Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/43**

Paper 4 Theory (Extended) **May/June 2020**

1 hour 15 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 **20** pages. Blank pages are indicated.

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1 **(a)** State **three** uses of energy in the human body.

View solution

1 .....

2 .....

3 .....

[3]

(b) Fig. 1.1 shows part of the digestive system of a human.

View solution

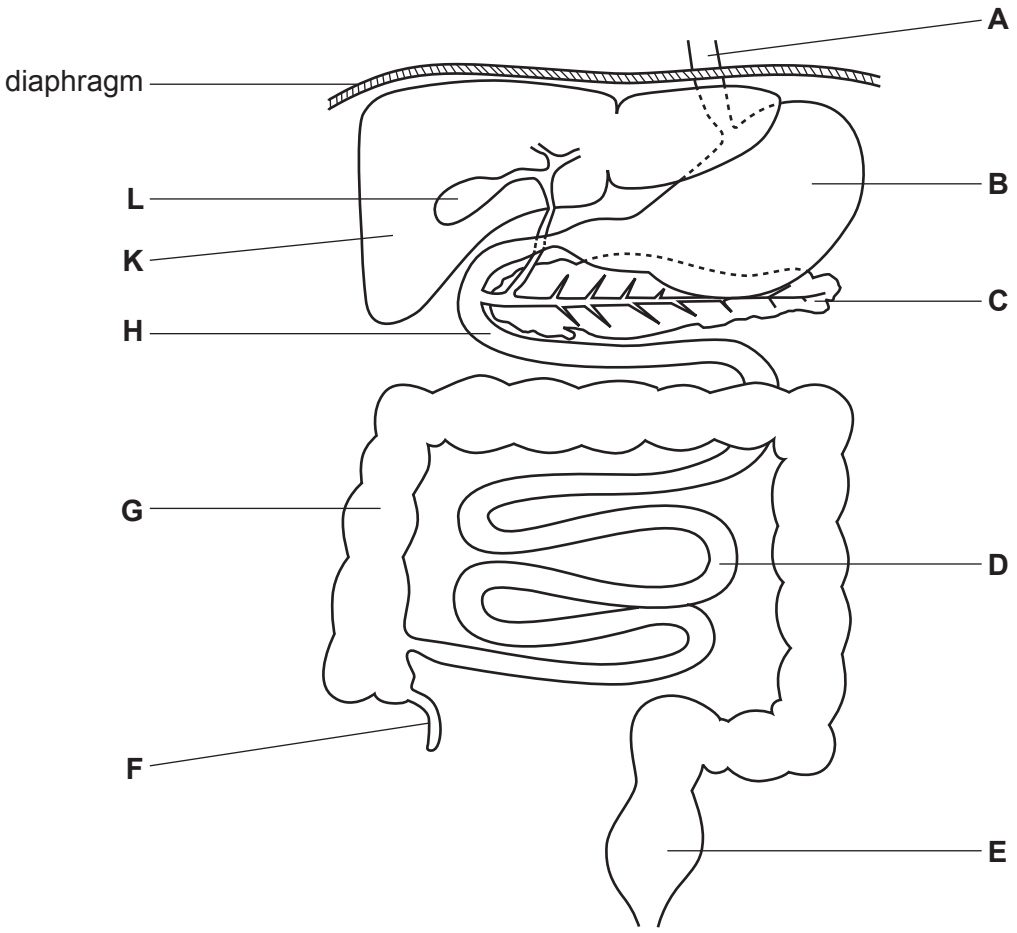

Fig. 1.1

Complete Table 1.1. One row has been done for you.

Table 1.1

function	name of structure	letter from Fig. 1.1
pushes food to the stomach	oesophagus	**A**
assimilation of amino acids to produce plasma proteins		
storage of bile		
secretion of insulin		
absorption of fatty acids and glycerol		
secretion of pepsin		
digestion of starch		

[6]

(c) Describe the role of the liver in the recovery from oxygen debt after strenuous exercise.

