Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

9235595067

BIOLOGY **5090/22**

Paper 2 Theory **May/June 2019**

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 Food supplements are substances that are often added to a person's diet. These supplements may be in the form of a tablet.

The diagram shows the label from a food supplement.

To be taken with a balanced diet.

Components:

- Amylase
- Cellulase
- Lipase
- Protease

This supplement may be taken by a person whose pancreas is not producing enough of some of the components shown on the label.

(a) (i) State the type of chemical that the supplement contains.

..... [1]

(ii) Each food group in the diet is the substrate for a specific component of the supplement.

Complete the table by writing the most appropriate word or words in each box.

component of supplement	substrate	end product or products
amylase		
protease		
lipase		

[3]

(iii) Cellulase is a component of the supplement that is **not** usually found in the human body.

Use your knowledge of the structure of a plant cell to suggest the function of the cellulase component of the supplement.

.....

..... [2]

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(b) The supplement is taken in the form of a tablet that is swallowed.

Each tablet is covered in a substance that breaks down **only** in alkaline conditions to release the components of the supplement.

Suggest why this covering is important if the supplement is to work effectively in the alimentary canal.

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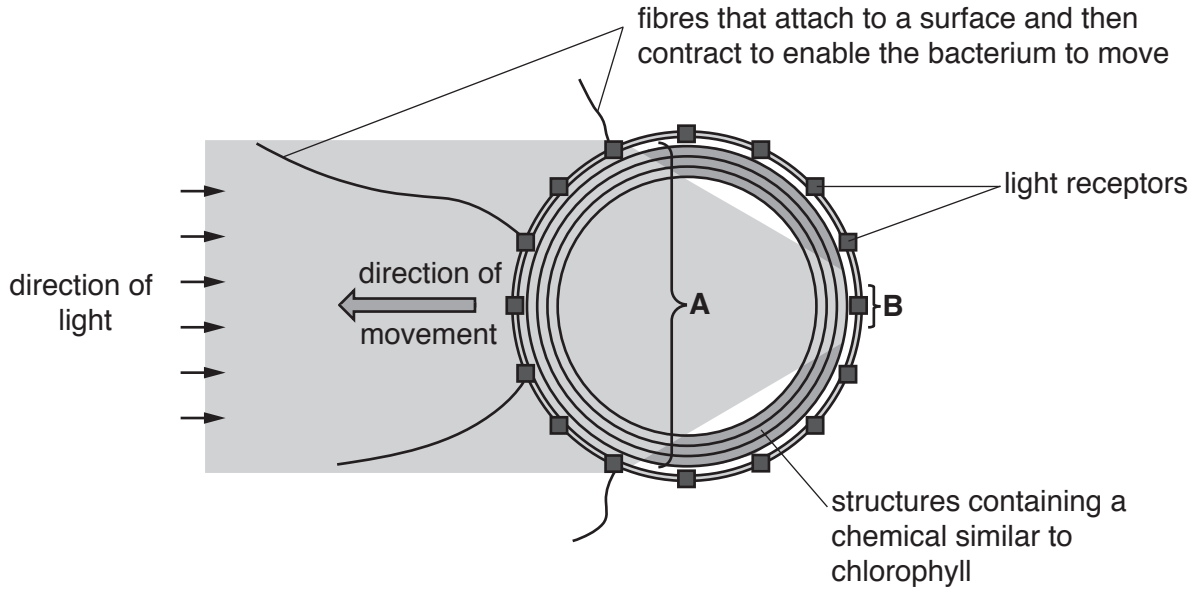
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..... [3]

[Total: 9]

2 The diagram shows the structure of a type of bacterium and details of the response of the bacterium to light.



(a) Use information in the diagram to suggest:

(i) the sequence of events that takes place when the bacterium is provided with light from the direction shown

.....

.....

.....

.....

..... [3]

(ii) the advantage to the bacterium of responding to light in this way.

.....

.....

..... [2]

(b) There are similarities between the functions of parts of the bacterium and the functions of structures found in the human eye.

Suggest which structure in the human eye has a function similar to each of the following regions of the bacterium.

A .....

B .....

[2]

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(c) The type of bacterium shown in the diagram fixes nitrogen.

Describe the role of bacteria in nitrogen fixation.

.....

.....

.....

..... [2]

(d) The enzyme that these bacteria use to fix nitrogen is destroyed in the presence of oxygen.

(i) Suggest why destruction of this enzyme is likely to occur in the type of bacterium in the diagram.

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.....

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..... [2]

(ii) Suggest **one** adaptation that such bacteria may have developed to prevent the destruction of this enzyme.

