Wednesday 25<sup>th</sup> March 2009  
Time: 1<sup>st</sup> Session

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Answer **all** questions in this paper in the spaces shown.

Calculators may be used. In calculations, show all the steps of your working.

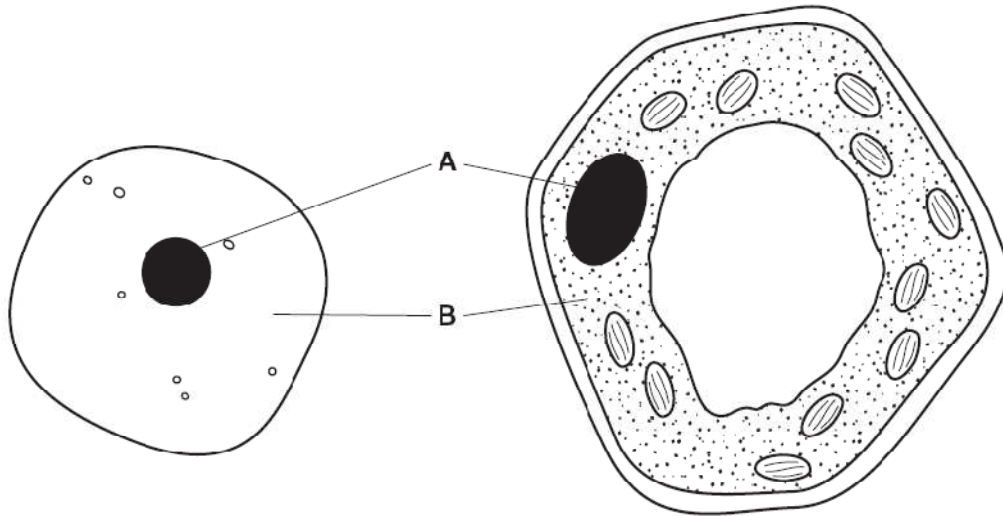
The maximum mark for this paper is 100.

Write your answers neatly and in good English.

|                        |          |          |          |          |          |          |          |          |          |           |           |           |           |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| <b>Question Number</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>13</b> |
| <b>Max mark</b>        | 11       | 5        | 6        | 12       | 6        | 5        | 6        | 11       | 7        | 9         | 10        | 5         | 7         |
| <b>Actual mark</b>     |          |          |          |          |          |          |          |          |          |           |           |           |           |

*Total Marks out of 100* \_\_\_\_\_

1. The diagram below shows a typical animal cell and a typical plant cell.



a) i. Name the parts of the cells labelled A and B.

A \_\_\_\_\_ B \_\_\_\_\_ (2 marks)

ii. **Label** on the diagram, with a **letter C**, another structure that occurs in both cells. (1 mark)

b) For each of the following types of cell, state one way in which it is different from the animal cell shown and state the function of each type of cell.

i. Cell lining the trachea (windpipe)

**Difference** \_\_\_\_\_

**Function** \_\_\_\_\_ (2 marks)

ii. Red blood cell

**Difference** \_\_\_\_\_

**Function** \_\_\_\_\_ (2 marks)

c) Materials can enter the cells shown above by diffusion and osmosis.

i. Define *diffusion*.

\_\_\_\_\_  
 \_\_\_\_\_ (2 marks)

ii. Describe how osmosis differs from diffusion.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ (2 marks)

2. **Complete** the following:

- a. The pigment found in chloroplasts is called \_\_\_\_\_.
- b. Excess water is removed from *Amoeba* by a structure called the \_\_\_\_\_.
- c. Yeast reproduces by a method called \_\_\_\_\_.
- d. Small finger-like projections in the small intestine are called \_\_\_\_\_.
- e. The muscle flap that closes the trachea during swallowing is called \_\_\_\_\_.

(5 marks)

3. A square garden, measuring 50 metres on each side, was surveyed using a quadrat. The quadrat measured 1 metre on each side. The aim of the survey was to estimate the number of earthworms in the garden. In order to extract the earthworms, the vegetation inside the quadrat was removed using a shears and a solution of washing-up liquid was applied over the area. The quadrat was thrown randomly a total of ten times. The results of the survey are shown in the table below.



| <b>Quadrat number</b>  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|------------------------|----|----|----|----|----|----|----|----|----|----|
| <b>Number of worms</b> | 25 | 20 | 19 | 31 | 27 | 25 | 15 | 11 | 19 | 28 |

a. Calculate the average number of worms per quadrat.

