Cambridge
O Level

**Cambridge International Examinations**
Cambridge Ordinary Level

| | |
|---|---|
| CANDIDATE NAME | |
| CENTRE NUMBER | |
| CANDIDATE NUMBER | |

*2358772853*

**BIOLOGY** **5090/21**

Paper 2 Theory **May/June 2015**

**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.



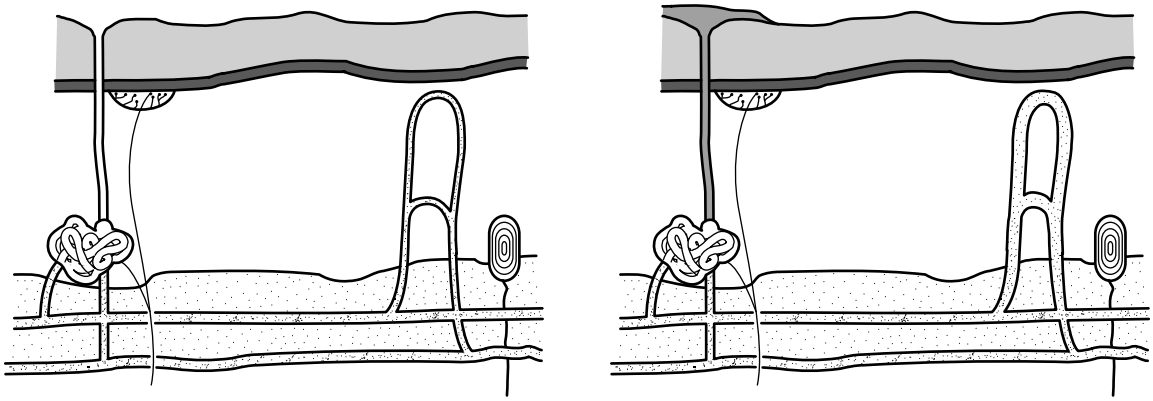
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## Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

**1** Fig. 1.1 shows a vertical section through the skin in two different environmental conditions, **A** and **B**.



skin in environmental condition **A**

skin in environmental condition **B**

**Fig. 1.1**

**(a)** On Fig. 1.1, label each of the following:

- a sweat gland
- a capillary. [2]

**(b)** Use the information in Fig. 1.1 to suggest how environmental condition **B** is different from environmental condition **A**.

.....

..... [1]

**(c)** **(i)** State **two** differences between the skin in environmental condition **A** and the skin in environmental condition **B**.

1 .....

.....

2 .....

..... [2]

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**(ii)** Explain the advantages to a person in environmental condition **B** of the **two** differences you have stated in your answer to **(c)(i)**.

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 8]

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**[Turn over**

**2** Table 2.1 shows the volume of blood supplied to parts of the body at rest and during strenuous exercise.

**Table 2.1**

| part of body | volume of blood supplied in $cm^3$/min | |
|---|---|---|
| | at rest | during strenuous exercise |
| brain | 750 | 750 |
| heart | 250 | 750 |
| skeletal muscle | 1200 | 12500 |
| skin | 500 | 1900 |
| kidneys | 1100 | ..... |
| digestive organs | 1400 | 600 |
| other | 600 | 400 |
| **Total** | 5800 | 17500 |

**(a) (i)** Calculate the volume of blood that is supplied to the brain **at rest** as a percentage of the total supplied to the whole body.

Show your working in the space below.

..... % [2]

**(ii)** Name the blood vessels that supply each kidney with blood.

..... [1]

**(iii)** Using the information in Table 2.1, calculate the volume of blood supplied to the kidneys during strenuous exercise.

Write your answer in the space provided in Table 2.1. [1]

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**(b)** Use the information in Table 2.1 to name **two** parts of the body that have an increased supply of blood during strenuous exercise.

Explain the advantage to the body of increasing the supply of blood to each of the parts you name.

name of part .....

advantage .....

.....

.....