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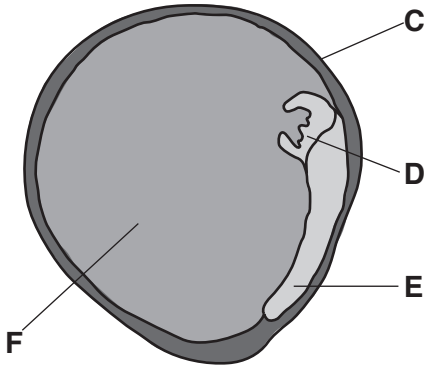
..... [1]

[Total: 12]

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[Turn over

3 The diagram shows the internal structure of a seed from a pea plant.



Seeds from a pea plant are non-endospermic.

(a) Identify each of parts **C** to **F**.

C .....

D .....

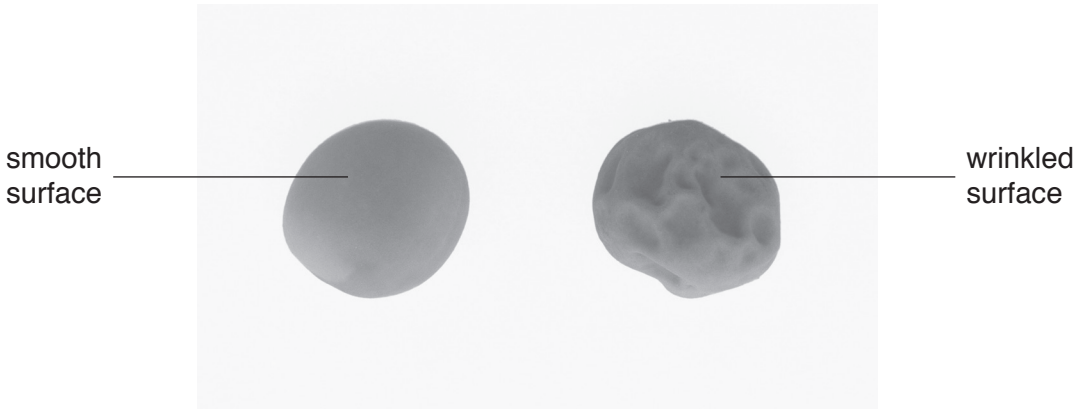
E .....

F .....

[4]

(b) The diagram below shows two seeds, one from each of two pea plants of the same species.

Seeds from this species of plant have either a smooth surface or a wrinkled surface.



The type of surface of a seed is controlled by a single gene. The allele of the gene that gives the seed a smooth surface (**R**) is dominant to the allele that gives the seed a wrinkled surface (**r**).

(i) Name the part of a cell that contains the genes.

.....

[1]

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(ii) Define each of the following terms:

gene .....

.....

.....

dominant allele .....

.....

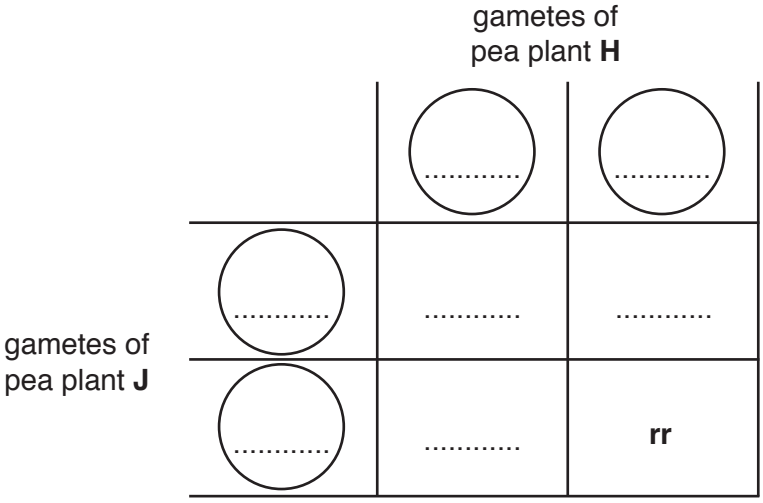
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[4]

(iii) One pea plant, **H**, has a homozygous genotype that develops seeds with a wrinkled surface. Another pea plant, **J**, has an unknown genotype.

When these two plants were cross-pollinated, approximately half of the new plants produced had peas with a wrinkled surface.

Complete the genetic diagram below for this cross **and** state the genotype of pea plant **J**.



genotype of pea plant **J**: .....

[3]

[Total: 12]

4 The photograph shows a species of tree frog.



Each tree frog of this species is either **grey** or **green** in colour.

The following are true for **both** grey and green tree frogs. They:

- eat insects
- live above the ground in vegetation
- live near water and lay their eggs in small pools
- are sometimes eaten by snakes and birds.

Grey tree frogs are more commonly found in areas where there are many trees with grey bark.

Green tree frogs are more commonly found in areas where there are many swamp and marsh plants with green leaves.

(a) State the type of variation shown by the colour of these tree frogs.

..... [1]

(b) Tree frogs eat insects which are herbivores.

