



AHMAD IBRAHIM SECONDARY SCHOOL
GCE O-LEVEL PRELIMINARY EXAMINATION 2022

SECONDARY 4 EXPRESS

Name:	Class:	Register No.:
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BIOLOGY

Paper 2

6093 / 02

26 August 2022

1 hour 45 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your class, index number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the Question Paper.

Section B

Answer **all** the questions, the last question is in the form either/or.
Write your answers in the spaces provided on the Question Paper.

Electronic calculators may be used.

You are advised to spend no longer than one hour on Section A and no longer than 45 minutes on Section B.
At the end of the examination fasten all your work securely together.
The number of marks is given in brackets [] at the end of each question or part question.

FOR EXAMINER'S USE	
Section A	/ 50
Qn 7	
Qn 8	
Qn 9 E/O	
Section B	/ 30
TOTAL	/ 80

This paper consists of **18** printed pages.

[Turn over

Section A

Answer all questions.
Write your answers in the spaces provided.

- 1 Fig. 1.1 shows a photomicrograph of the tissue that is found in the stem of a plant.

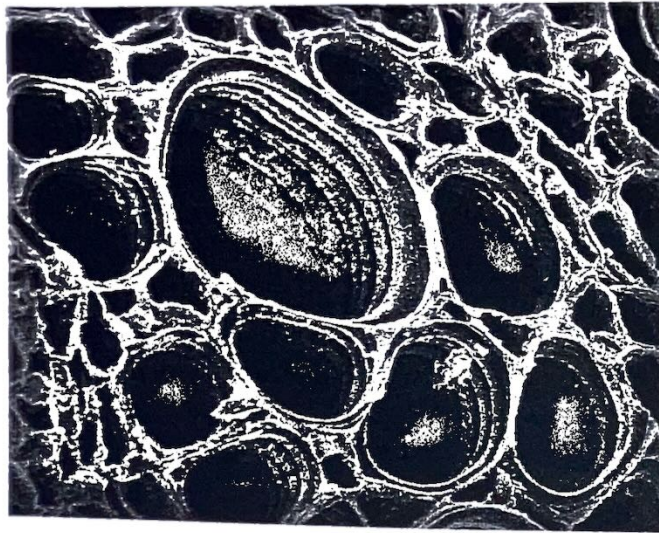


Fig. 1.1

- (a) (ii) State the name of the tissue shown.

..... [1]

- (iii) Describe how the tissue shown in Fig. 1.1 is adapted for one of its functions in the plant.

.....

 [2]

- (b) Explain how mineral ions in the soil is absorbed by root hair cells.

.....

 [2]

[Total: 5]

2 (a) Define **excretion**.

[1]

Urine is often tested as part of a medical health check. The results of these urine tests can be used to suggest whether a person has a health problem.

Table 2.1 shows urine samples collected from two patients during a medical health check.

Table 2.1

patient	observation of final colour	
	reducing sugar test	protein test
A	orange	blue
B	blue	violet

(b) Use the information from Table 2.1, suggest and explain a conclusion about the health condition of patients **A** and **B**.

Patient **A**:

 [2]

Patient **B**:

 [2]

(c) Explain why glucose and protein are usually absent in the urine of healthy people.

.....

 [4]

[Total: 9]

- 3 Some laundry detergents used to wash clothes contain enzymes to break down the molecules that cause stains.

Savinase is a protease enzyme that is a component of laundry detergents.

The enzyme is produced by genetically engineered bacteria.

- (a) Explain how a transgenic bacteria can be used to produce Savinase.

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..... [5]

Fig. 3.1 show the results of an investigation into the effects of temperature and pH on the rate of Savinase activity.

