Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7221676992

BIOLOGY **5090/21**

Paper 2 Theory **May/June 2018**

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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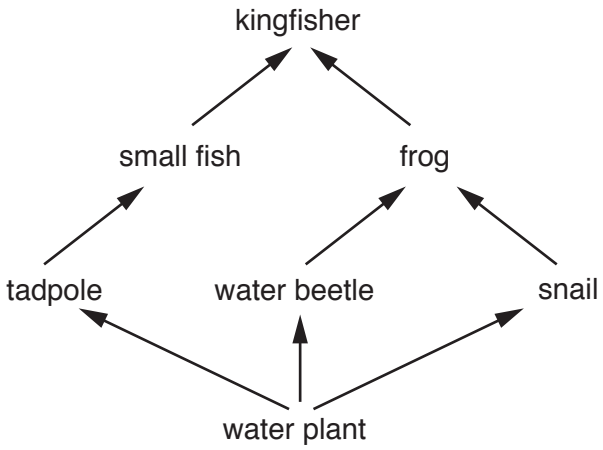
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Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 The diagram shows a food web in a pond.



(a) (i) Complete the table by writing the correct number of organisms for each statement about the food web. The first number has been written for you.

statement	number
the number of producers	1
the number of consumers	
the number of herbivores	
the number of carnivores	
the number of food chains	

[4]

(ii) Draw and label a pyramid of biomass for **one** food chain from the food web.

[2]

(b) The pond may become polluted by fertilisers containing nitrogen.

Explain how this pollution might affect the population of frogs in the pond.

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.....[4]

[Total: 10]

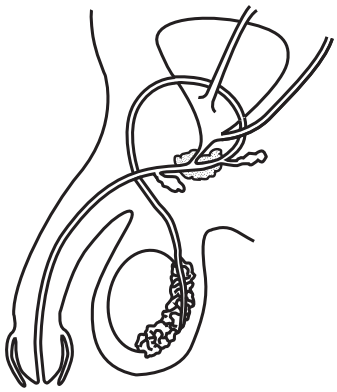
2 The diagram shows a male human gamete.



(a) (i) State the name of the male human gamete.

..... [1]

The diagram below shows the male reproductive system and associated organs.



(ii) Label with a letter **X** on the diagram where the male gametes are produced. [1]

(iii) The nucleus of the male gamete is different from the nuclei of other types of cell found at location **X**.

State the cause of this difference and explain its importance in reproduction.

cause of difference .....

.....

.....

explanation .....

.....

.....

.....

..... [3]

(b) Describe the differences in size and mobility between the male human gamete and the female human gamete.

.....

.....

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.....[2]

(c) Complete the paragraph by writing the most appropriate word in each of the spaces.

The fusion of a male human gamete and a female human gamete to form a ..... is called ..... . A ball of cells is then formed that becomes implanted in the wall of the ..... .

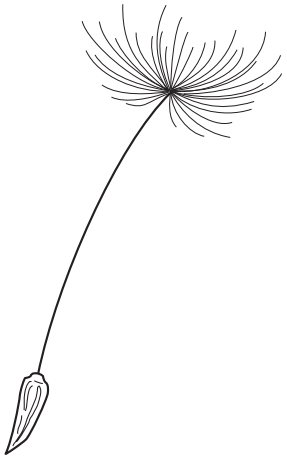
[3]

[Total: 10]

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[Turn over

3 The diagram shows the fruit of a plant.



(a) Suggest why this fruit is most likely to be wind-dispersed.

.....

.....

