



Cambridge O Level

CANDIDATE
NAME
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NUMBER

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BIOLOGY**5090/22**

Paper 2 Theory

October/November 2024**1 hour 45 minutes**

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Any blank pages are indicated.



- 1 Use the dichotomous key in Fig. 1.1 to identify the five main vertebrate groups, **A**, **B**, **C**, **D** and **E**.

Complete Table 1.1.

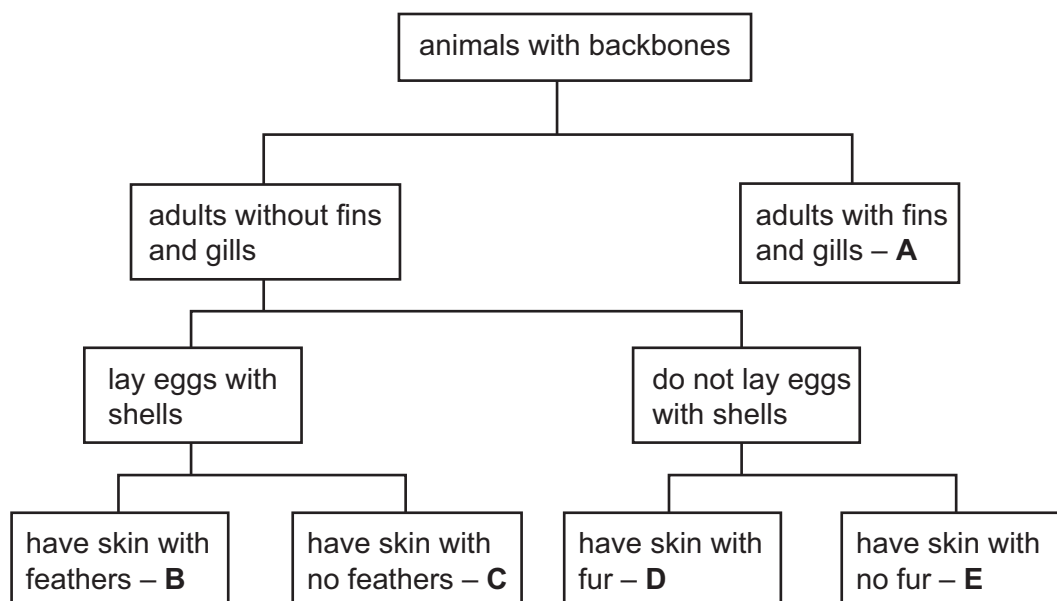


Fig. 1.1

Table 1.1

letter in key	name of vertebrate group
A	
B	
C	
D	
E	

[5]





2 A virus is a type of pathogen.

Fig. 2.1 shows the external structure of a virus.

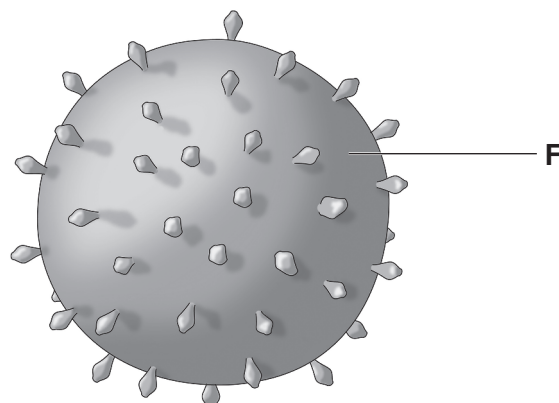


Fig. 2.1

(a) (i) Identify component **F**.

..... [1]

(ii) Identify one component of a virus **not** shown in Fig. 2.1.

..... [1]

(b) Pathogens may be transmitted to humans either by direct contact or indirectly.

List **two** of the human body's barriers to the entry of pathogens.

1

2

[2]

(c) If a virus is able to pass through the body's barriers, an immune response takes place.

Antibodies are produced during this immune response.

(i) Name **four** chemical elements that will always be present in an antibody molecule.

.....

[2]





- (ii) Explain how the structure and function of an antibody molecule are important in an immune response.

.....

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.....

.....

..... [5]

- (d) The average length of pregnancy in an adult human is 40 weeks.

A human mother may give birth to her baby before the end of the usual length of pregnancy. This is known as a premature birth.

- (i) Suggest why babies born prematurely are at higher risk of developing some infectious diseases than babies born **after** 40 weeks of pregnancy.

.....

.....

.....

..... [2]

- (ii) Suggest **one** action that a mother can take to protect her premature baby from infection in the weeks after birth.