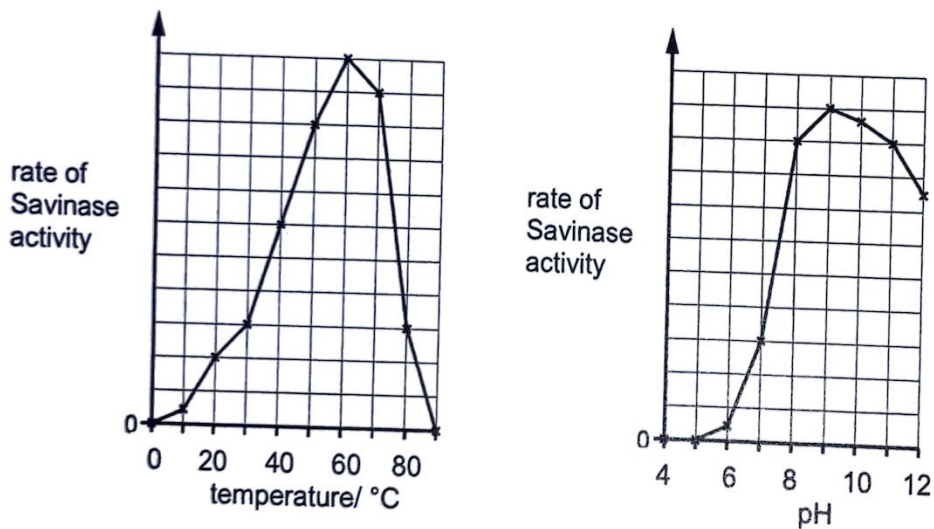


Fig. 3.1

- (b) (i) Describe how the effect of temperature on Savinase activity differs from the effect of temperature on a protease that functions in the human stomach.

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..... [2]

- (ii) With reference to Fig. 3.1, suggest why laundry detergents that contain Savinase also contain chemicals that dissolve to form an alkaline solution.

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..... [2]

- (c) After washing clothes using laundry detergents, the waste water is sometimes released into the environment.

This waste water contains inorganic phosphate ions that are also found in fertilisers.

Explain the harmful effect on aquatic life of releasing this waste water into the environment.

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..... [4]

[Total: 13]

- 4 Fig. 4.1 shows a photomicrograph of the lower surface of a leaf.

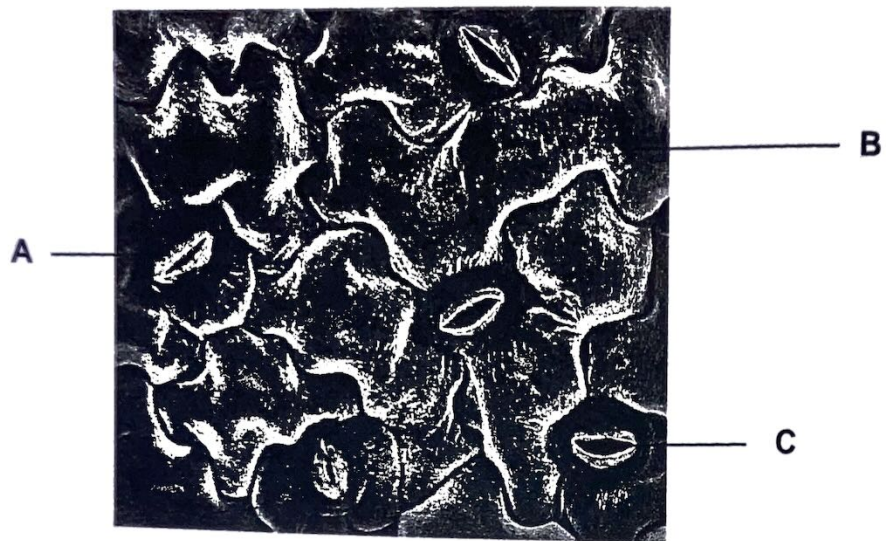


Fig. 4.1

- (a) Identify cells A and B.

cell	name of cell
A	
B	

[2]

- (b) In an area affected by air pollution, particles may block all pores of the type labelled C.

Explain how this will affect the production of starch by the plant.