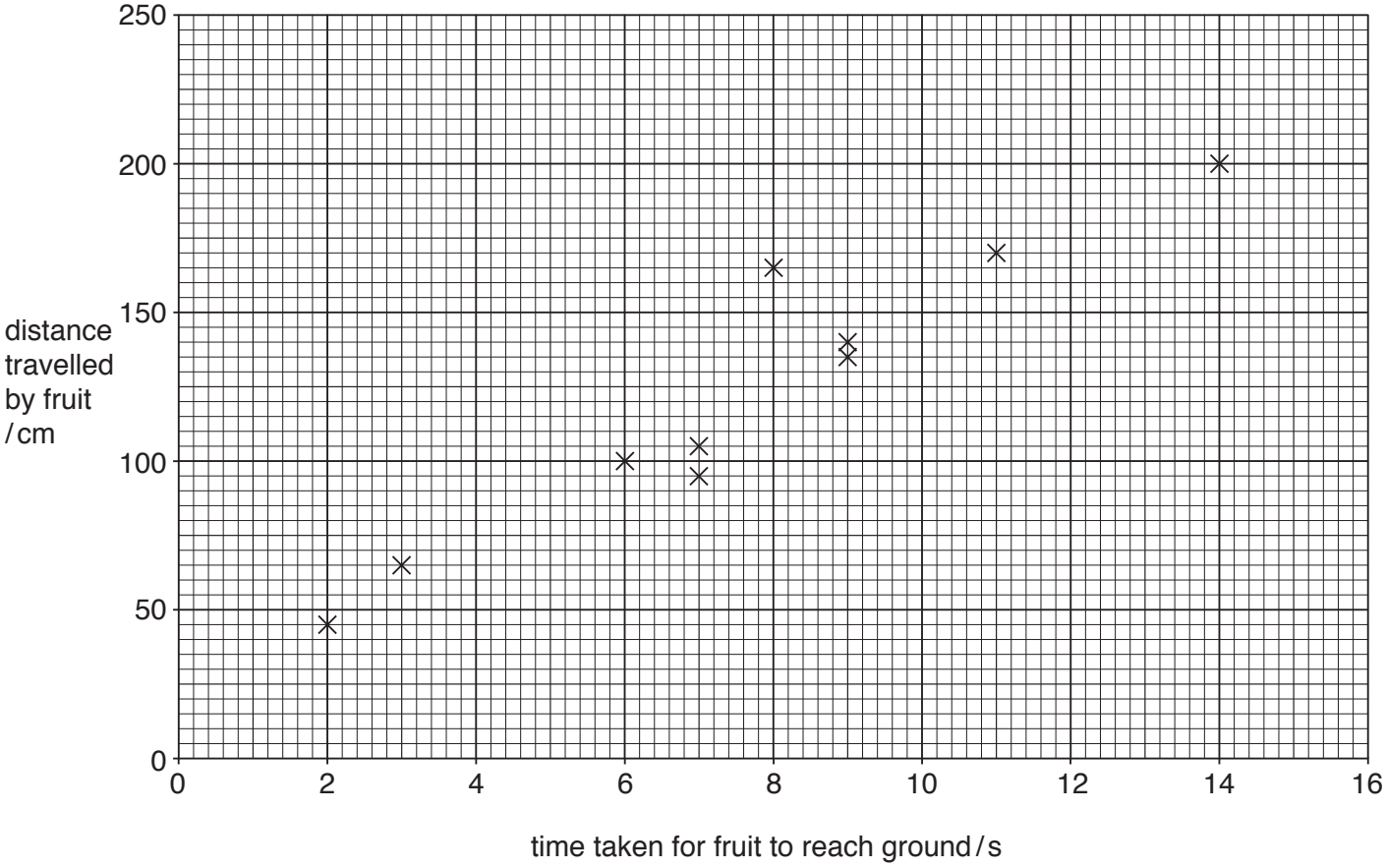
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.....[3]

(b) An investigation was carried out to find the time taken for several of these fruits to reach the ground when dropped from the same height. The horizontal distance travelled by each fruit in that time was also measured.

The results of the investigation are shown in the graph.



(i) Describe the pattern shown by the results in the graph.

.....

.....[1]

(ii) State the number of fruits in the investigation that took between 4 and 10 seconds to reach the ground.

..... [1]

(iii) Suggest and explain advantages to the plant of its fruits taking a longer time to reach the ground.

.....

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.....

.....

.....[4]

(c) When a fruit of the plant reaches the ground, the process of germination to form a new plant may take place.

State **one** environmental condition that affects germination and explain the importance of this condition.

environmental condition .....

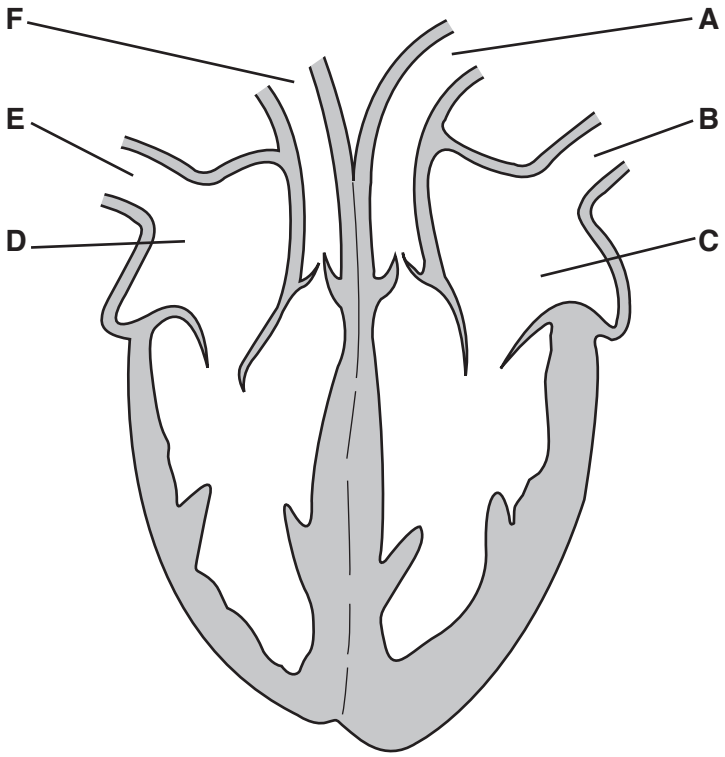
explanation .....