.....

name of part .....

advantage .....

.....

.....

..... [4]

**(c)** Using the information in Table 2.1, suggest why eating immediately before exercise is not recommended.

.....

.....

.....

..... [2]

[Total: 10]

**3** Fig. 3.1 shows a fetus developing in the uterus of a mother. The fluid labelled **C** contains cells from the fetus.

A long, hollow needle may be used to withdraw some of the fluid into a syringe. The DNA from the cells in this fluid can then be analysed to find the sex of the fetus and to detect mutations.

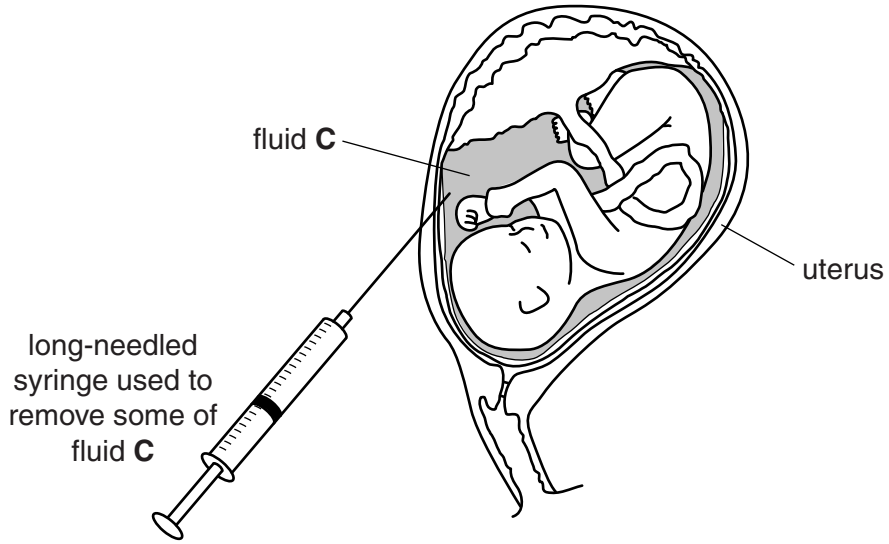



**Fig. 3.1**

**(a)** Name fluid **C** and state its function.

name of fluid .....

function .....

..... [2]

**(b)** **(i)** Label the placenta on Fig. 3.1 using a line and the letter **P**. [1]

**(ii)** State **two** functions of the placenta.

1 .....

.....

2 .....

..... [2]

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**(c)** Fig. 3.2 shows the chromosomes found in the nucleus of one cell of a developing fetus.

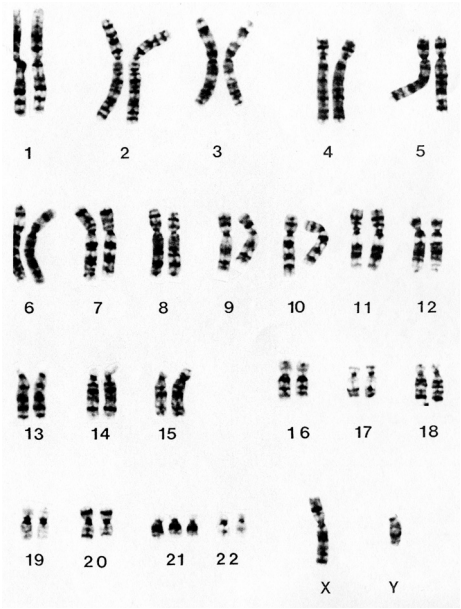



**Fig. 3.2**

State the sex of this fetus and explain your answer.

sex .....

explanation .....

..... [2]

**(d)** This fetus has a mutation.

**(i)** Describe the mutation shown in Fig. 3.2.

.....

.....

.....

..... [2]

**(ii)** Suggest the condition that this child could be born with as a result of this mutation.

..... [1]

[Total: 10]

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**[Turn over**

**4** **(a)** Define the term *drug*.

.....

