Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

1900076294

BIOLOGY **5090/21**

Paper 2 Theory **October/November 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 plant cell before and after being placed in a concentrated salt solution.

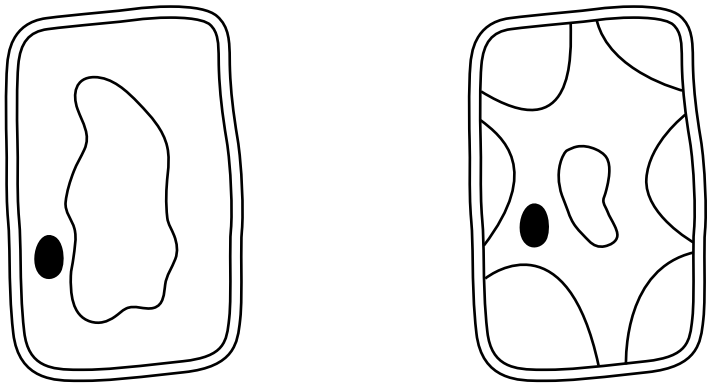


Fig. 1.1

(a) With reference to **named** parts of the cell, describe changes in the appearance of the cell after being placed in the concentrated salt solution.

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..... [3]

(b) Explain how the changes you have described in **(a)** have occurred.

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..... [3]

[Total: 6]

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2 Fig. 2.1 shows a vertical section through a human heart viewed from the front.
Two chambers, **X** and **Y**, are labelled.

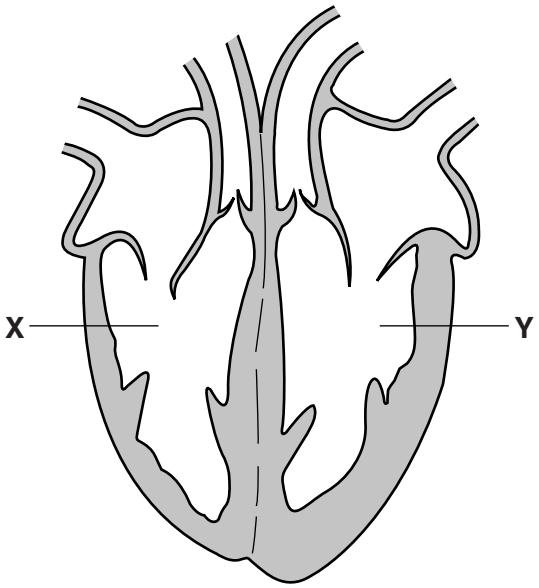


Fig. 2.1

(a) Use Fig. 2.1, and your knowledge of the circulatory system, to complete Table 2.1.

Table 2.1

chamber	name of chamber	name of blood vessel carrying blood from chamber
X		
Y		

[4]

(b) Fig. 2.2(a) shows how the mean blood pressure changes as blood flows through different types of blood vessel after leaving the heart.

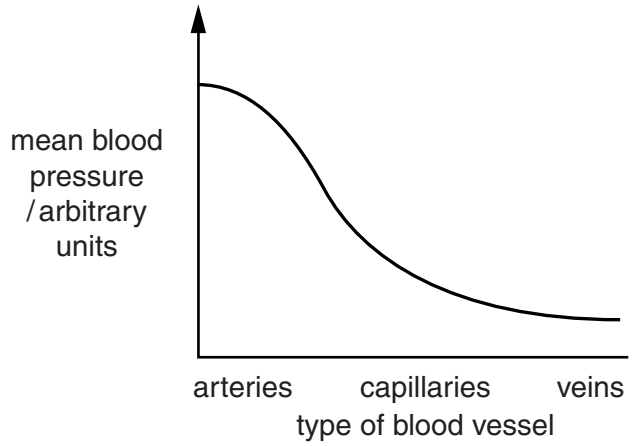


Fig. 2.2(a)