.....

..... [1]

[Total: 14]





3 (a) Use words from the list to complete the paragraph.

platelets glucagon pancreas plasma
 liver sucrose endocrine
 pituitary insulin glycogen

Glucose is transported in solution by the component of blood called
 If the concentration of glucose in the blood
 increases above normal, the hormone is
 released into the blood by an gland called the
 This hormone promotes the removal of glucose from
 the blood and its conversion into the chemical

[5]

(b) Fig. 3.1 is a photomicrograph of a type of blood cell.

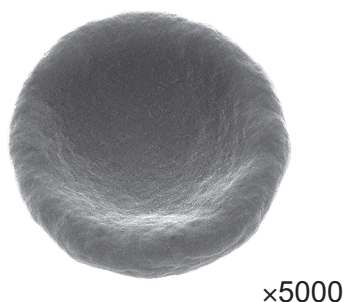


Fig. 3.1

(i) Identify the type of blood cell shown in Fig. 3.1.

.....

[1]





(ii) If the concentration of glucose in the blood increases above normal and is **not** controlled, this can result in changes to some cells of this type. They may:

- lose their specialised shape
- become less flexible
- stick together with many other cells of the same type.

Suggest and explain how these changes will affect the body.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

[Total: 11]





- 4 Fig. 4.1 shows changes in the curved shape of the lens of a person's eye over time.

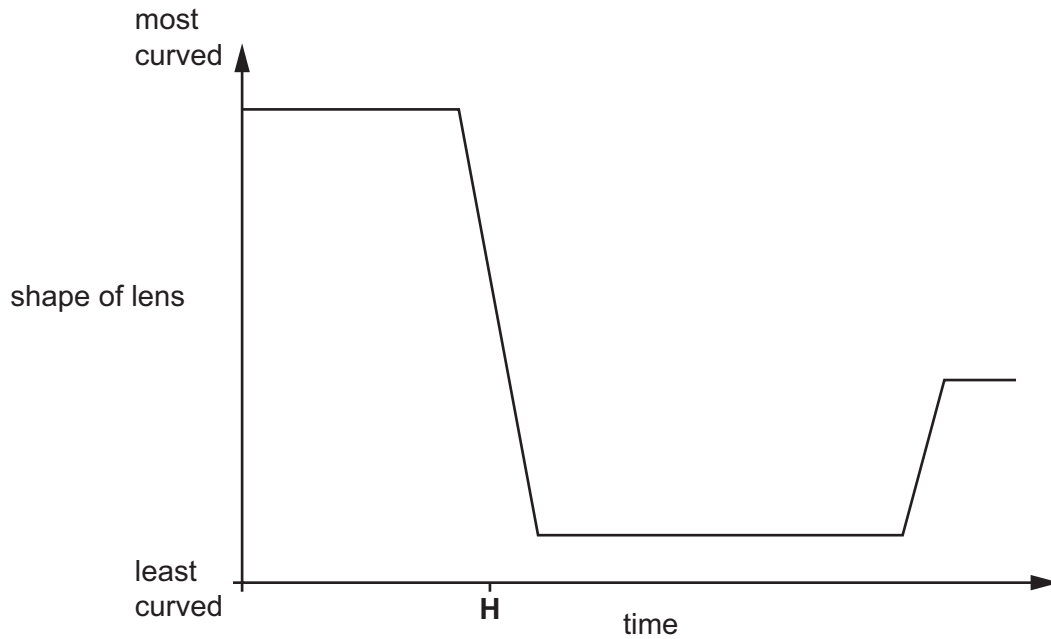


Fig. 4.1

- (a) (i) During the period of time shown in Fig. 4.1, the person carried out each of the following actions:

- P** read the words in a book
Q read the time on a wall clock
R looked out of a window at a bird high in the sky.

Identify in what order the person carried out actions **P**, **Q** and **R**.

Place the letters **P**, **Q** and **R** in the correct order below.

..... → → [1]

- (ii) At the time labelled **H** on Fig. 4.1, the shape of the lens is changing. Outline, with reference to **named** structures in the eye, how this change happens.

.....

 [4]



(b) Fig. 4.2 shows a front view of the eye in dim light.

