UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

*1897268128*

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

Paper 2 Theory **October/November 2013**

**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 a pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

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

Electronic calculators may be used.

This document consists of **14** printed pages and **2** blank pages.


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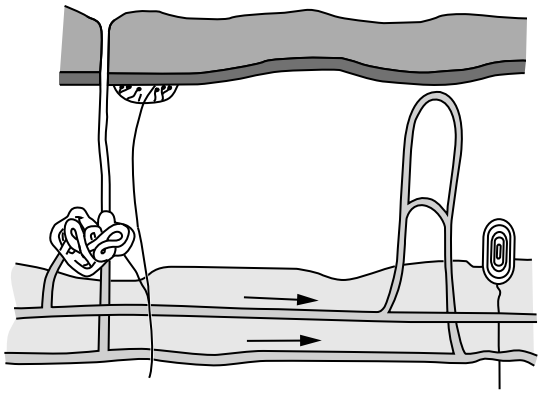
## Section A

For Examiner's Use

Answer **all** the questions in this section.

Write your answers in the spaces provided.

**1** Fig. 1.1(a) and Fig. 1.1(b) show a section through the skin of a person at two different body temperatures.



**Key**

→ direction of blood flow

**Fig. 1.1(a)**

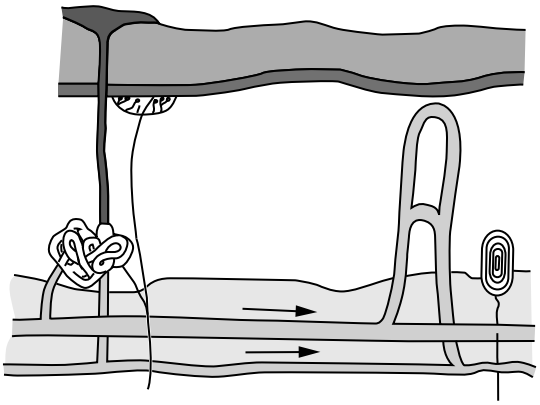


**Fig. 1.1(b)**

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

**(i)** a sweat gland

**(ii)** a temperature receptor. [2]

**(b) (i)** State what has happened to the body temperature to cause the changes shown in Fig. 1.1(b) compared with Fig. 1.1(a).

.....[1]

**(ii)** State **two** reasons for the answer you have given in **(b)(i)**.

1 .....

2 .....[2]

**(c) (i)** On Fig. 1.1(a), label and name the type of blood vessel that constricts when the body temperature falls. [2]

*For Examiner's Use*

**(ii)** Explain the effects caused by constriction of the blood vessel you have named in **(c)(i)**.

.....

.....

.....

.....[4]

[Total: 11]

*For Examiner's Use*

**2** **(a)** Muscles that move bones at joints are arranged in pairs.

**(i)** State the term used to describe such a pair of muscles.

..... [1]

**(ii)** Explain why muscles are arranged in this way.

.....

.....

.....

.....[3]

**(iii)** Name a muscle in the human body that is **not** arranged as one of a pair.

.....[1]

**(b)** Name **two** different types of joint found in the arm. For each joint, state exactly where in the arm it is found.

1 type of joint ..... where found .....

2 type of joint ..... where found ..... [2]

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Fig. 2.2(a) shows an X-ray of the shoulder joint. Fig. 2.2(b) shows an X-ray of a shoulder with an artificial replacement joint.

*For Examiner's Use*



**Fig. 2.2(a)**



**Fig. 2.2(b)**

**(c)** Using evidence from Fig. 2.2(a) and Fig. 2.2(b), suggest why the type of replacement joint shown in Fig. 2.2(b) is known as a 'Reverse Shoulder Replacement'.

.....

.....

.....

.....[3]

[Total: 10]

For Examiner's Use

**3** **(a)** Name **two** constituents of a diet that are absorbed without digestion. For each constituent, name the part of the alimentary canal in which it is absorbed.

constituent 1 ..... absorbed in .....

constituent 2 ..... absorbed in ..... [2]

**(b)** Suggest a constituent of a healthy diet that is never absorbed. .....[1]

**(c)** Fig. 3.1 is a diagrammatic representation of the small intestine containing three types of food molecule, a fat, a carbohydrate and a protein, before they have been digested. Fig. 3.1 also shows a lacteal and a capillary. The different features in Fig. 3.1 have not been drawn to the same scale.