\_\_\_\_\_  
\_\_\_\_\_  
(2 marks)

b. Estimate the total number of worms in the garden.

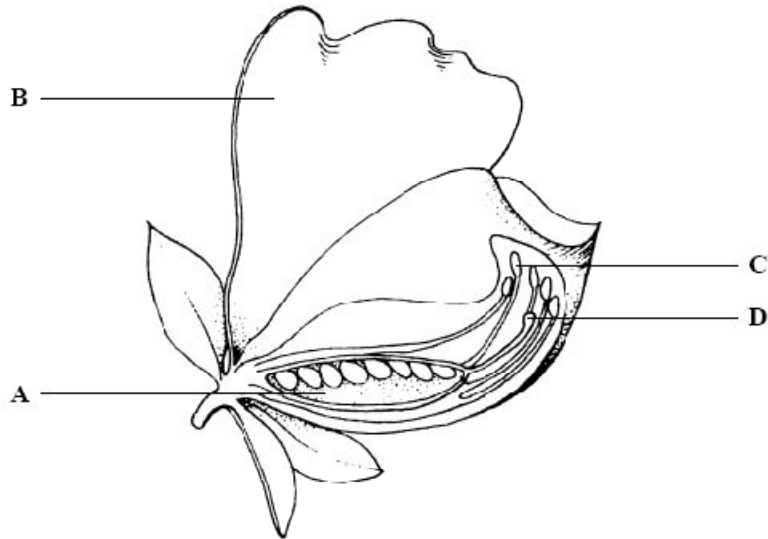
\_\_\_\_\_  
\_\_\_\_\_  
(1 mark)

c. State **three** ways in which earthworms are of benefit to the garden soil

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
(3 marks)

4. Flowering plants reproduce sexually using structures in their flowers.

The diagram below shows an insect-pollinated flower.



a) i. Name the structures labelled **A**, **B**, **C** and **D**.

**A** \_\_\_\_\_ **B** \_\_\_\_\_

**C** \_\_\_\_\_ **D** \_\_\_\_\_

(4 marks)

ii. Which letter shows where pollen must land if fertilization is to occur? \_\_\_\_\_ (1 mark)

b) Describe what happens to structures **A** and **B** after fertilization.

Structure **A** \_\_\_\_\_

\_\_\_\_\_

Structure **B** \_\_\_\_\_

\_\_\_\_\_

(2 marks)

c) Give **three** ways in which this insect-pollinated flower differs from a wind-pollinated flower.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(3 marks)

d) Some students wanted to study meiosis. From which parts of this flower should they take cells? Explain your answer.

\_\_\_\_\_

\_\_\_\_\_

(2 marks)

**5. Write a brief explanatory note on each word to clearly distinguish between each pair of terms.**

a. Moulting and Metamorphosis

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b. Cerebellum and Cerebrum

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c. Stomata and Spiracle

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(6 marks)