View solution

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..... [2]

(d) Alcohol is a drug.

View solution

Define the term drug.

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..... [2]

(e) **(i)** State **two** immediate effects of excessive alcohol on the body.

View solution

1 .....

2 .....

[2]

(ii) State **two** long-term effects of excessive alcohol on the body.

View solution

1 .....

2 .....

[2]

(f) Pregnant women are advised not to drink alcohol as it may have harmful effects on the fetus.

(i) Outline these harmful effects.

View solution

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..... [2]

(ii) State **two** harmful substances **other than alcohol** that can cross the placenta.

View solution

1 .....

2 .....

[2]

[Total: 21]

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2 **(a)** Fig. 2.1 shows the human population of a country between 1910 and 2020.

View solution

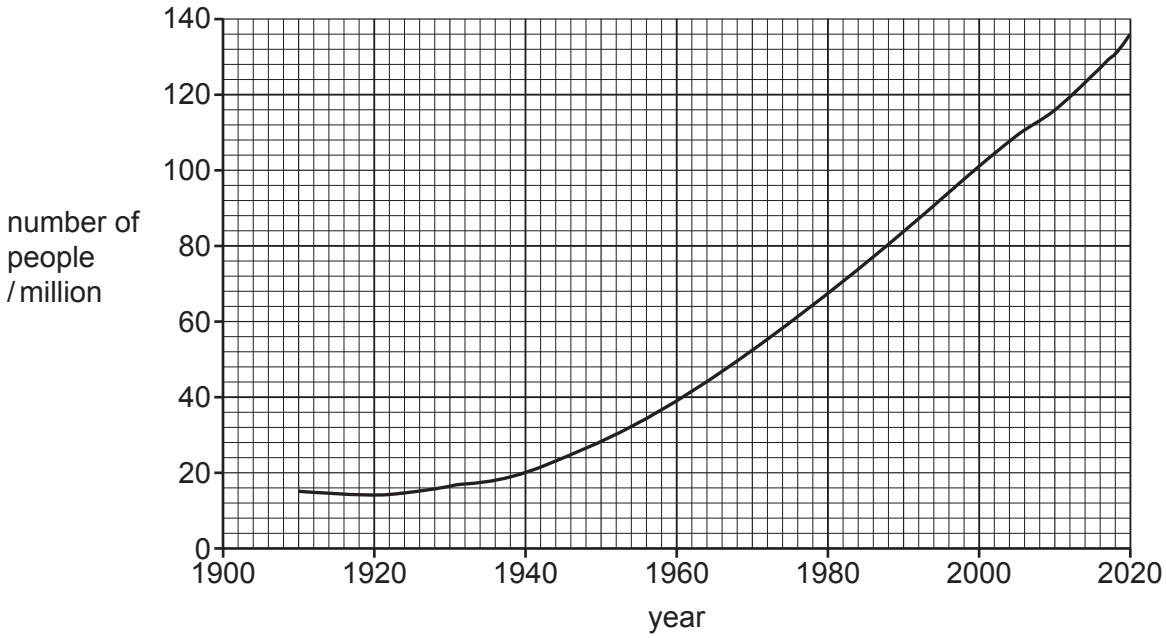

Fig. 2.1

(i) Calculate the percentage increase in the population of the country between 1940 and 2020.

Space for working.

.....%
[3]

(ii) Describe the factors that could cause the change in the population size between 1940 and 2020, shown in Fig. 2.1.

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View solution

(b) Some countries have invested in biofuels such as ethanol, biomass and biodiesel.

View solution

(i) Describe how ethanol can be made by microorganisms.

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..... [2]

(ii) Some countries use large areas of land to grow maize plants. This crop plant can be used to produce biofuels.

Discuss the negative impact on the **environment** of growing large-scale monocultures of crop plants such as maize.

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..... [4]

[Total: 12]

View solution

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3 The American writer Ernest Hemingway lived on the island of Key West in Florida, USA in the 1930s. During this time he was given a male cat by a sea captain.