.....

.....

..... [2]

**(b)** Fig. 4.1 shows some of the organs of a person that can be affected by the use of drugs.

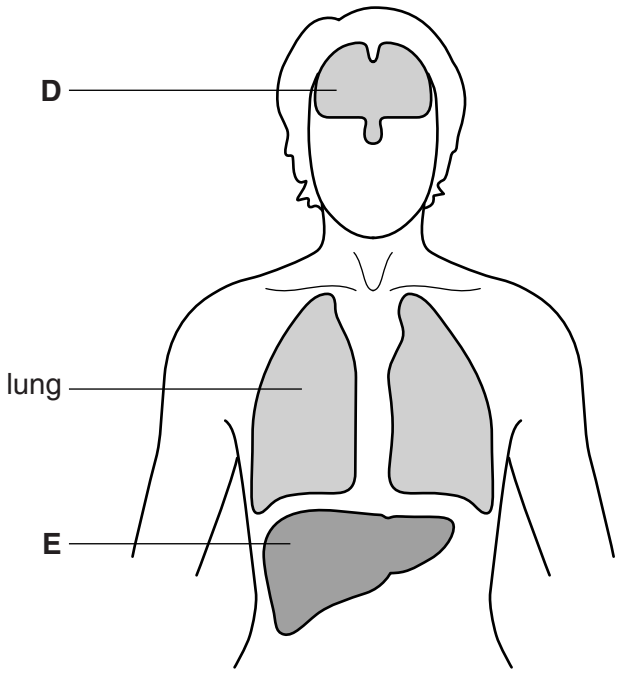



**Fig. 4.1**

Complete Table 4.1 by naming organs **D** and **E** and by giving **one** effect of each drug on the named organ.

**Table 4.1**

| drug | organ label on Fig. 4.1 | name of organ | one effect of drug |
|---|---|---|---|
| heroin | **D** | | |
| alcohol | **E** | | |

[4]

**(c) (i)** Name **two** toxic components of tobacco smoke.

1 .....

2 ..... [2]

**(ii)** State the likely effect on her baby if a mother smokes tobacco throughout pregnancy.

.....

.....

..... [1]

[Total: 9]