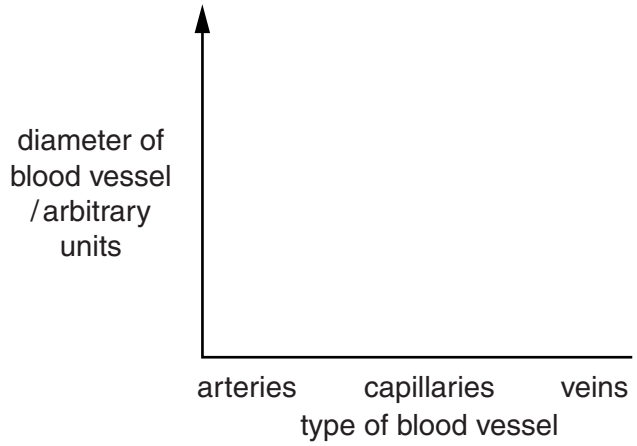


Fig. 2.2(b)

(i) Draw a line on Fig. 2.2(b) to show how the diameters of the vessels that blood flows through vary.

[2]

(ii) Use the line you have drawn on Fig. 2.2(b), and your biological knowledge, to explain why the mean blood pressure is higher in an artery than in a vein.

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..... [4]

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(c) Fig. 2.3 shows blood returning to the heart at low pressure through a vein in a leg.

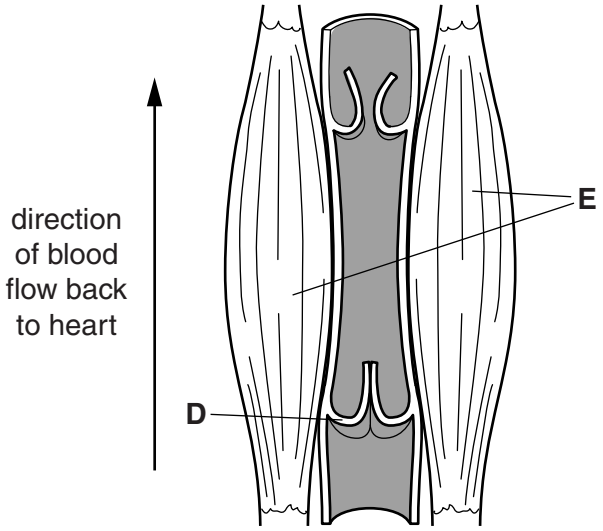


Fig. 2.3

Name part **D** in Fig. 2.3.

Explain how this part enables blood to return to the heart.

(i) name of part **D** .....

function .....

.....

..... [2]

(ii) Suggest how the parts labelled **E** in Fig. 2.3 help blood to return to the heart.

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..... [2]

[Total: 14]

3 **(a)** Fig. 3.1 shows the distribution of blood groups in the population of a country.

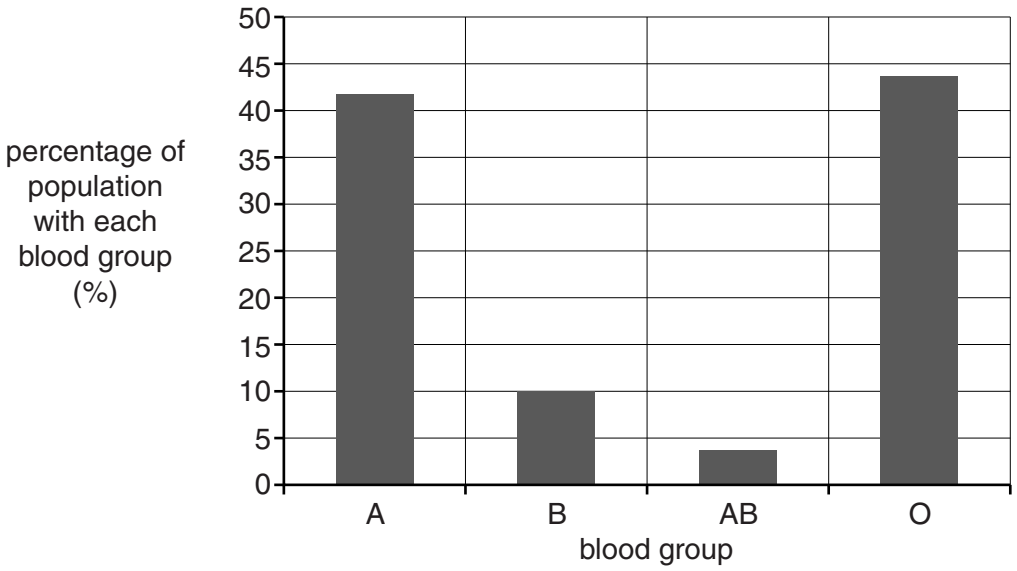


Fig. 3.1

(i) State the type of variation shown in Fig. 3.1.

