Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

2011844862

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2016**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Section A
Answer **all** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section B
Answer **both** questions in this section.
Write your answers in the spaces provided on the Question Paper.

Section C
Answer **either** question 8 **or** question 9.
Write your answers in the spaces provided on the Question Paper.

You are advised to spend no longer than one hour on Section A.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

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Section A

Answer **all** questions in this section.

1 Fig. 1.1 shows a model that a student made to represent the human breathing system.

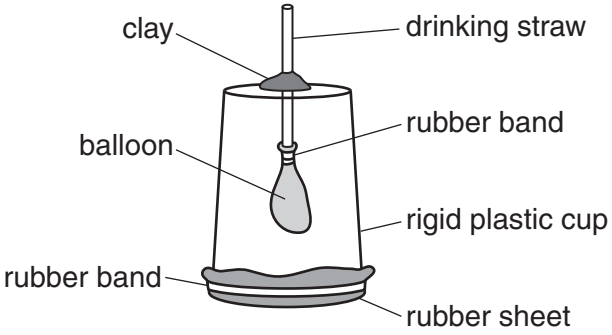


Fig. 1.1

(a) State the part of the model shown in Fig. 1.1 that represents each of the following structures.

the trachea .....

the diaphragm ..... [2]

(b) Describe how this model does **not** accurately represent the human breathing system.

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..... [4]

(c) (i) The model can be used to demonstrate the action of breathing.

Describe what the student must do to the model to demonstrate the action of breathing in.

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..... [2]

(ii) State what the student would observe as the model is used to demonstrate the action of breathing in.

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..... [1]

(iii) The model becomes damaged by a hole being made in the side of the rigid plastic cup.

Describe and explain how this damage will change what the student would observe as the model is used to demonstrate the action of breathing in.

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..... [3]

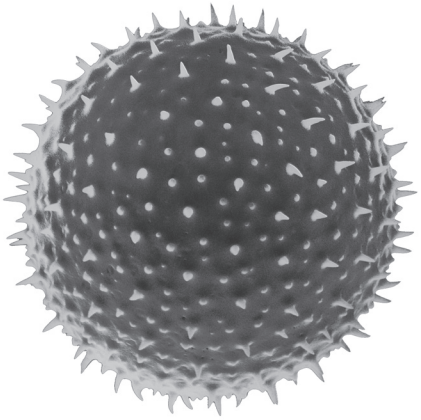
[Total: 12]

2 Fig. 2.1 shows a magnified pollen grain from each of two plant species, **A** and **B**.



magnification ×830

pollen grain from plant species **A**



magnification ×200

pollen grain from plant species **B**

Fig. 2.1

(a) (i) Use the information in Fig. 2.1 and your biological knowledge to describe **three** differences between the pollen grains from species **A** and species **B**.

Write your answers in Table 2.1.

Table 2.1

pollen grain from species **A**	pollen grain from species **B**

[3]

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(ii) Cross-pollination takes place in both species **A** and species **B**.

Describe what is meant by the term *cross-pollination*.

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..... [3]

(iii) Using the information provided by Fig. 2.1, describe how cross-pollination is most likely to occur in species **A** and in species **B**.

species **A**

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species **B**

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.....[3]

(b) Fig. 2.2 is a photograph of the flowers of species **A**.



Fig. 2.2

List **two** features that would be present in the flowers of species **B** that are **not** present in those of species **A**.

1 .....

2 ..... [2]

[Total: 11]

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3 Fig. 3.1a is a diagram of the human skeleton. Fig. 3.1b is an X-ray that shows damage to part of a person's skeleton.

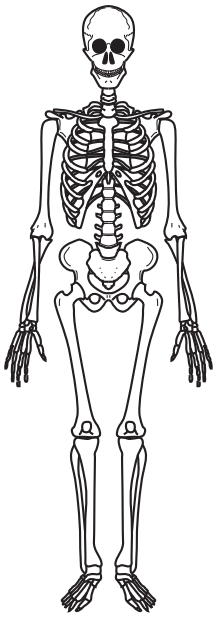


Fig. 3.1a



Fig. 3.1b

(a) (i) Draw the letter **X** on Fig. 3.1a to show the location of the damage to the person's skeleton that is shown in Fig. 3.1b.

[1]

(ii) Describe the damage to the person's skeleton shown in Fig. 3.1b.

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..... [2]

(b) Fig. 3.2 shows the arrangement of bones and muscles in part of a person's body.

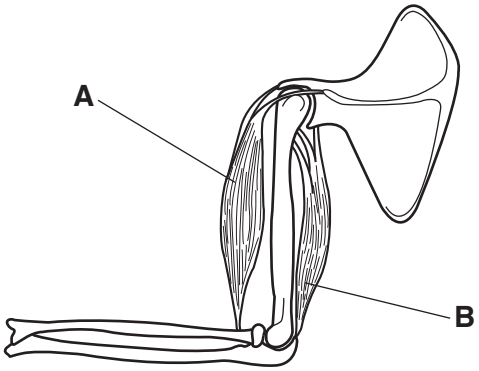


Fig. 3.2

(i) Name the muscle labelled **B** in Fig. 3.2.

…….. [1]

(ii) Draw an arrow on Fig. 3.2 to show the direction of movement that will be caused when the muscle labelled **B** contracts.