The cat had more toes than usual. This inherited condition is called polydactyly. The allele for polydactyly is dominant.

View solution

(a) Define the term inheritance.

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..... [1]

(b) Fig. 3.1 is part of a pedigree diagram for Hemingway's cats.

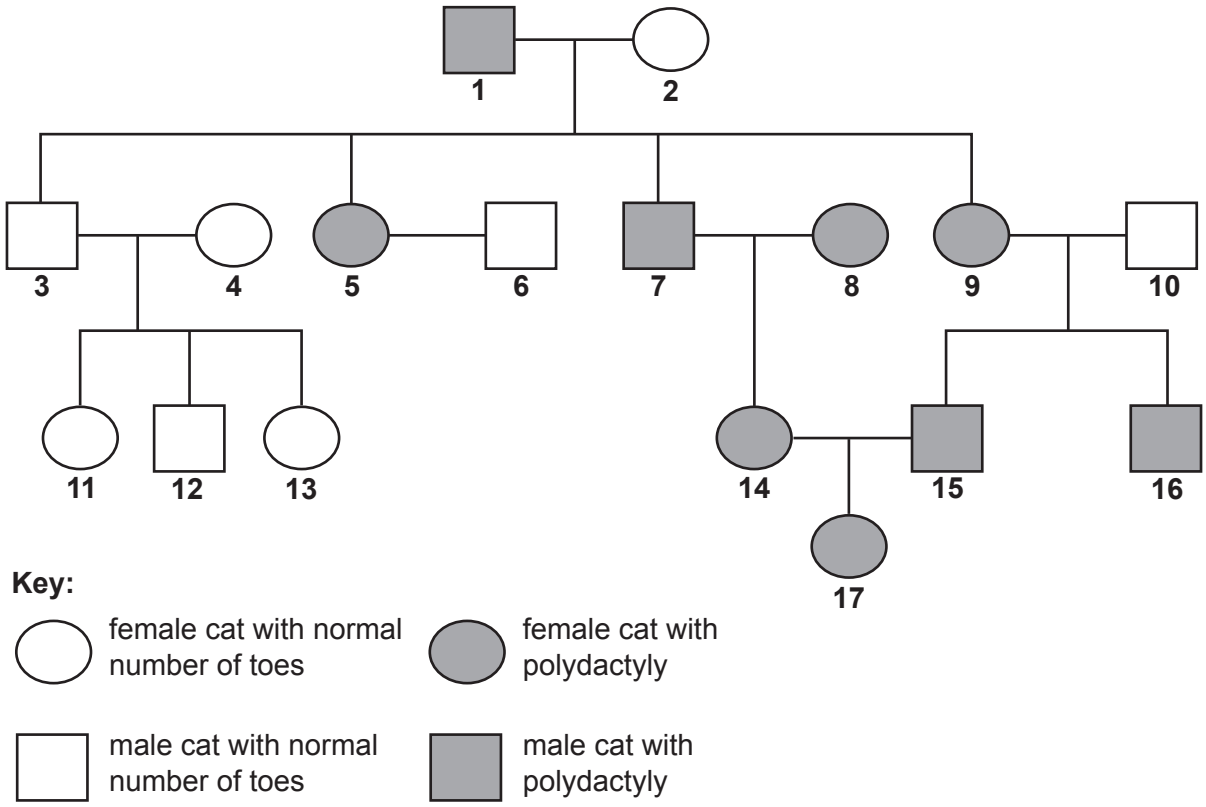

Fig. 3.1

(i) State the genotypes of cats **5**, **6** and **14** in the pedigree diagram in Fig. 3.1.

View solution

Use the letters **T** and **t**.

cat **5** .....

cat **6** .....

cat **14** .....

[3]

(ii) Explain why none of the offspring of cats **3** and **4** have inherited polydactyly.

View solution

Use the information in Fig. 3.1 in your answer.

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..... [1]

(c) Scientists published the results of an investigation into the DNA of cats with and without polydactyly. They compared the base sequence from a particular region of DNA that controls the development of the limbs.