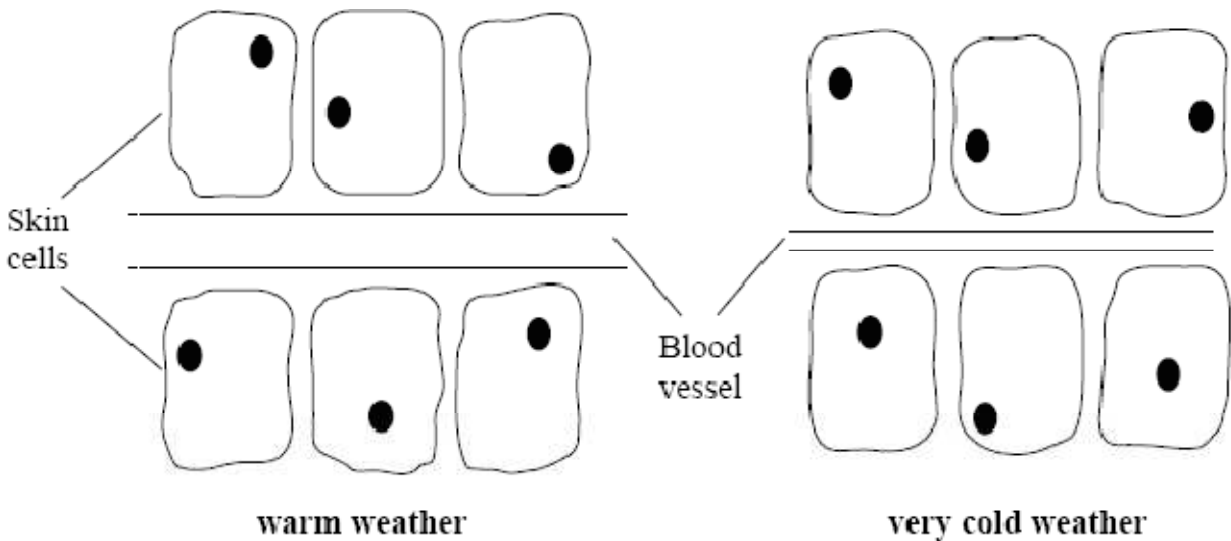
*Please turn the page for the next question*

6. a. State the **term** used to describe the maintenance of a **constant** internal environment in the human body.

\_\_\_\_\_ (1 mark)

b. In very cold weather, the fluid surrounding cells in the body may freeze. This would lead to frostbite and death of the cells. In these conditions, the circulation of blood to the extremities, such as the feet and hands, is reduced and this acts as a way of protecting internal organs.

The diagram below shows a blood vessel supplying a group of skin cells in warm weather and in very cold weather.



b) i. What evidence in the diagram suggests that less blood flows to skin cells in cold weather?

\_\_\_\_\_ (1 mark)

ii. Why is it an advantage that less blood flows to skin cells in cold weather?

\_\_\_\_\_ (1 mark)

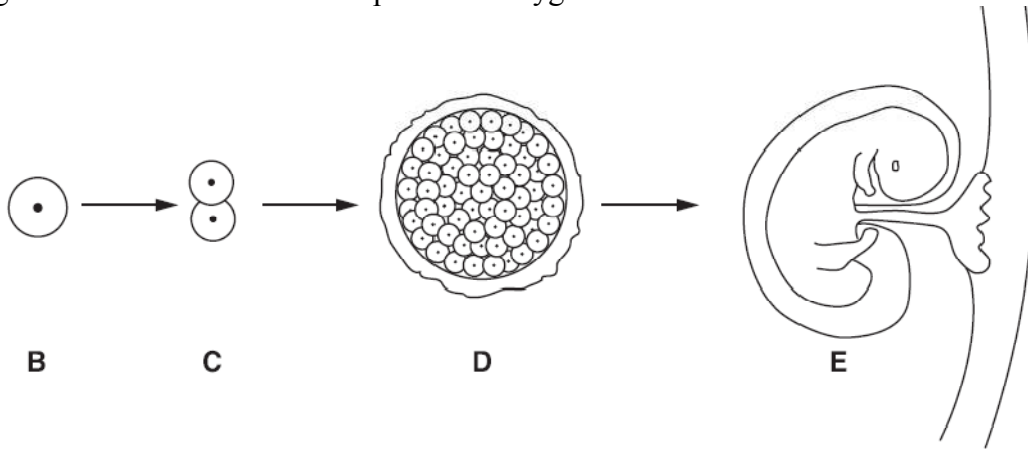
iii. Name the mechanism shown in the diagram above.

\_\_\_\_\_ (1 mark)

c) Why do cells die if the fluid surrounding them freezes?

\_\_\_\_\_ (1 mark)

7. The diagram below shows the development of a zygote into a foetus.



a) Name the place in the female reproductive systems, where one expects to find C

\_\_\_\_\_ (1 mark)

b) Name the type of cell division occurring in stages B to E shown above.