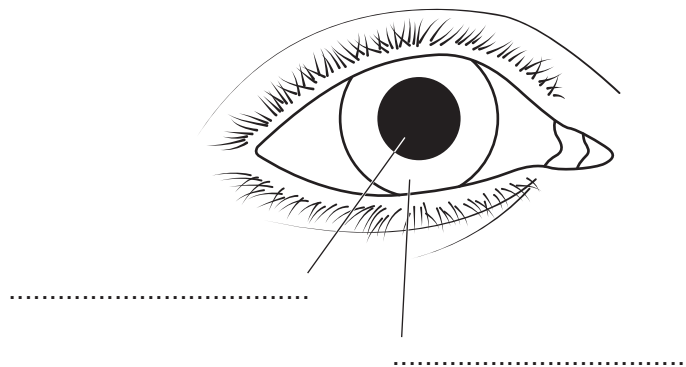


Fig. 4.2

- (i) Complete the labels on Fig. 4.2 by naming the two parts of the eye indicated by the label lines. [2]
- (ii) Complete Fig. 4.3 to show a view of the same eye as it would appear in bright light. [1]

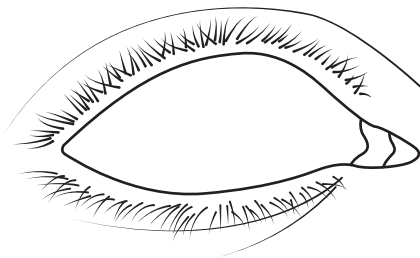


Fig. 4.3

- (iii) State the type of nervous response that takes place when the eye changes its appearance from that in Fig. 4.2 to that in Fig. 4.3. [1]
-
- (iv) Suggest the importance to the person of this response taking place in the eye. [2]
-
-
-

[Total: 11]





- 5 Fish are an important part of the balanced diet of many people, and fishing is a major source of employment in some countries.

Many people therefore believe that fish should be treated as a sustainable resource.

- (a) Describe what is meant by the term **sustainable resource**.

.....

.....

.....

..... [2]

- (b) The government of a country decided to set fishing quotas for herring fish between 2012 and 2020.

Fig. 5.1 shows the maximum number of tonnes of herring that the quota allowed to be caught each year.

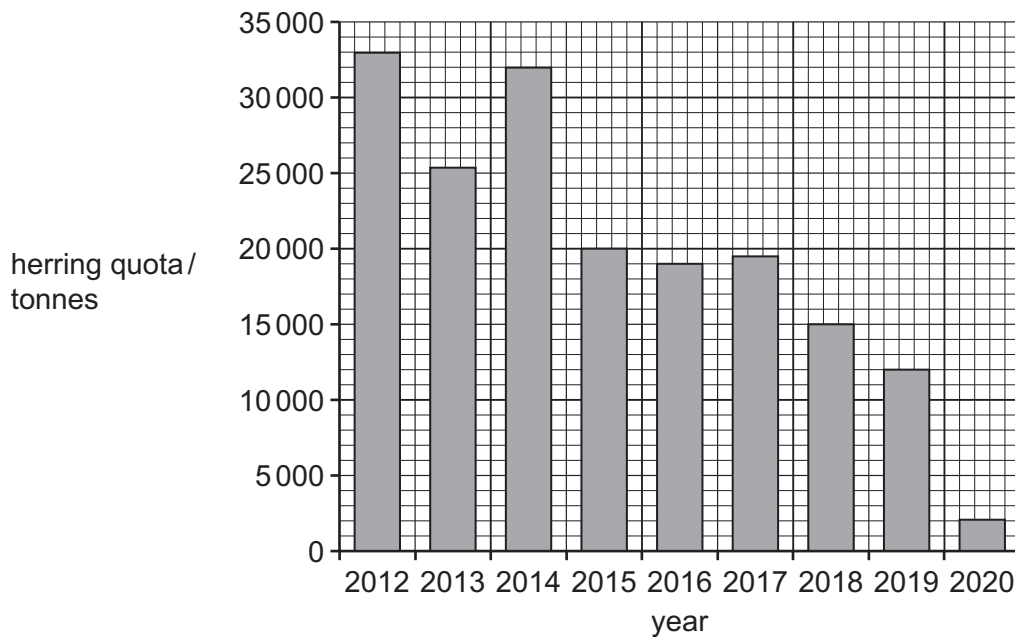


Fig. 5.1

- (i) Using the information from Fig. 5.1, describe the trend in quota size and suggest explanations for this trend.

.....

.....

.....

.....

.....

..... [4]





(ii) Setting fishing quotas is one method used when trying to conserve fish stocks.

Explain how **two other** named methods can be used to conserve fish stocks.

name of method

.....

explanation

.....

.....

.....

.....

name of method

.....

explanation

.....

.....

.....

.....

[4]





(c) Fish are a good source of lipids in the form of fish oil.