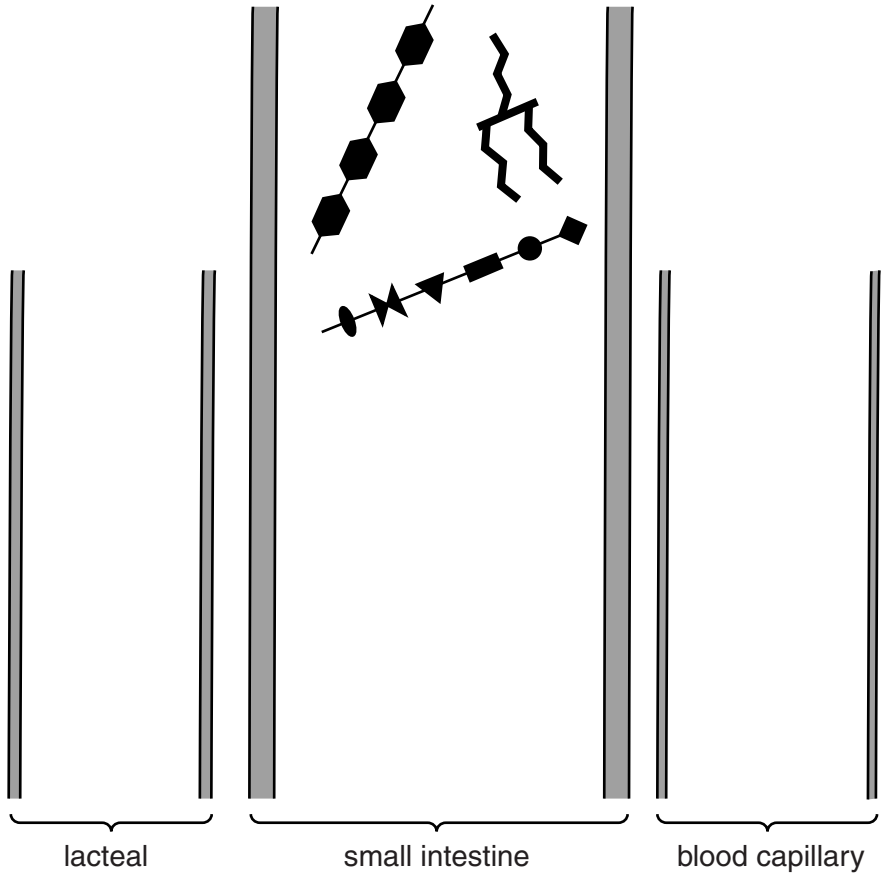



**Fig. 3.1**

On Fig. 3.1, draw **and** label the molecules as they would appear **after** they have been digested and then absorbed by the lacteal and by the capillary. [4]

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**(d)** Some absorbed molecules travel directly to the liver.

*For Examiner's Use*

**(i)** Name **three** of these molecules.

molecule 1 .....

molecule 2 .....

molecule 3 ..... [3]

**(ii)** Explain how these molecules are carried to the liver.

.....

.....

.....

.....[2]

[Total: 12]

**4** Fig. 4.1 shows a field near an industrial site.

*For Examiner's Use*

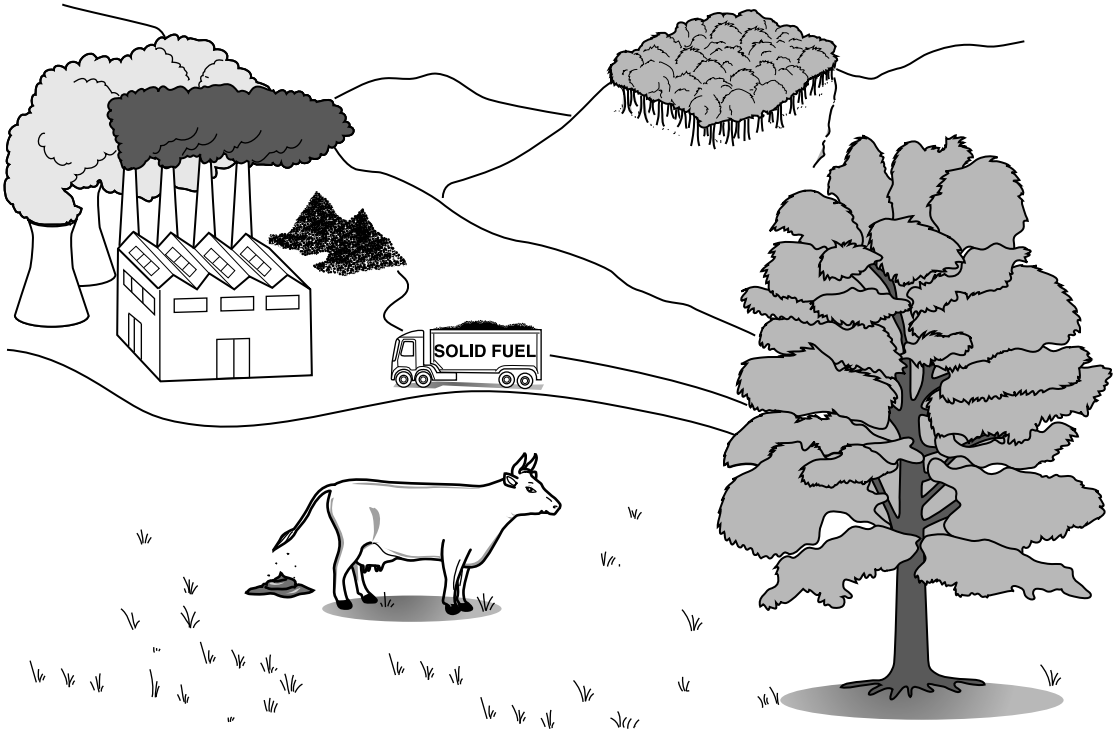



**Fig. 4.1**

**(a)** State **two** products released from the factory into the air, that form part of the carbon cycle.

1 .....