View solution

Table 3.1 shows the base sequences.

Table 3.1

cats without polydactyly	AGACACAGAAATGAG
Hemingway's cats with polydactyly	AGACACGGAAATGAG
cats with polydactyly from Oregon and Missouri in the USA	AGACACGGAAATGAG
cats with polydactyly from the UK	AGACACAGTAATGAG

(i) Describe how the base sequences of the cats with polydactyly differ from the base sequence of cats without polydactyly.

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..... [2]

(ii) State the name of the process by which base sequences in DNA are changed.

..... [1]

(iii) The base sequences in Table 3.1 provide evidence that indicates which country the male cat given to Hemingway in the 1930s came from.

Suggest which country this cat came from **and** give a reason for your choice.

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..... [2]

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(d) Fig. 3.2 shows part of a DNA molecule from a chromosome of a cat.

Complete Fig. 3.2 by writing the letters for the base sequence of the other strand of the DNA molecule.

View solution

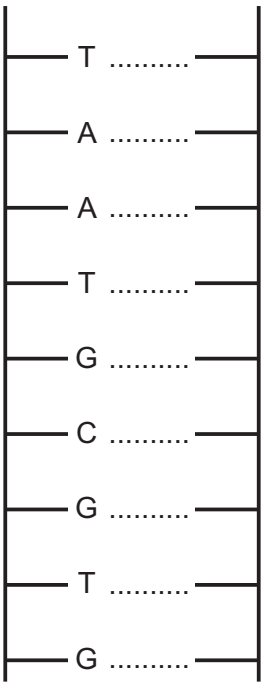

Fig. 3.2

[1]

(e) Explain why polydactyly is an example of discontinuous variation.

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..... [2]

[Total: 13]

View solution

4 Xerophytes grow in habitats with low rainfall and soils that often have high concentrations of salts.

Fig. 4.1 shows the xerophyte *Yucca treculeana* growing on salt flats.



Fig. 4.1

(a) (i) Explain how xerophytes, such as *Y. treculeana*, are adapted to absorb sufficient water in the conditions in which they live.

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View solution

(ii) Explain how xerophytes are adapted to reduce water loss to the atmosphere. View solution

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(iii) Xerophytes often have many defence mechanisms that reduce or prevent herbivores eating them.

Suggest how xerophytes protect themselves against herbivores. View solution

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(b) Forest ecosystems can be affected by acid rain. View solution

Describe how the production of acid rain **and** its effects on forest ecosystems can be reduced.

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..... [4]

[Total: 13]

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5 Bacteria are classified in the Prokaryote kingdom.

(a) State **two** features of animal **and** plant cells that are **not** found in prokaryotes.

View solution

1 .....

2 .....

[2]

(b) Methicillin-resistant *Staphylococcus aureus* (MRSA) is a type of bacterium that is resistant to some antibiotics.

Fig. 5.1 shows how a population of bacteria may develop antibiotic resistance and how the antibiotic resistance can be passed from one strain of bacterium to another.