..... [1]

(ii) Give a reason for your answer to part **(a)(i)**.

.....

..... [1]

(iii) The population of this country is approximately 63 million people. Use the information in Fig. 3.1 to calculate the approximate number of people in the country that have **blood group B**.

Show your working in the space below.

..... [2]

(b) Table 3.1 shows the distribution of blood groups in the populations of four countries.

Table 3.1

country	percentage of population with each blood group (%)			
	A	B	AB	O
S	23	38	10	29
T	42	10	4	44
U	26	18	.....	52
V	36	14	4	46

(i) Calculate the percentage of the population of country **U** that has blood group AB.

Write your answer in the space provided in Table 3.1. [1]

(ii) Suggest why the percentage of the population with each blood group varies between the countries listed.

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..... [2]

(c) Suggest why it might be necessary to know a person's blood group.

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..... [2]

(d) A child's mother has blood group AB and the child's father has blood group O.

Draw a (ring) around each possible genotype and blood group of the child.

genotypes	I^AI^A	I^Ai^o	I^BI^B	I^Bi^o	I^AI^B	i^oi^o
blood groups	**A**	**B**	**AB**	**O**		

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

[2]

[Total: 11]

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4 **(a)** Fig. 4.1 shows changes in the thickness of the uterus lining and in the concentration of progesterone in the blood during the menstrual cycle.

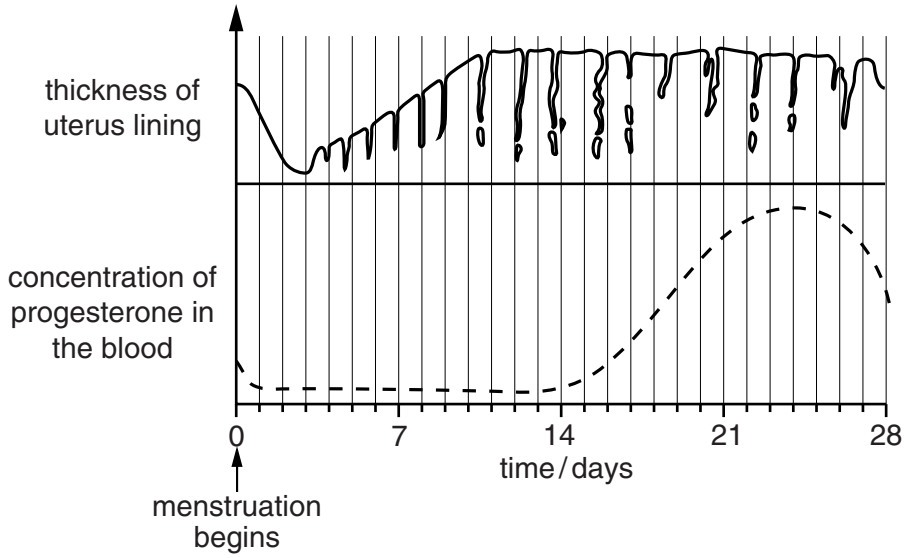


Fig. 4.1

(i) Use Fig. 4.1 to state the time at which each of the following occurs:

the uterus lining reaches maximum thickness

.....

the concentration of progesterone begins to increase.

..... [2]

(ii) Draw a (ring) around the day from Fig. 4.1 on which ovulation is most likely to occur.

day 0 day 7 day 14 day 21 day 28

[1]

(iii) Explain how it can be concluded from Fig. 4.1 that the person did **not** become pregnant during the 28 days shown, even though ovulation occurred.

