



Wellingborough  
School  
Founded 1595

## SAMPLE PAPER

# BIOLOGY SCHOLARSHIP EXAMINATION 16+

Candidate Number:

Time:

- 1 ½ hours

**Instructions to Candidates:**

- The paper consists of two sections A and B.
- Answer **ALL** the short answer questions in Section A and **ONE** of the essays from Section B.

**Information for Candidates:**

- Writing and presentation are important. Poor presentation or failure to pay due attention to spelling and punctuation may lose marks.

## SECTION A

Q1. Fig. 7.1 shows a diagram of the carbon cycle.

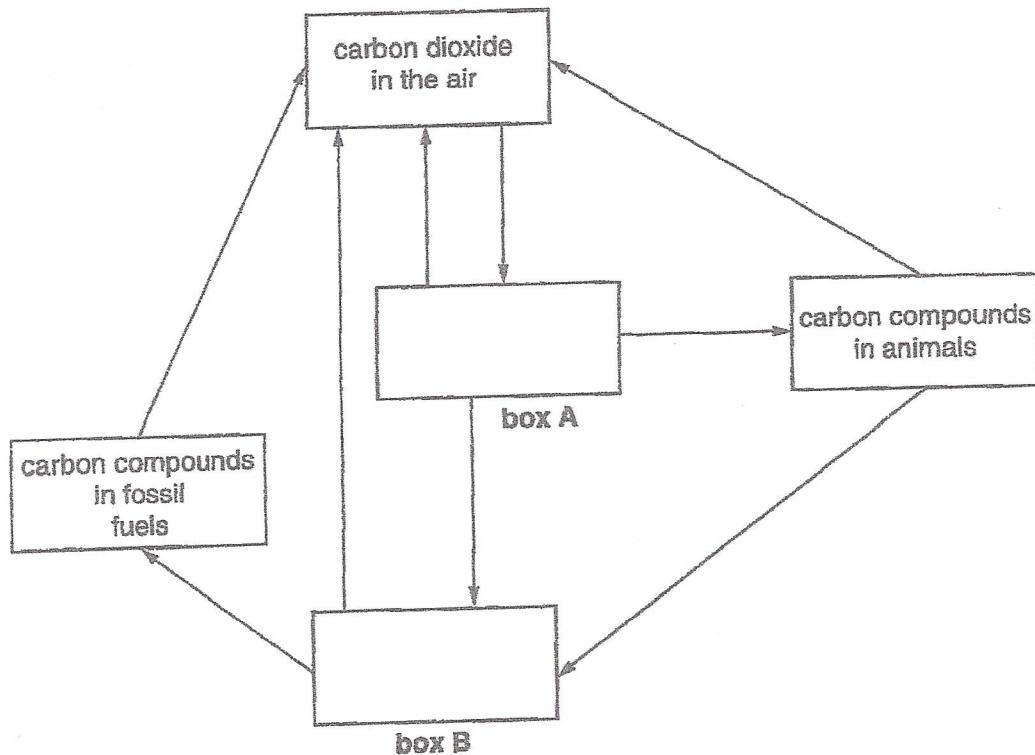


Fig. 7.1

- (a) Complete the cycle by filling in boxes A and B. [2]
- (b) On Fig. 7.1, label with the letter indicated an arrow that represents the process of
- (i) combustion - C; [1]
  - (ii) decomposition - D; [1]
  - (iii) photosynthesis - P; [1]
  - (iv) respiration - R. [1]

[Total : 6]

2.

- Q2. (a) Complete the equation for photosynthesis, either in words or symbols.



- (b) Where in the cells of a leaf does photosynthesis occur?

..... [1]

- (c) (i) Name the structures through which oxygen is lost from a leaf.

..... [1]

- (ii) Explain why excess sugar is often stored as starch and not as a simple sugar.

.....  
.....  
.....  
..... [2]

- (iii) The sugar can be changed into cellulose and amino acids or protein.

State a use for each of these substances in a plant.

*cellulose* .....

*amino acids or protein* .....

[2]

[Total : 8]

3.

Q3. Fig. 9.1 shows the human digestive system and associated organs.