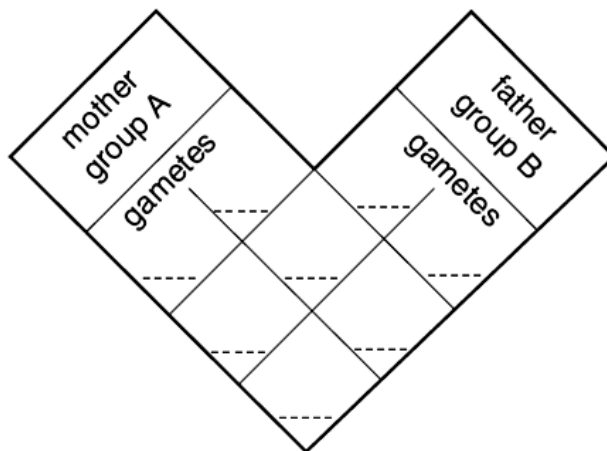
\_\_\_\_\_ (1 mark)

c) Describe what must happen to structure D so that it can continue to develop into a foetus.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ (2 marks)

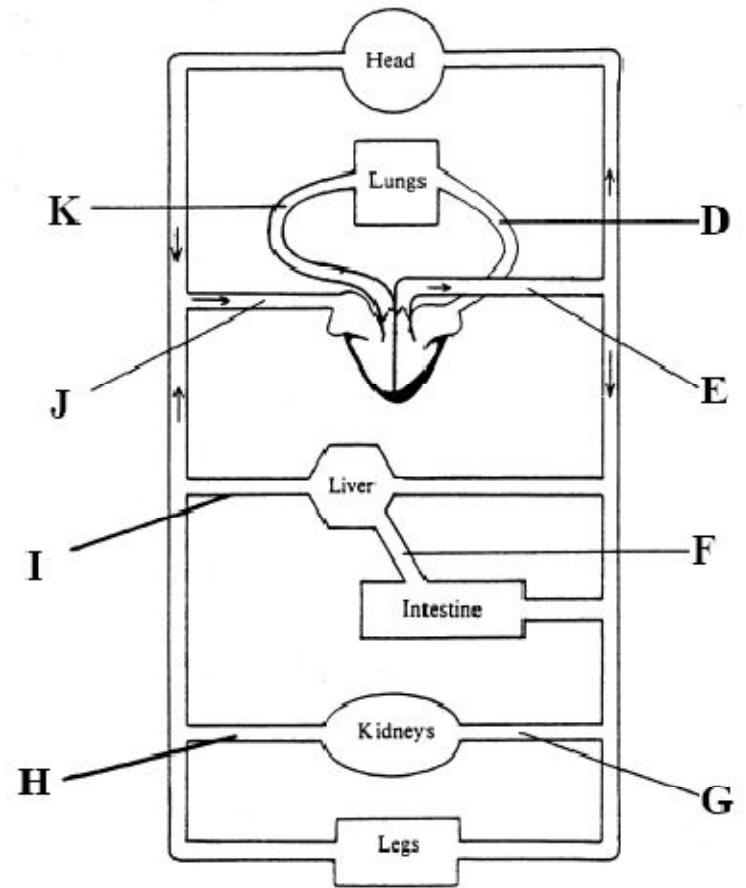
d) If the embryo's mother had blood group A and the father had blood group B, complete the diagram below to show how the embryo could have blood group O.

- Use  $I^A$ ,  $I^B$  and  $I^O$  to represent the alleles
- Clearly indicate any embryo that has blood group O.



(2 marks)

8. The diagram shows the blood circulatory system of a mammal.



a) State which **letter** represents each of the following parts. (4 marks)

- i. aorta \_\_\_\_\_
- ii. hepatic portal vein \_\_\_\_\_
- iii. pulmonary vein \_\_\_\_\_
- iv) renal artery \_\_\_\_\_

b) State what changes occur in the blood as it passes through:

i. the *lungs*

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(2 marks)