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[3]

A scientist investigated the effect of temperature on the mass of leaves picked from a tea plant, *Camellia sinensis*.

Three samples of leaves were picked and the mass of each sample of leaves was recorded.

Each sample of leaves was kept at a different temperature for four hours.

After four hours, the mass of each sample of leaves was measured and recorded again.

The scientist then calculated the final mass as a percentage of the initial mass for each sample.

Fig. 4.2 shows the final mass as a percentage of the initial mass against the temperature at which the leaves were kept.

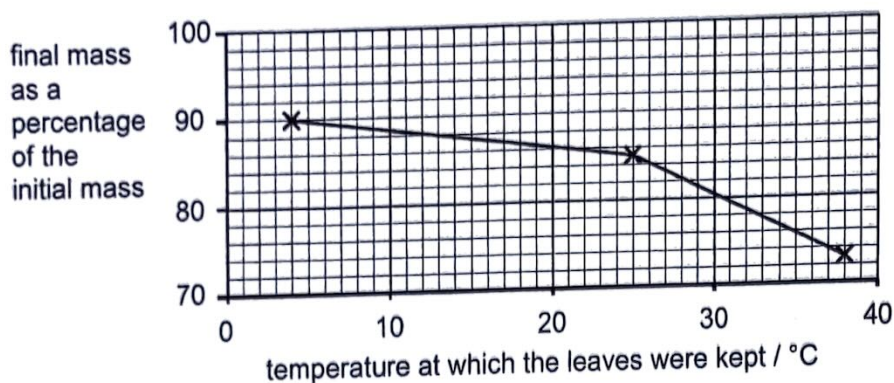


Fig. 4.2

- (c) (i) Using information from Fig. 4.2, describe the effect of temperature on the mass of leaves.

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..... [2]

- (ii) State **one** other factor that would affect the loss of mass from the leaves of a plant.

..... [1]

[Total: 8]

- 5 Fig. 5.1 shows the stages involved in protein synthesis.