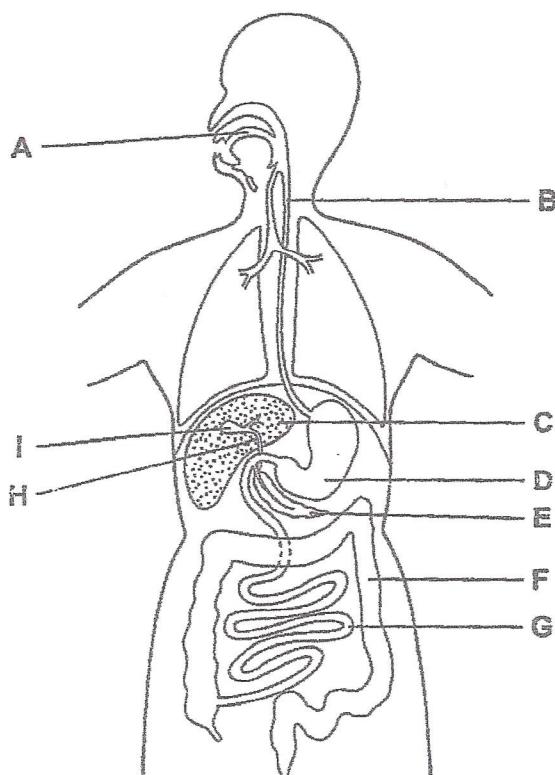


Fig. 9.1

(a) Use letters from Fig. 9.1 to identify the structures described.

Each letter may be used once, more than once, or not at all.

(i) One structure where digestion of protein occurs.

(ii) One structure where bile is stored.

(iii) One structure where peristalsis happens.

(iv) One structure where starch digestion occurs.

(v) One structure where amino acids are absorbed into the blood.

TOTAL [5]

4.

Q4. Insulin is a hormone produced to control blood glucose levels. Diabetics do not have a natural ability to control these levels.

(a) Define the term *hormone*.

[2]

(b) With reference to the pancreas and the liver, describe the role of insulin in controlling blood glucose levels.

[4]

(c)

- Insulin is a protein.
- Diabetics can control their blood glucose levels artificially by injecting insulin.
- Many medicines are swallowed as tablets.

Explain what would happen to the insulin in the stomach if it was swallowed as a tablet.

[2]

5.

- (d) An alternative treatment to injecting insulin is being developed. The insulin is inhaled into the lungs as a spray. It is then absorbed into the bloodstream.

- (i) Suggest the path the spray would take from the mouth to enter the alveoli.

.....  
.....  
.....

[3]

- (ii) Suggest the process by which the insulin would pass from the alveoli into the bloodstream.

.....  
.....

[1]

- (iii) State three features of the alveoli that might help the insulin to pass into the blood stream efficiently.

1. ....  
2. ....  
3. ....

[3]

[Total: 15]

6.

Q5. Fig. 6.1 shows a food chain.

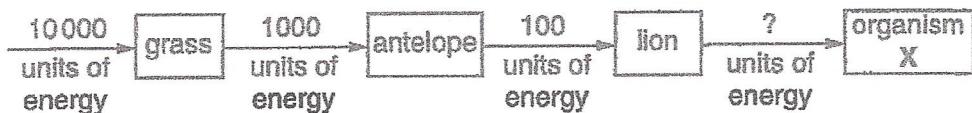


Fig. 6.1

- (a) (i) State the form of energy that is absorbed by the grass.

..... [1]

- (ii) State the form in which energy is passed along the food chain.

..... [1]

- (iii) Large amounts of energy are lost from the food chain.

In what form is most of this energy lost?

..... [1]

- (b) (i) State two reasons why only a small part of the energy passing into the antelope is passed on to the lion.

1. .....

.....

2. .....

..... [2]

- (ii) The lion is not the prey of another carnivore.

Suggest what type of organism X could be.

..... [1]

- (iii) Predict the number of units of energy that would pass from the lion to X.

..... [1]

[Total : 7]

7.

- Q6.** Flowers from three red-flowered plants, A, B and C, of the same species were self-pollinated.

- (a) Explain what is meant by the term *pollination*.

.....  
.....  
.....  
.....

[2]

- (b) Seeds were collected from plants A, B and C. The seeds were germinated separately and were allowed to grow and produce flowers.