ii. the *kidney*

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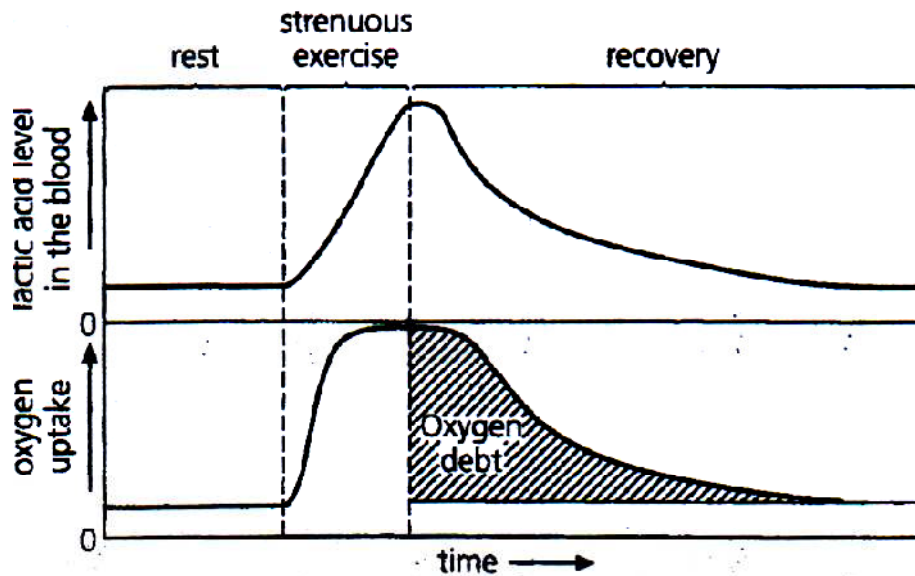
(2 marks)

c) Draw and label a cross-section through a *vein* and an *artery* to show the main differences between them.

(3 marks)



9. Study the graphs below and then answer the questions that follow:



a) i. Describe what happens to the amount of oxygen taken up just as a person starts strenuous exercise. \_\_\_\_\_ (1 mark)

ii. Describe what happens to the amount of lactic acid produced when a person starts carrying out some type of strenuous exercise. \_\_\_\_\_ (1 mark)

b) Name the type of respiration that takes place during strenuous exercise. \_\_\_\_\_ (1 mark)

c) What effect does the build-up of lactic acid have on muscles? \_\_\_\_\_ (1 mark)

d) i. Give the meaning of the term *oxygen debt*. \_\_\_\_\_ (1 mark)

ii. Explain how oxygen debt is repaid. \_\_\_\_\_ (1 mark)

e) Explain why lactic acid is not produced during an activity such as walking. \_\_\_\_\_ (1 mark)



10. Pond snails are invertebrates which are often found in ponds amongst the pondweed *Elodea*.



a) Suggest two reasons why pond snails live amongst *Elodea*.

1. \_\_\_\_\_
  2. \_\_\_\_\_
- (2 marks)

b) Six boiling tubes were filled with fresh pond water, to which some hydrogencarbonate indicator solution was added. This indicator is red in water of pH 7, purple when carbon dioxide levels are low and yellow when carbon dioxide levels are high.

The tubes and their contents were set up in daylight, as shown in Table 9.1.

| Tube | Organisms Added                                    | Conditions               | Colour of Indicator after one hour |
|------|--|--------------------------|------------------------------------|
| 1    | One piece of <i>Elodea</i>                         | uncovered                | Purple                             |
| 2    | One pond snail                                     | uncovered                | Yellow                             |
| 3    | One piece of <i>Elodea</i> and one pond snail      | uncovered                | Red                                |
| 4    | One piece of <i>Elodea</i> and several pond snails | uncovered                | Yellow                             |
| 5    | One piece of <i>Elodea</i>                         | Covered with black paper | Yellow                             |
| 6    | none   | uncovered                | Red                                |

i. Explain the results for tubes 1–5.

tube 1 \_\_\_\_\_

tube 2 \_\_\_\_\_

tube 3 \_\_\_\_\_

tube 4 \_\_\_\_\_

tube 5 \_\_\_\_\_

(5 marks)

ii. Suggest why tube 6 was used and explain why a red colour was observed.

\_\_\_\_\_ (2 marks)

11. **Proteins** are digested in the stomach and small intestine.

a) i. Which **type** of enzyme breaks down proteins?

\_\_\_\_\_ (1 mark)

ii. State how the conditions necessary for the digestion of proteins in the stomach are different from those in the small intestine.