A student investigated the digestion of fish oil in the laboratory.

The student set up the two experiments shown in Fig. 5.2.

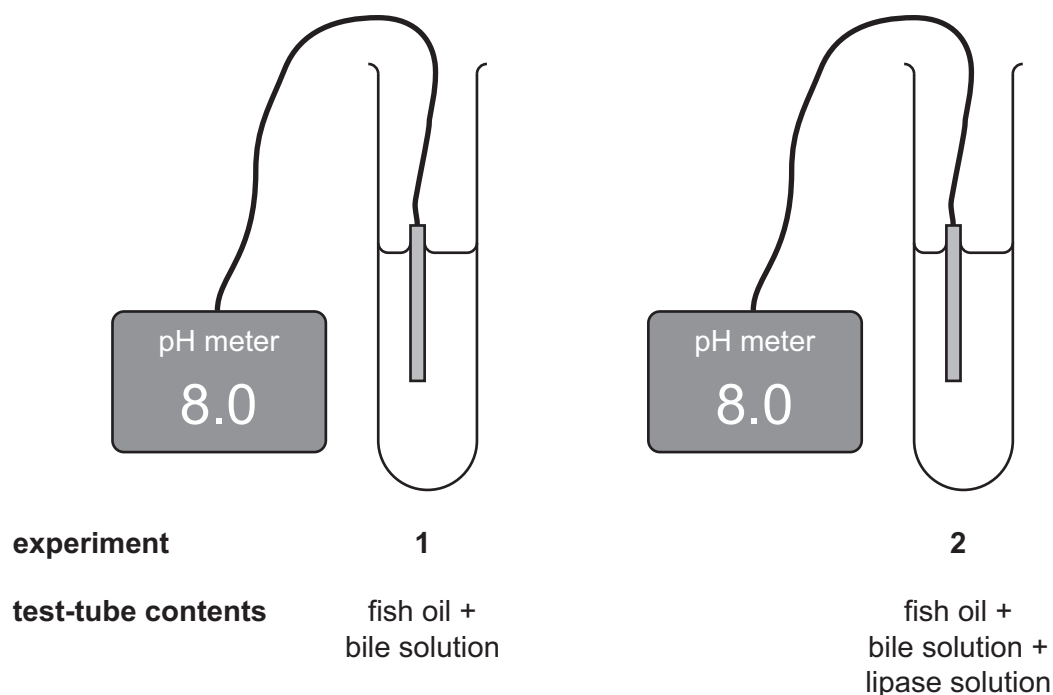


Fig. 5.2

The student recorded the pH of the contents of each test-tube using a digital pH meter at the start of each experiment. Both meters recorded a pH of 8.0.

The student continued to monitor the readings on the pH meters for 30 minutes.

Use your knowledge of how lipids are digested to explain what you would expect to happen in each test-tube.

experiment 1

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experiment 2

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[5]





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- 6 Farmers in many countries, including the United States of America (USA), keep cows to produce milk.

This milk is then sold for human consumption.

- (a) Table 6.1 shows how the yearly average milk production per cow in the USA changed over a period of 60 years.

Table 6.1

year	mass of milk produced per cow /kg per year
1950	2250
1970	4500
1990	6750
2010	9400

- (i) Between the years 1970 and 2010, a farmer in the USA always had 250 cows producing milk on his farm.

Use the data in Table 6.1 to calculate the increase in milk production by 250 cows between the years 1970 and 2010.

Express your answer in standard form.

Space for working.

..... kg per year [3]

- (ii) One reason for the pattern shown by the data in Table 6.1 is the use by farmers of artificial selection to breed cows that produce more milk. This is an example of selective breeding.

Use this example to describe the main stages in the process of selective breeding.

.....

.....

.....

.....

.....

..... [3]





- (b) Research has shown that 95% of cows used to produce milk in the USA are fed crop plants that have been produced by genetic modification.

These crop plants have been produced to provide the cows that eat them with additional vitamins.

- (i) Outline the stages in the genetic modification process used to produce these crop plants.

.....

.....

.....

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.....

.....

..... [4]

- (ii) Genetic modification has been used to change crop plants in other ways. One example of this is the production of crop plants that contain a chemical to make them resistant to insect pests.

Outline **two** potential risks of growing these crops.

.....

.....

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..... [2]

[Total: 12]





7 Compare each of these processes:

(a) diffusion and active transport

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..... [4]

(b) transpiration and translocation

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..... [4]

(c) phototropism and gravitropism.

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.....

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.....

..... [4]

[Total: 12]

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