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..... [2]

(b) The menstrual cycle is controlled by hormones. Name **two** hormones, **other than progesterone**, that control the menstrual cycle. State **one** role of each hormone.

name of hormone

……

role in the menstrual cycle

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name of hormone

……

role in the menstrual cycle

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..... [4]

[Total: 9]

5 Fig. 5.1 shows a plant growing in an area of well-watered soil.

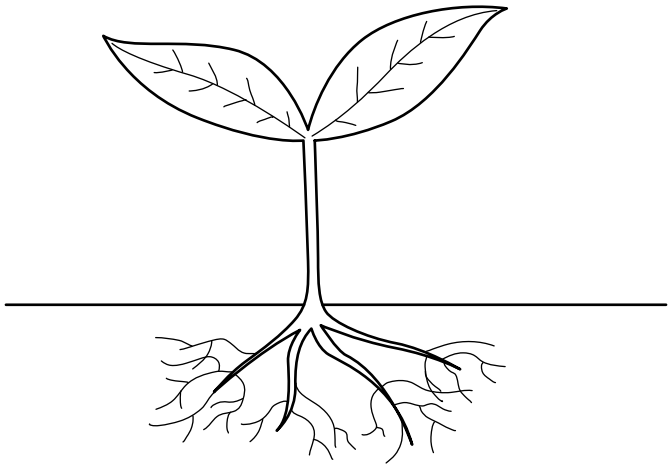


Fig. 5.1

(a) The plant was held by the stem and pulled from the ground before being re-planted in another area of well-watered soil.

It was observed that the plant wilted for several days after being re-planted and then recovered its original appearance.

Suggest an explanation for this observation.

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..... [4]

(b) Photosynthesis takes place in the leaves of the plant.

Complete the equation below for photosynthesis using either words or symbols.

..... + ... → ..... + Glucose ($C_6H_{12}O_6$)

[1]

(c) Fig. 5.2 shows one leaf taken from the plant and the appearance of part of the lower side of the leaf when viewed using a microscope.

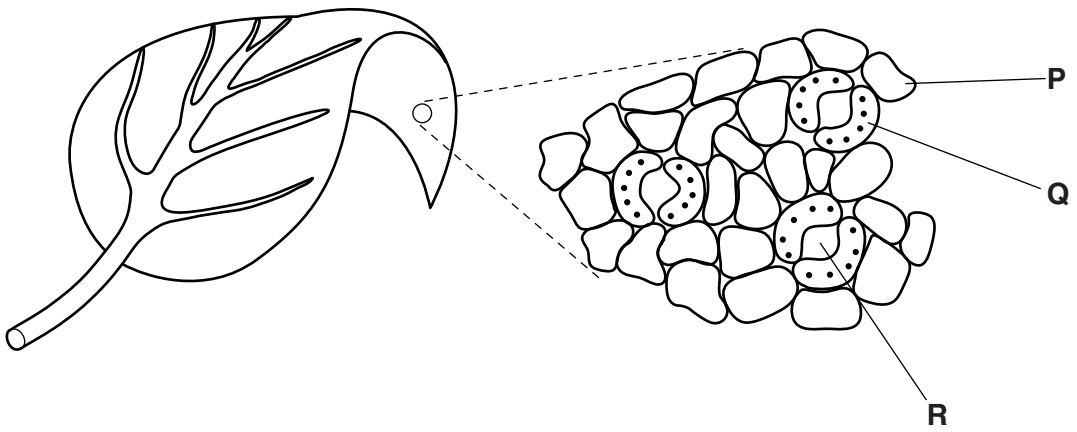


Fig. 5.2

(i) Name the parts labelled **P**, **Q** and **R** in Fig. 5.2.

P .....

Q .....

R ..... [3]

(ii) Suggest how the upper surface of the same leaf would appear different from the lower surface shown in Fig. 5.2 when viewed using a microscope. Explain the reason for this difference.

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..... [2]

[Total: 10]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Explain why most foods must be digested.

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..... [3]

(b) Describe the digestion of fats.

You should include reference to the following in your answer:

- named regions of the alimentary canal and associated organs
- named chemicals, including the end products of fat digestion.

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..... [7]

[Total: 10]

7 **(a)** A person looks up from focusing on a near object to focus on an object further away.

Describe how changes that take place in **named** components of the person's eye produce a focused image of the distant object.

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..... [6]

(b) Suggest why these changes that take place in the eye are controlled by the nervous system, rather than by a hormone.

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..... [4]

[Total: 10]

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Section C

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

Write your answers in the spaces provided.

8 Name the components of human blood and explain how each component carries out its function.

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[Total: 10]

9 **(a)** Define the term *excretion*.

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(b) Explain how a kidney machine carries out the functions of a kidney for a person with kidney disease.

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..... [7]

[Total: 10]

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