\_\_\_\_\_ (1 mark)

b) When carbohydrates have been digested, excess glucose is stored.

i. **Where** is it stored?

\_\_\_\_\_ (1 mark)

ii. What is it stored as?

\_\_\_\_\_ (1 mark)

c) Excess amino acids **cannot** be stored.

Describe what happens to them and how they are removed from the body.

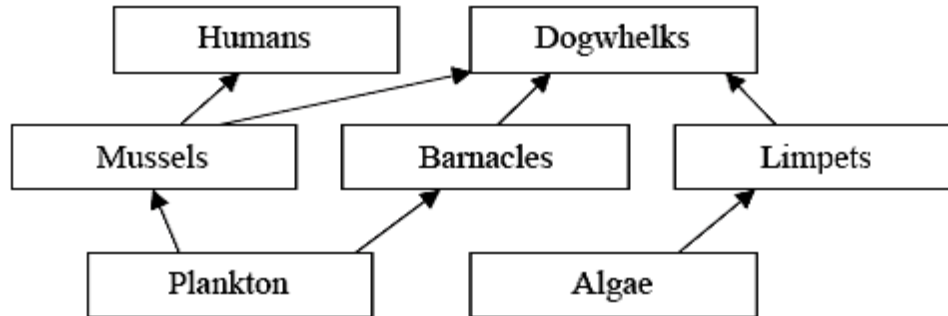
\_\_\_\_\_ (2 marks)

d) Apart from proteins, other food substances are required for a balanced diet. **Complete** the table:

| <i>Food Type</i> | <i>Required for</i> | <i>Important Food source</i> | <i>Deficiency disease</i> |
|------------------|---------------------|------------------------------|---------------------------|
|                  | Development of gums |                              | Scurvy                    |
| Vitamin A        |                     |                              |                           |
|                  |                     |                              | Anaemia                   |

(4 marks)

12. Look at the food web below.



a) How many different food chains are contained in this food web?

(1 mark)

b) Name the primary consumers in this food web.

(1 mark)

c) In the space below draw and label a pyramid of biomass for this food web.

(1 mark)

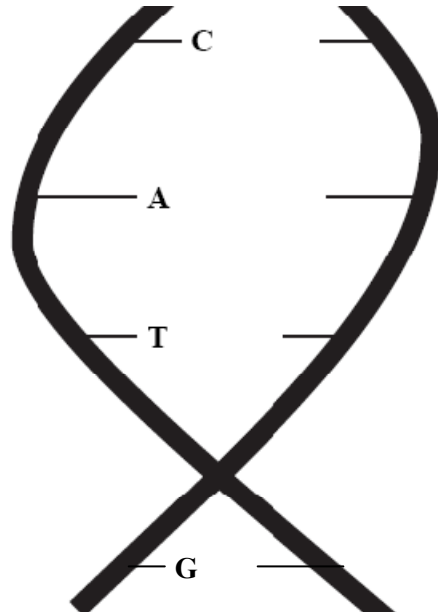
d) Explain how a pyramid of biomass for the food chain:

Oak Tree → aphids → ladybirds → robin

would differ from the pyramid of biomass drawn above and give a reason for your answer.

(2 marks)

13. The diagram below shows part of a DNA molecule. It consists of two strands linked by a series of paired bases.



a) i) The bases in DNA are adenine (A), cytosine (C), guanine (G) and thymine (T).

*Complete the diagram* above by writing in the correct base to complete each pair. (2 marks)

ii) The DNA molecule is known as a double helix. Explain what is meant by the term ‘double helix’.

\_\_\_\_\_ (1 mark)

b) Genetic modification (genetic engineering) uses enzymes to cut and join sections of DNA.

i. Name the enzyme used to cut DNA at a specific site.

\_\_\_\_\_ (1 mark)

ii. Name **one** human hormone that is produced by genetically modified bacteria.

\_\_\_\_\_ (1 mark)

iii. Give **one** advantage of using genetically modified bacteria to produce this hormone.

\_\_\_\_\_ (1 mark)

iv. Give a possible **hazard** of genetic engineering.

\_\_\_\_\_ (1 mark)