The colour of these flowers is shown in Table 10.1.

Table 10.1

seeds from plant	colour of the flowers grown from the seeds
A	all red
B	some red and some white
C	some red and some white

- (i) State the recessive allele for flower colour.

[1]

- (ii) State which plant, A, B or C, produced seeds that were homozygous for flower colour.

[1]

- (iii) Suggest how you could make certain that self-pollination took place in the flowers of plants A, B and C.

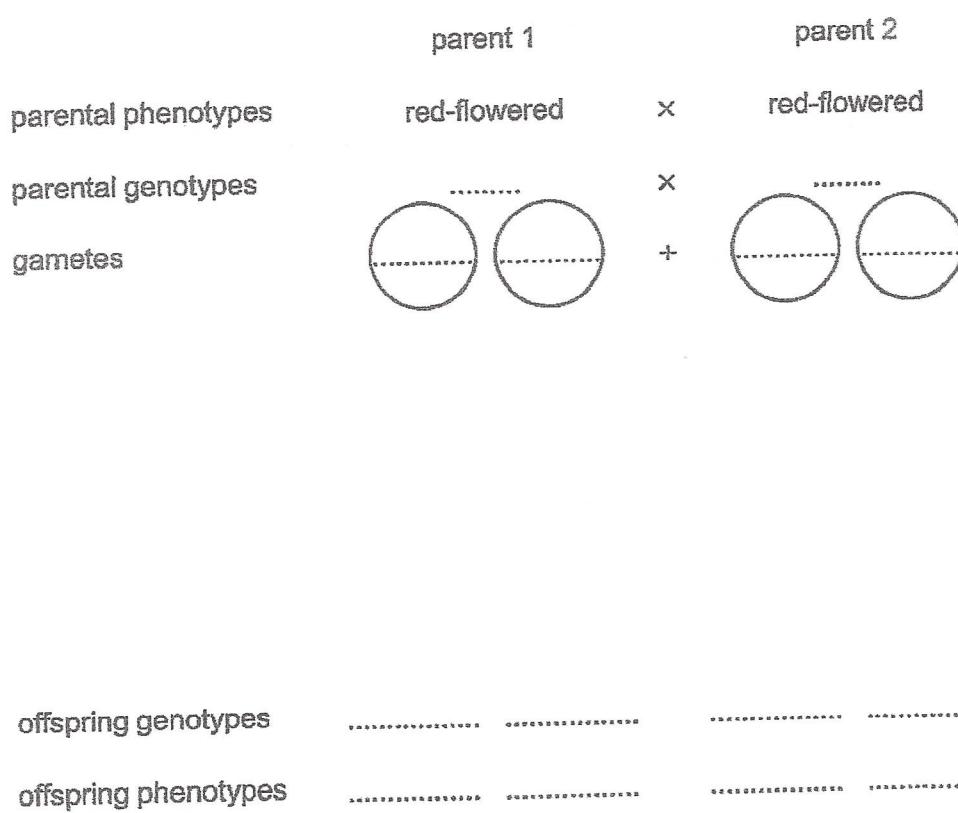
.....  
.....  
.....  
.....

[2]

8.

- (c) Complete the genetic diagram to explain how two red-flowered plants identical to plant B could produce both red-flowered plants and white-flowered plants.

Use the symbols R to represent the dominant allele and r to represent the recessive allele.



[4]

[Total: 10]

9.

Q7. (a) The human circulatory system contains valves.

(i) State the function of these valves.

[1]

(ii) Complete Table 2.1 by placing a tick (✓) against two structures in the human circulatory system that have valves.

Table 2.1

structure in circulatory system	have valves
arteries	
capillaries	
heart	
veins	

[1]

(b) Describe how you could measure the heart rates of some students before they start running.

[2]

- (c) Fig. 2.1 shows the results of an investigation of the heart rates of some students before and immediately after running.

Each student ran the same distance.