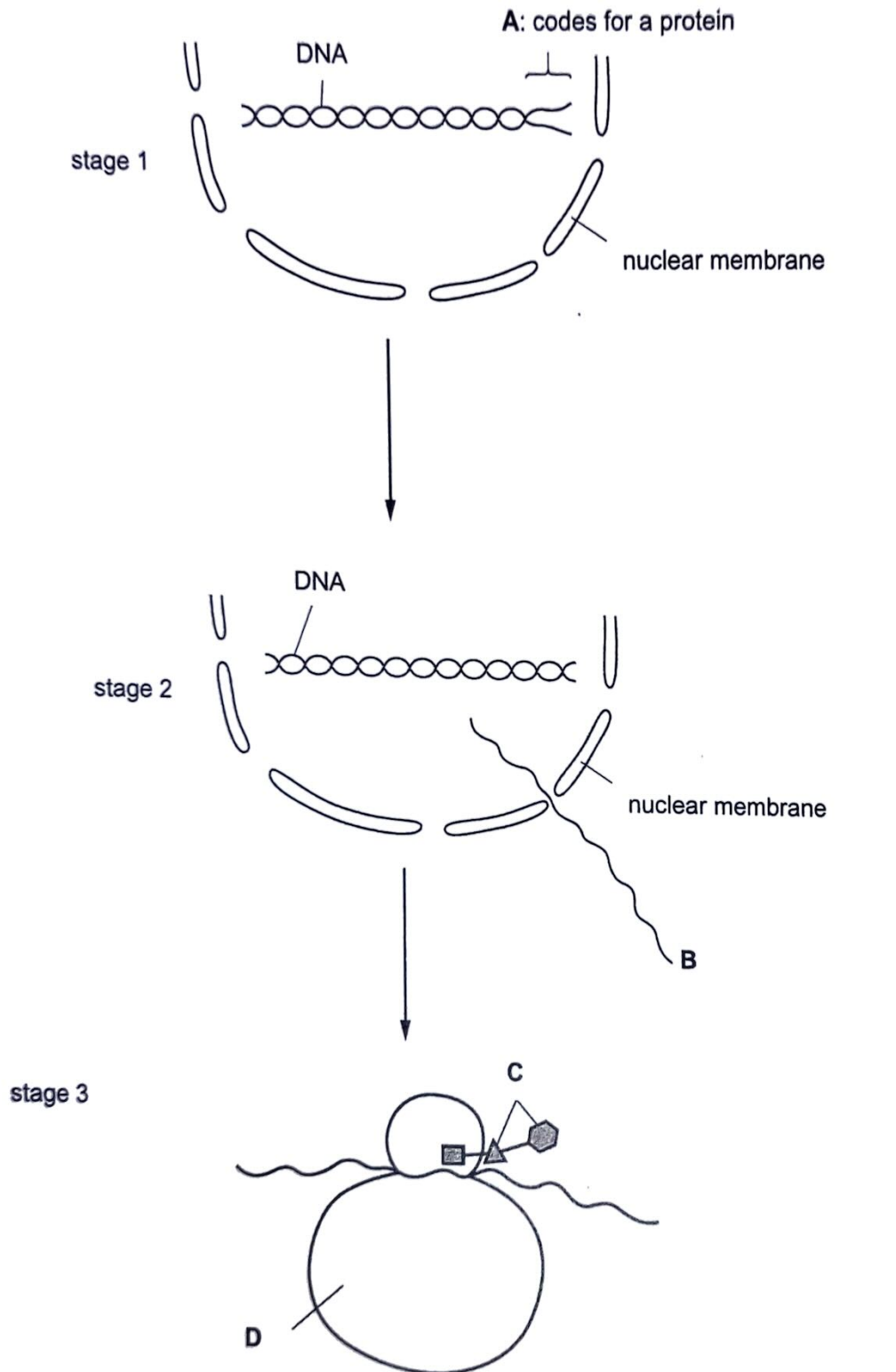


Fig. 5.1

- (a) State the name of the parts represented by the letters **A**, **C** and **D** in Fig. 5.1.

A

C

D

[2]

- (b) Below is the sequence of bases on the template strand of the DNA.

T A C A A A G G C C G A A T A

State the sequence of bases on **B**.

..... [1]

- (c) Describe the events that occur during stage 2 in Fig. 5.1.

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..... [2]

[Total: 5]

- 6 (a) Define **sexual reproduction**.

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 [1]

Fig. 6.1 shows the human life cycle.

The components of the diagram are **not** drawn to the same scale.

The diagram shows:

- cells **L**, **M** and **N**
- two types of cell division, **K** and **O**.

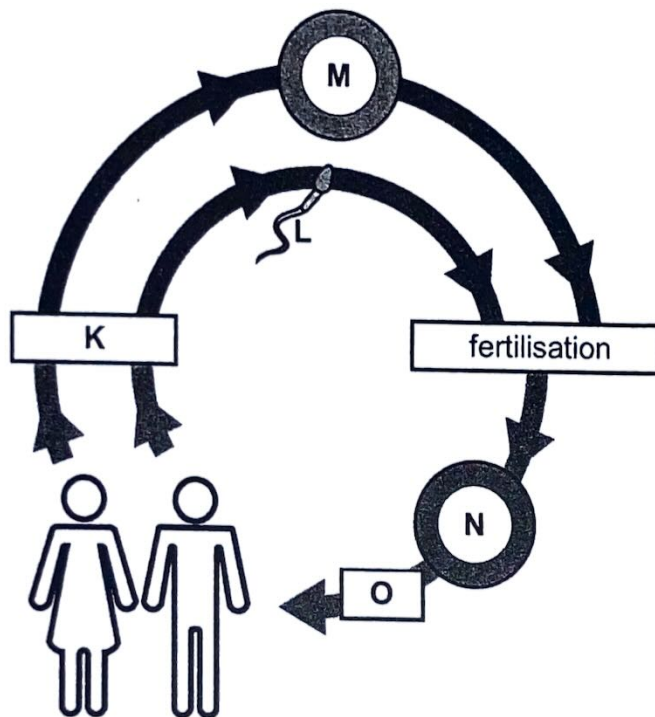


Fig. 6.1

- (b) **L** and **M** are both the same type of cell.
 Name this type of cell.