[1]

(iii) When the muscle labelled **B** contracts, the muscle labelled **A** relaxes. State the term that refers to a pair of muscles that act in this way.

……. [1]

(c) Fig. 3.3 shows the approximate percentage of body mass that is due to the skeleton in birds and in humans.

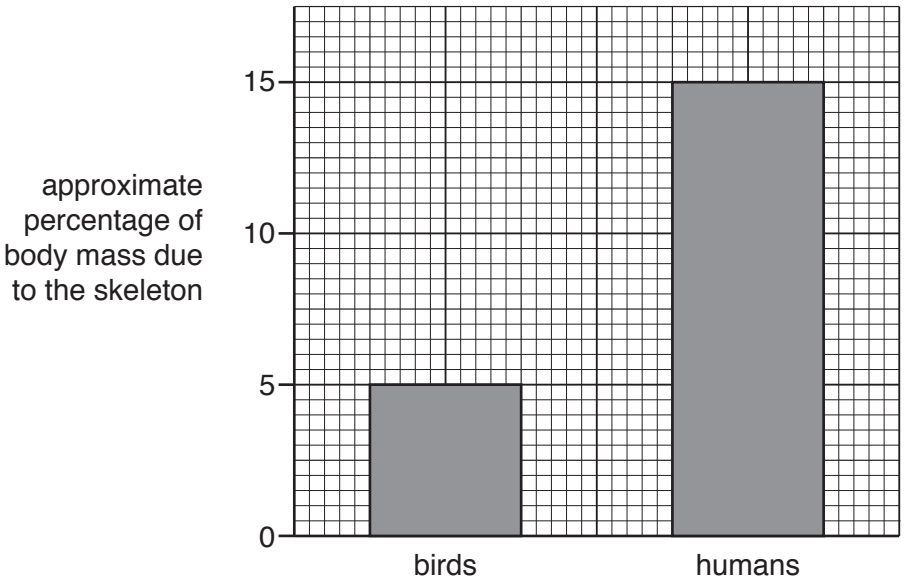


Fig. 3.3

(i) Use the information in Fig. 3.3 to compare the approximate percentage of body mass that is due to the skeleton in birds and in humans.

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..... [1]

(ii) One reason for this difference is that the bones of a bird contain air spaces. These air spaces are connected to the lungs of the bird.

The blood of birds contains more haemoglobin per unit volume than that of humans.

Suggest how these adaptations, and that shown in Fig. 3.3, help a bird to move by flying.

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..... [4]

[Total: 11]

4 Table 4.1a shows some of the recommended dietary allowances for a child under the age of six months.

Table 4.1b shows part of the composition of bottle milk that may be fed to a child under the age of six months.

Table 4.1a

component	recommended dietary allowance
energy	2770 kJ
protein	13 g
vitamin C	30 mg
iron	6 mg

Table 4.1b

component	amount per 100 cm^3 of bottle milk
energy	277 kJ
fat	3.6 g
carbohydrate	7.3 g
protein	1.3 g
vitamin C	3.0 mg
iron	0.6 mg

(a) (i) Calculate the volume of bottle milk that a child under the age of six months should be fed each day to obtain the recommended dietary allowance of each component listed in Table 4.1a.

You may use the space below to work out your answer.

..... [2]

(ii) State and explain the health risks to a child who is fed less bottle milk each day than the volume you have calculated.

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(b) (i) Many mothers choose to feed their child breast milk rather than bottle milk.

Describe some advantages of breast milk compared with bottle milk.

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(ii) Suggest **one** reason why a mother may choose to feed her child bottle milk.

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[Total: 11]

5 Complete the paragraph below by writing the most appropriate word in each of the spaces.

A …….. includes a long molecule of DNA that is divided into sections called genes. Genes may be copied and passed on to the next generation. Each gene may have two or more alternative forms called …….. . One of these forms may be …….. and the other recessive. A change in the structure of a gene or in the number of chromosomes is called a …….. . Chemicals and …….. may increase the rate at which these changes take place.

[5]

[Total: 5]

Section B

Answer **both** questions in this section.

6 Syphilis is an infectious disease.

(a) Describe how syphilis is transmitted.

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(b) Describe the symptoms, signs and effects of syphilis.

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(c) Describe the treatment of syphilis and suggest why it is **not** possible to treat the infection that leads to AIDS in the same way.

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..... [3]

[Total: 10]

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7 **(a)** Define the term *hormone*.

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..... [3]

(b) **(i)** State the role of the hormone insulin in controlling blood sugar concentration.

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(ii) Name the condition caused if a person is unable to produce sufficient amounts of the hormone insulin.

Describe the signs of the condition that you have named, and its treatment.

name of condition

…….

description of signs and treatment

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..... [4]

[Total: 10]

Section C

Answer **either** question 8 **or** question 9.

8 **(a)** Describe the double circulation of blood in the human circulatory system and the different functions of the two circuits.

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(b) Describe the structure of a capillary and the transfer of a **named** material between capillaries and tissue fluid.

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..... [4]

[Total: 10]

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9 **(a)** Discuss reasons for the conservation of species with reference to the management of fisheries.

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(b) Describe the consequences of deforestation.

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[Total: 10]

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