2 .....[2]

**(b)** Suggest the part played by the trees and the grass in the recycling of water.

.....

.....

.....

.....

.....

.....[3]

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**(c)** Suggest how the cow and the factory are involved in returning nitrates to the soil.

*For Examiner's Use*

the cow .....

.....

.....

.....

.....

the factory .....

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.....[4]

[Total: 9]

**5** Fig. 5.1 shows a graph drawn by a student of the rate of photosynthesis in a plant exposed to the same concentration of carbon dioxide at two different temperatures.

*For Examiner's Use*

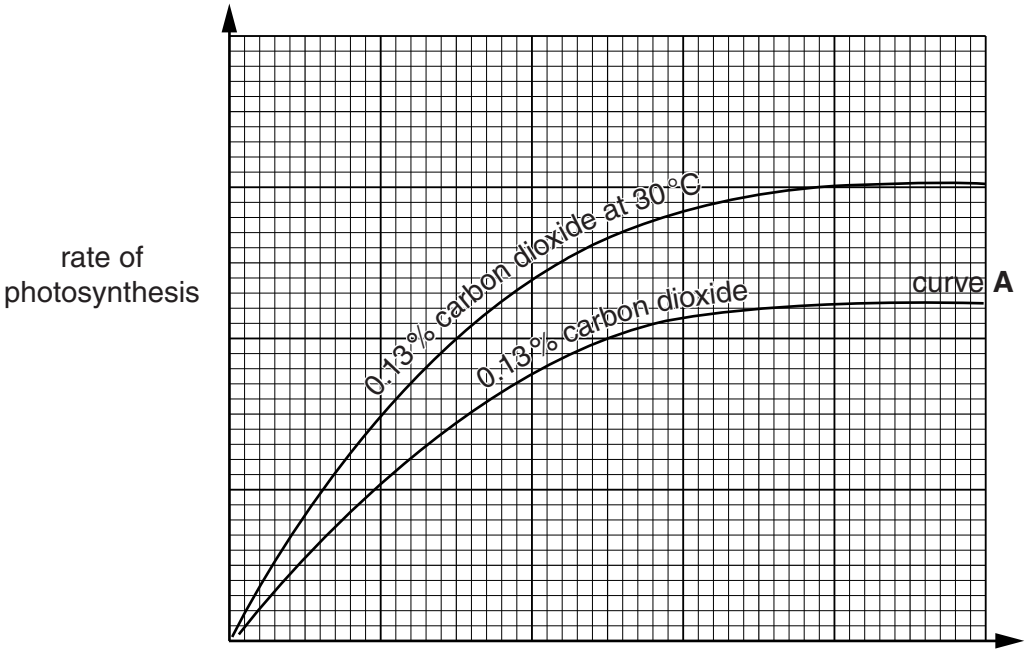



**Fig. 5.1**

**(a) (i)** Name **one** limiting factor, other than carbon dioxide and temperature, that affects the rate of photosynthesis.

.....[1]

**(ii)** Suggest a likely temperature for curve **A**. Give an explanation for your answer.

likely temperature .....

explanation .....

.....

.....[3]

**(b)** The student failed to label the horizontal (x) axis of the graph. Suggest a suitable label for this axis and explain your suggestion.

label for x axis .....

explanation .....

.....

.....

.....[4]

[Total: 8]

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## Section B

For Examiner's Use

Answer **all** the questions in this section.

Write your answers in the spaces provided.

**6** **(a)** Describe the functions of xylem in a plant.

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.....[3]

**(b)** Explain how starch and protein stored in the roots of a plant during the day can be used in the growth of a shoot during the night.

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.....[7]

[Total: 10]

**7** **(a)** Explain the importance of active transport in plants and in humans.

*For Examiner's Use*

in plants .....

.....

.....

.....

in humans .....

.....

.....

.....[4]

**(b)** **(i)** Explain what is meant by the term *diffusion*.

.....

.....[2]

**(ii)** Explain why respiration depends on the process of diffusion.

.....

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.....[4]

[Total: 10]

## Section C

For Examiner's Use

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

Write your answers in the spaces provided.

**8** **(a)** Explain the importance of *meiosis* in sexual reproduction.

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.....[4]

**(b)** Fruits and seeds may be dispersed by the wind.

Describe the features of a **named** wind-dispersed fruit or seed and explain the importance of these features in the process of dispersal.

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.....[6]

[Total: 10]

For Examiner's Use

**9** **(a)** Describe how pyramids of numbers differ from pyramids of biomass.

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.....

.....

.....[3]

**(b)** Describe the ways in which energy is gained and lost between members of a food chain.

energy gained .....

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energy lost .....

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.....[7]

[Total: 10]

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