..... [1]

- (c) State one difference between the nucleus of cell **M** and the nucleus of cell **N**.

.....

 [1]

(d) Name and compare the types of cell division K and O.

[5]

(e) State the advantages of asexual reproduction.

..... [2]

[Total: 10]

Section B

Answer **all** questions.

Write your answers in the spaces provided.

- 7 The shortest distance from the eye at which a clear focus is possible is known as the near point. The distance of near point changes as a person gets older.

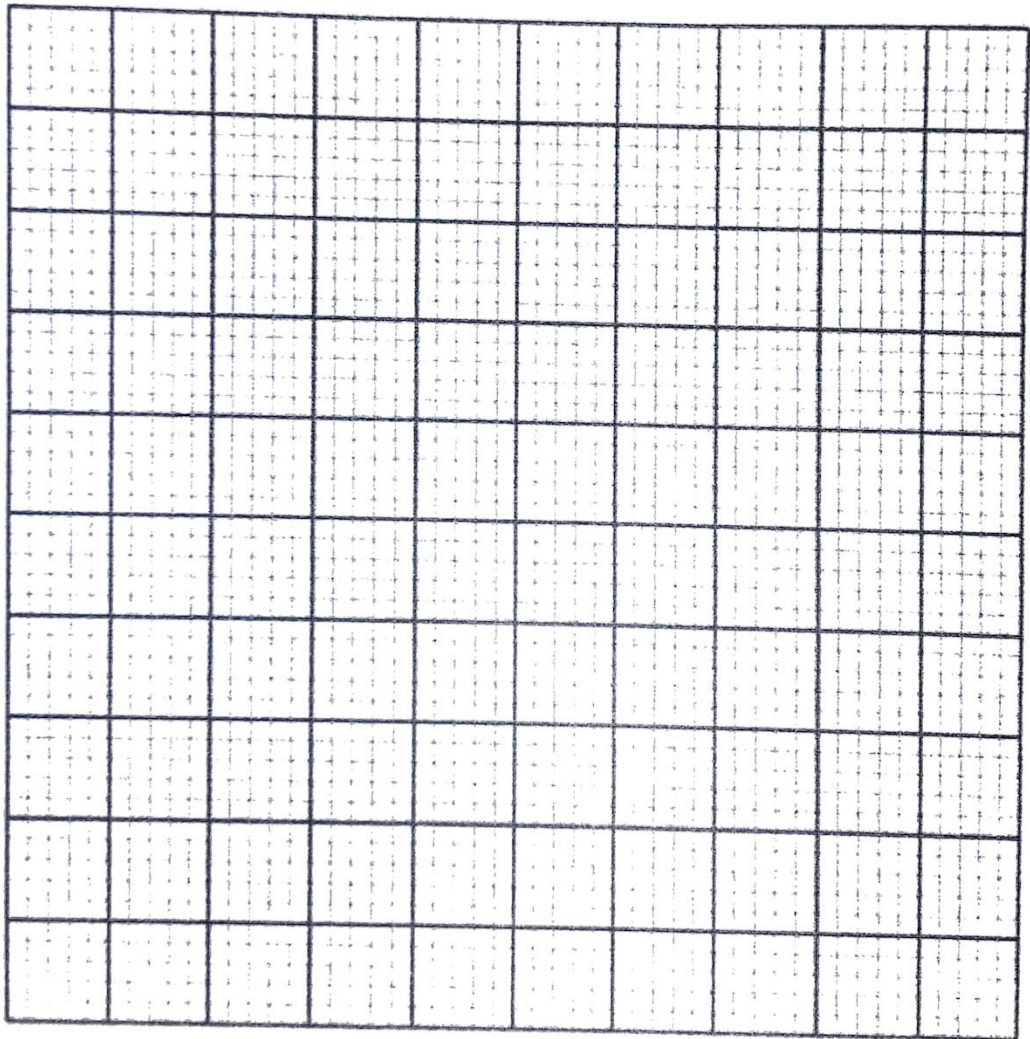
Table 7.1 shows the near point for people of different ages who have normal vision.