View solution

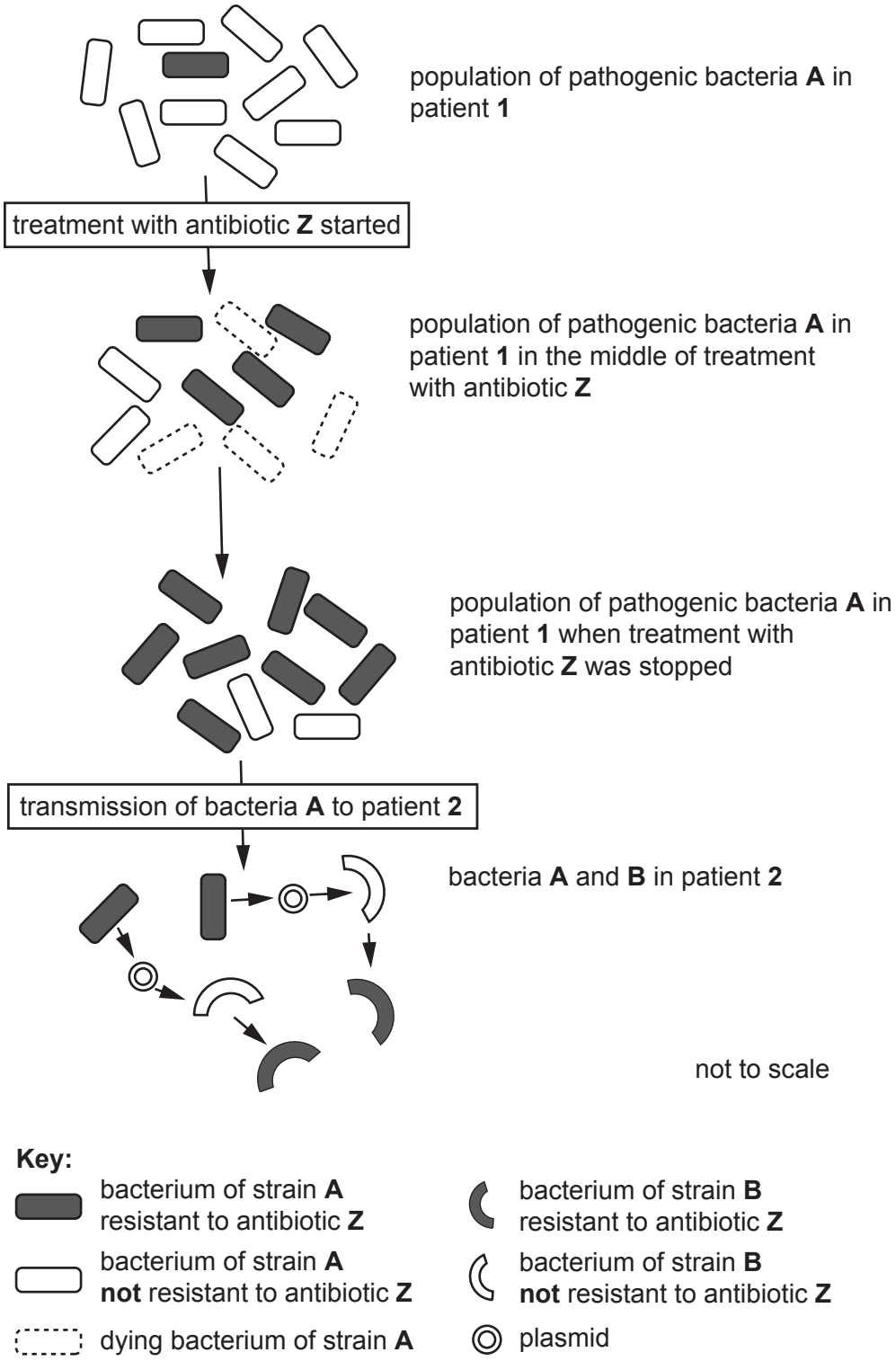

Fig. 5.1

Explain how resistance to an antibiotic develops in a population of bacteria and spreads in the human population.

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(c) Explain how the development of resistant bacteria, such as MRSA, can be minimised.

View solution

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..... [3]

[Total: 11]

6 In many parts of the world dairy cattle are kept in large barns and reared intensively, as shown in Fig. 6.1.



Fig. 6.1

(a) Food for cattle that are reared intensively includes cereals, such as maize and barley.

Ecologists have calculated that it is more energy efficient to grow crops for human consumption than for food for livestock.

View solution

Explain why intensive rearing of livestock is **not** an efficient use of crops.

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..... [3]

(b) The urine and faeces from cattle kept in barns is removed and treated in the same way as human sewage to avoid polluting the aquatic environment.

View solution

Outline the effects of **untreated waste** from cattle on the aquatic environment.

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(c) Intensive livestock production could be one way of preventing famine.

View solution

Describe the causes of famine.

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[Total: 10]

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