.....

[2]

[Total: 11]

4 The diagram shows a human heart and associated blood vessels.



(a) Complete the table to show which of the parts **A** to **F** contain oxygenated blood and which contain deoxygenated blood.

Write **each** of the letters **A** to **F** in either the right or the left side of the table.

contain oxygenated blood	contain deoxygenated blood

[2]

(b) (i) Complete the table below to show which of **A** to **F** are involved in the circulation of blood to or from each of the following locations:

- the lungs,
- the body tissues.

Write **each** of the letters **A** to **F** in either the right or the left side of the table.

blood to or from the lungs	blood to or from the body tissues

[4]

(ii) Compare the pressure of blood in the circulation to the body tissues and the pressure of blood in the circulation to the lungs.

.....

.....[1]

(iii) Explain how the structure of the heart produces this difference in blood pressure.

.....

.....

.....

.....[3]

[Total: 10]

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5 (a) (i) Describe the main characteristics of a virus.

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.....

.....[3]

(ii) The human immunodeficiency virus (HIV) reproduces inside white blood cells and destroys them.

Use your knowledge of the functions of white blood cells to suggest why the virus is named the **immunodeficiency** virus.

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.....[2]

(b) (i) HIV causes a disease called AIDS. The virus may be transmitted during sexual intercourse.

State **two** methods by which the spread of HIV by sexual intercourse may be controlled.

1 .....

.....

2 .....

.....
[2]

(ii) HIV may be transmitted in other ways.

State **two** ways, other than during sexual intercourse, by which HIV may be transmitted.

1 .....

.....

2 .....

.....
[2]

[Total: 9]

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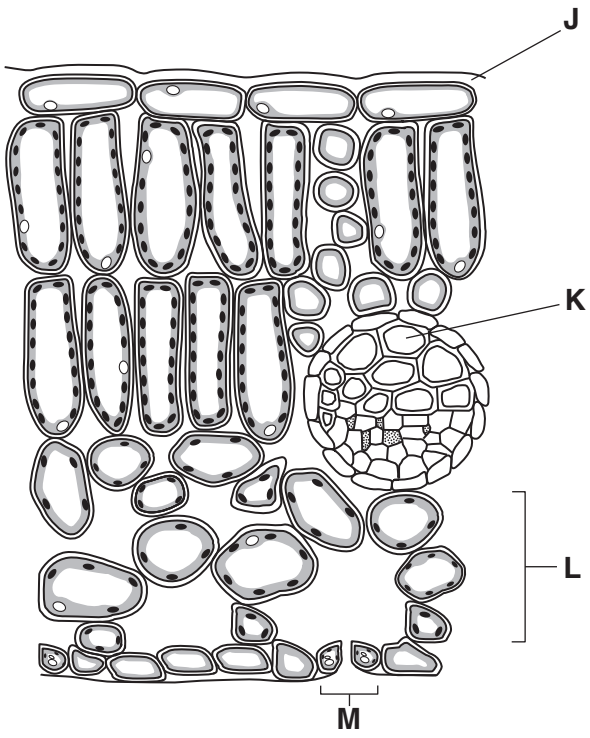
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Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 The diagram shows a magnified transverse section through a leaf.



Name each of **J**, **K**, **L** and **M** and explain the importance of each in the process of transpiration.

J .....

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.....

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K .....

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L .....

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M .....

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.....

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[10]

[Total: 10]

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

.....

.....

.....[2]

(b) In mice, the allele for black fur (**B**) is dominant to the allele for white fur (**b**).

Two mice with black fur were mated to produce offspring, all of which were black.

One of these black offspring was then mated with a mouse with white fur. Equal numbers of mice with black fur and with white fur were produced.

Complete the genetic diagram to show the pattern of inheritance in each cross.

phenotypes of first parents	black fur	×	black fur
genotypes of first parents	.....	×	.....
gametes	....		
genotypes	.....		.....
phenotype	all have black fur		
phenotypes of second parents	black fur	×	white fur
genotypes of second parents	.....	×	.....
gametes	....		
genotypes	.....		.....
phenotypes	black fur		white fur

[8]

[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 **one** example of a simple reflex action and explain the importance to the body of this action.

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.....[4]

(b) Describe how **named** components of the nervous system are involved in producing a reflex action.

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.....[6]

[Total: 10]

9 **(a)** Explain the concept of control by negative feedback.

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.....[4]

(b) Describe how **two named** components of the skin are involved in regulating body temperature in **hot** conditions.

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.....[6]

[Total: 10]

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