Table 7.1

age / years	10	15	20	25	40	50	60
distance of near point / cm	7.0	8.5	10.0	12.5	22.0	40.0	80.0

- (a) Plot a graph of the data from Table 7.1 on the grid below.

[4]



- (b) With reference to your graph, describe the relationship between age and distance of near point.

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..... [2]

- (c) Use the graph to estimate the age of a person whose near point is 32.0 cm.

age [1]

- (d) A man saw a poster on a wall 10 m away. He walked closer to try to read the words on the poster. Describe the changes that take place in his eyes that allowed him to read the words on the poster clearly.

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..... [3]

[Total: 10]

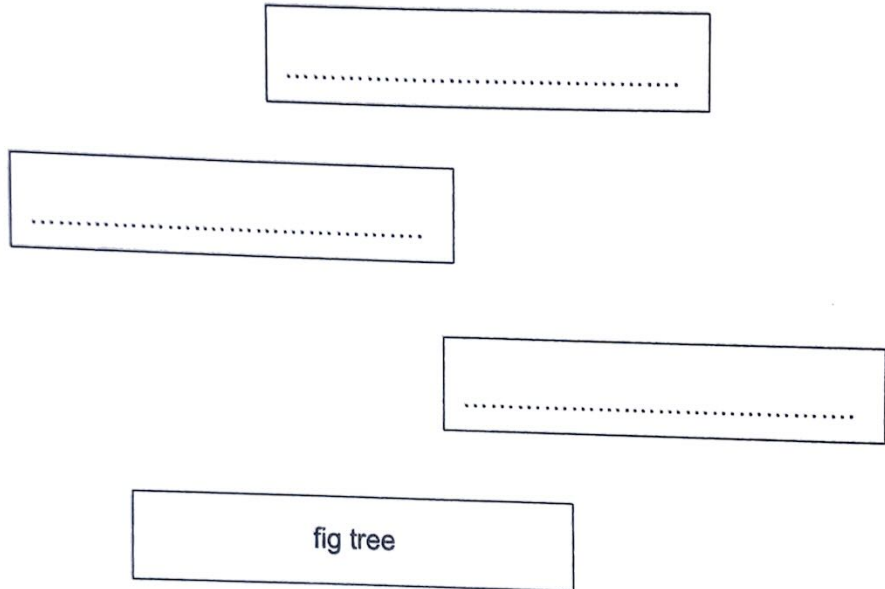
- 8 (a) A species of caterpillar, the fig sphinx, feeds on the leaves of the fig tree.

Fig trees produce fruits that are eaten by a species of bird, the blackbird.

Blackbirds also eat caterpillars and are eaten by hawks.

- (i) Use the information above to

- Complete the food web below by writing the name of **one species** in each box. [1]
- Draw arrows between the boxes to show the direction of energy flow between organisms. [1]



- (ii) To increase the harvest of figs, fig farmers treat their fig trees with insecticide to protect fig fruits from being eaten by insects.

With reference to the food chain in (a) (i), explain why the hawks in the population are found to contain high levels of insecticide in their body.

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..... [4]

(b) Explain why it is advantageous to have short food chains instead of long food chains.

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..... [4]

[Total: 10]

9 Either

(a) Define the term **allele**.

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..... [2]

Fig. 9.1 shows the colouration patterns on pigeons.