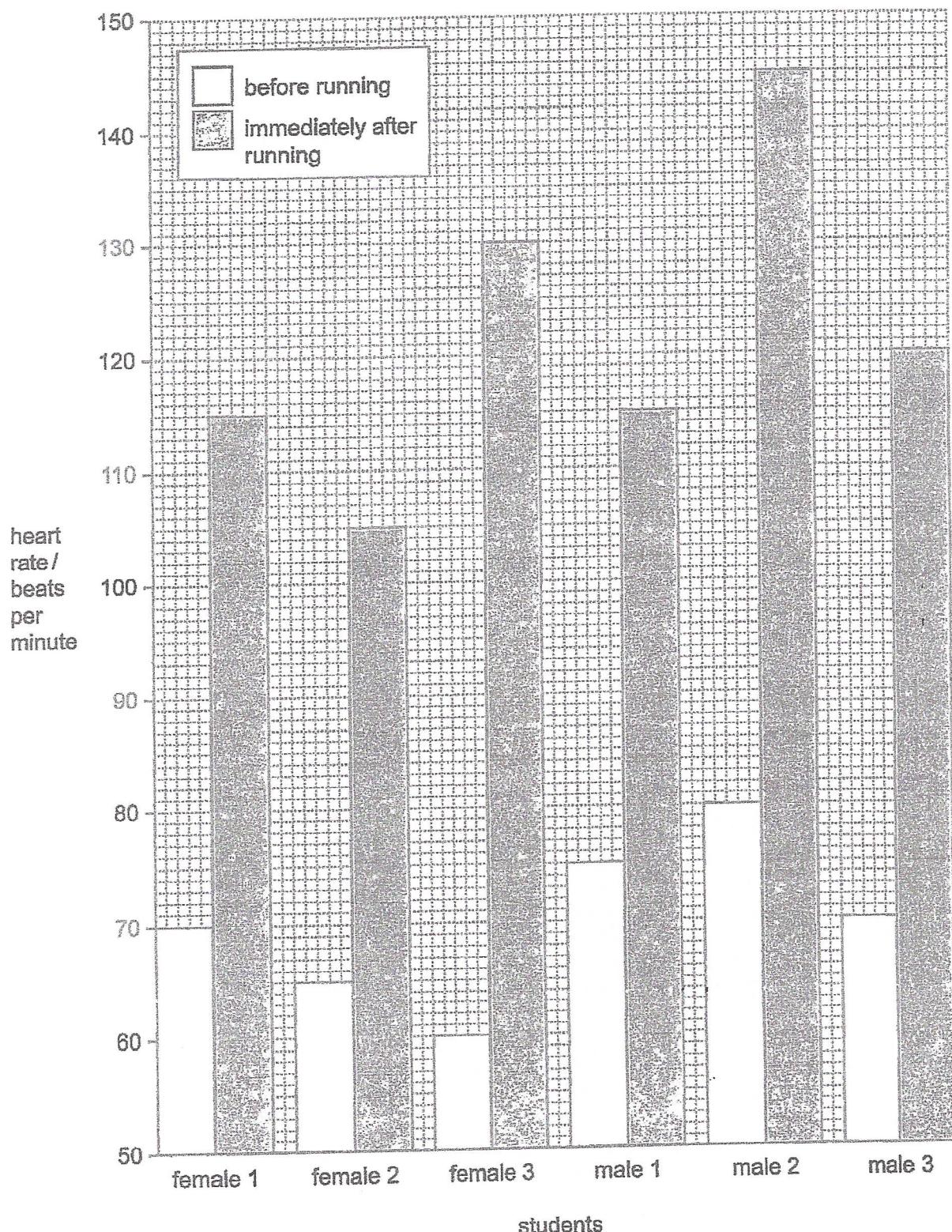


Fig. 2.1

11.

- (i) State which student has the lowest heart rate immediately after running.

[1]

- (ii) State which student has the largest change in heart rate from before to immediately after running.

[1]

- (iii) Describe any trends that you can see in the results.

[2]

- (d) Explain why heart rate changes when you run.

[4]

[Total: 12]

2

## SECTION B

**Answer Either Question 1 OR Question 2**

Q1. (a) Describe with examples the process of Natural Selection.[10]

(b) How have farmers/horticulturalists used artificial selection to improve animals and crops? [5]

**Q2.** (a) Describe the processes of Diffusion, Osmosis and Active transport. [5]

(b) With reference to specific examples, explain the importance of these processes in respiration, digestion and uptake by plants. [10]

13.

14.

Leave  
blank