**5** Fig. 5.1 shows some of the interactions that take place in an aquatic ecosystem.

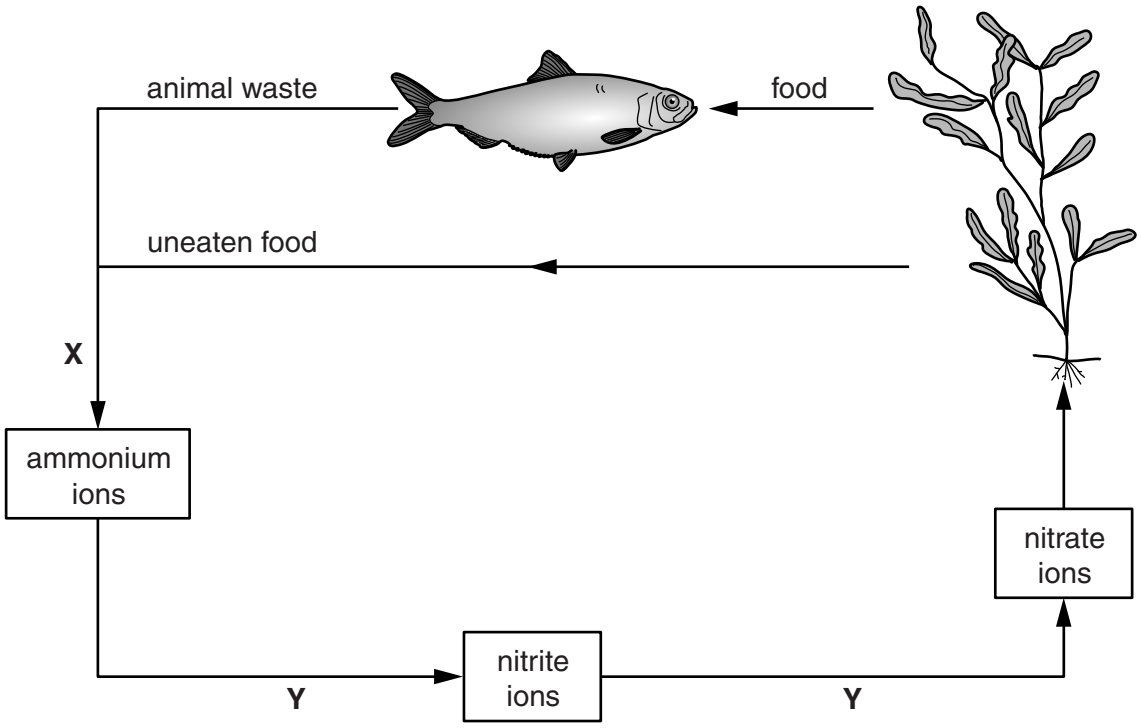



**Fig. 5.1**

**(a) (i)** Use the information in Fig. 5.1 to state each of the following:

the trophic level of the aquatic plant

.....

the trophic level of the fish

.....

the chemical element being cycled in this ecosystem.

..... [3]

**(ii)** Explain **one** way, other than for food, that the fish may depend on the aquatic plant.

.....

.....

.....

..... [2]

**(b) (i)** Name each of the processes represented by the letters **X** and **Y**.

process **X** .....

process **Y** ..... [2]

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**(ii)** Name **one** type of microorganism that will carry out **both** process **X** and process **Y**.

..... [1]

**(iii)** Explain how aquatic plants take up nitrate ions from their surroundings.

.....

.....

.....

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.....

..... [3]

**(c)** Suggest what effect pollution by nitrogen-containing fertilisers might have on this ecosystem.

.....

.....

.....

.....

..... [2]

[Total: 13]

## Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

**6** Fig. 6.1 shows a structure found in part of the alimentary canal.

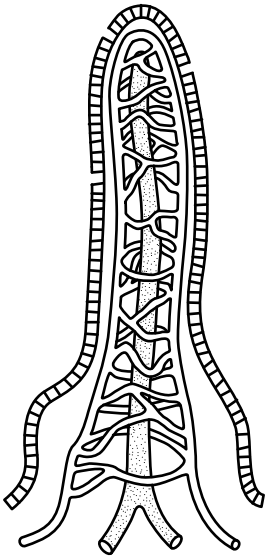


**Fig. 6.1**

**(a)** Name the structure shown in Fig. 6.1 and state the part of the alimentary canal in which it is found.

name of structure.....

location in alimentary canal ..... [2]

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**(b)** Explain the ways in which this structure is adapted to enable it to carry out its function.

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..... [8]

[Total: 10]

7 **(a)** Describe the significance of each of the following features of a dicotyledonous leaf in terms of the process named:

**(i)** the distribution of chloroplasts in the process of photosynthesis

.....

.....

.....

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..... [4]

**(ii)** stomata and mesophyll cells in the process of gas exchange.

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..... [3]

**(b)** Transverse sections were taken from the root and stem of a dicotyledonous plant.

Describe differences in how **two named** tissues involved in transport are arranged in each of these sections.

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

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## Section C

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

Write your answers in the spaces provided.

**8** **(a)** Describe the external features of **one named** example of a wind-dispersed fruit or seed. State the importance to the plant of this method of dispersal.

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..... [5]

**(b)** State **two** environmental conditions that affect the germination of seeds. Describe the importance of each condition.

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..... [5]

[Total: 10]

**9** **(a)** Describe and explain how an **increase** in each of the following factors surrounding a plant affects the rate of transpiration:

- temperature

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.....

.....

- light intensity

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.....

.....

- humidity.

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..... [7]

**(b)** Suggest the importance of transpiration to a plant.

.....

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.....

..... [3]

[Total: 10]

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