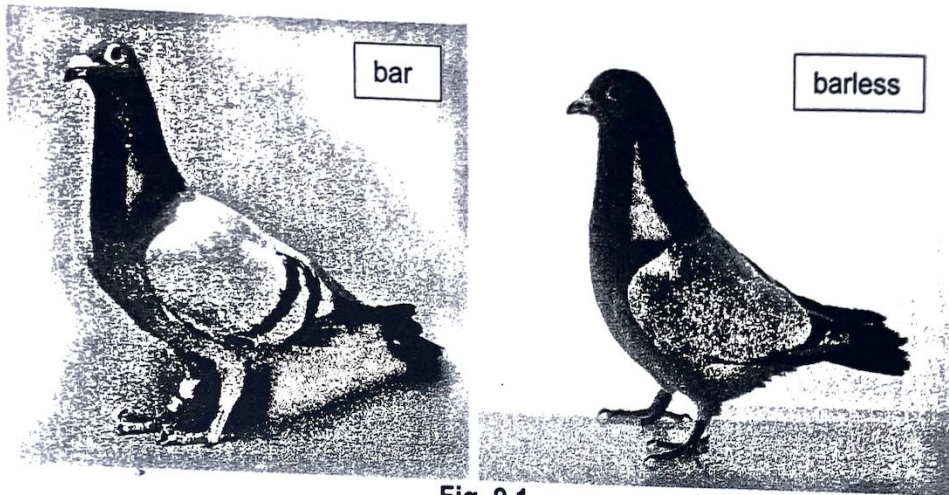


Fig. 9.1

The allele that causes bar condition is dominant to the allele for the barless condition.

Fig. 9.2 shows the inheritance of this condition in a family of pigeons.

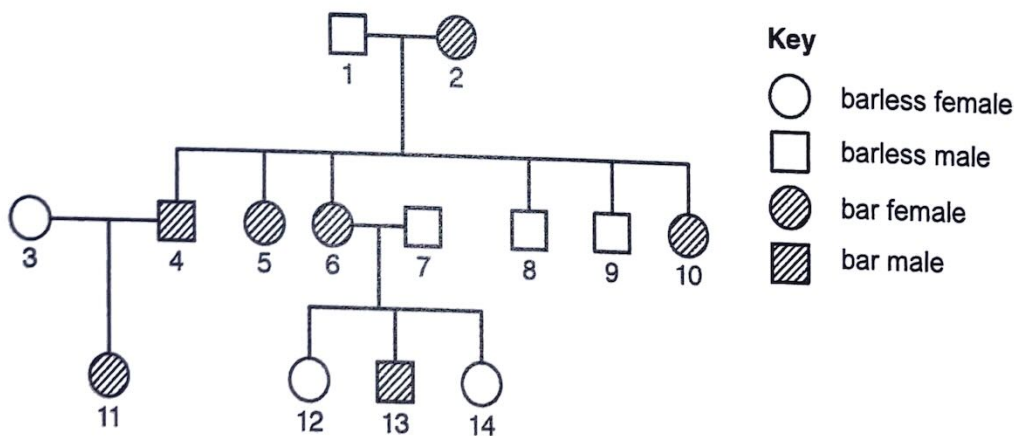


Fig. 9.2

- (b) Complete Table 9.1 by stating the genotypes of the numbered individuals.

Use **B** for the dominant allele and **b** for the recessive allele.

Table 9.1

number of individual in Fig. 9.1	genotype of individual
1	
2	
4	
14	

[4]

Individual 11 was crossed with a pure breeding pigeon with barless pattern.

Using a suitable genetic diagram, determine the probability of the offsprings having barless pattern.

probability:.....[4]

[Total: 10]

9

Or

(a) Explain the importance of adrenaline when a human is exercising intensely.

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..... [5]

(b) Describe the role played by the human skin in thermoregulation when a person enters a sauna.

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..... [5]

[Total: 10]

END OF PAPER

Setter: Mr Tan Hong Chan