(i) State the meaning of the term *herbivore*.

..... [1]

(ii) State the trophic level of the tree frogs.

..... [1]

(c) Use your knowledge of the process of natural selection to explain the distribution of grey and green tree frogs in different areas.

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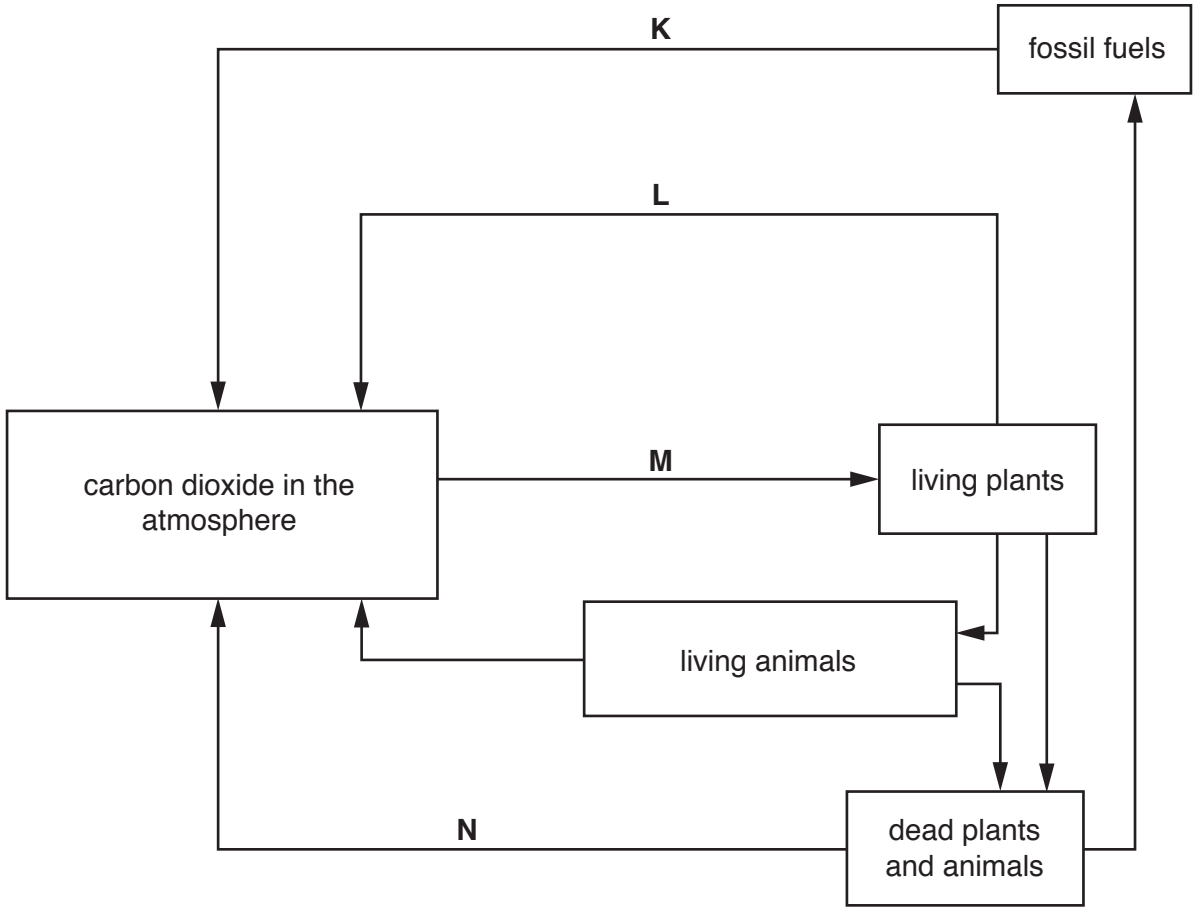
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..... [5]

[Total: 8]

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5 The diagram shows the carbon cycle.



(a) Name each of the processes **K** to **N**.

K .....

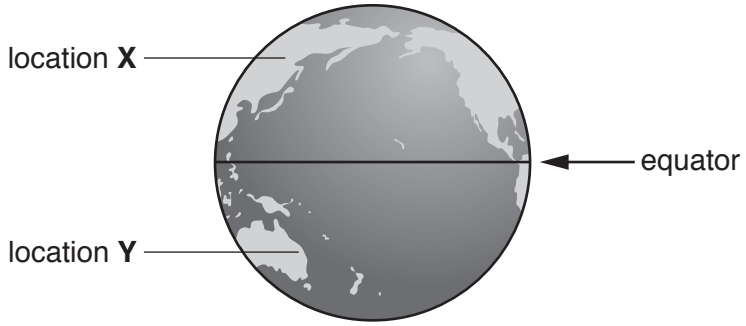
L .....

M .....

N .....

[4]

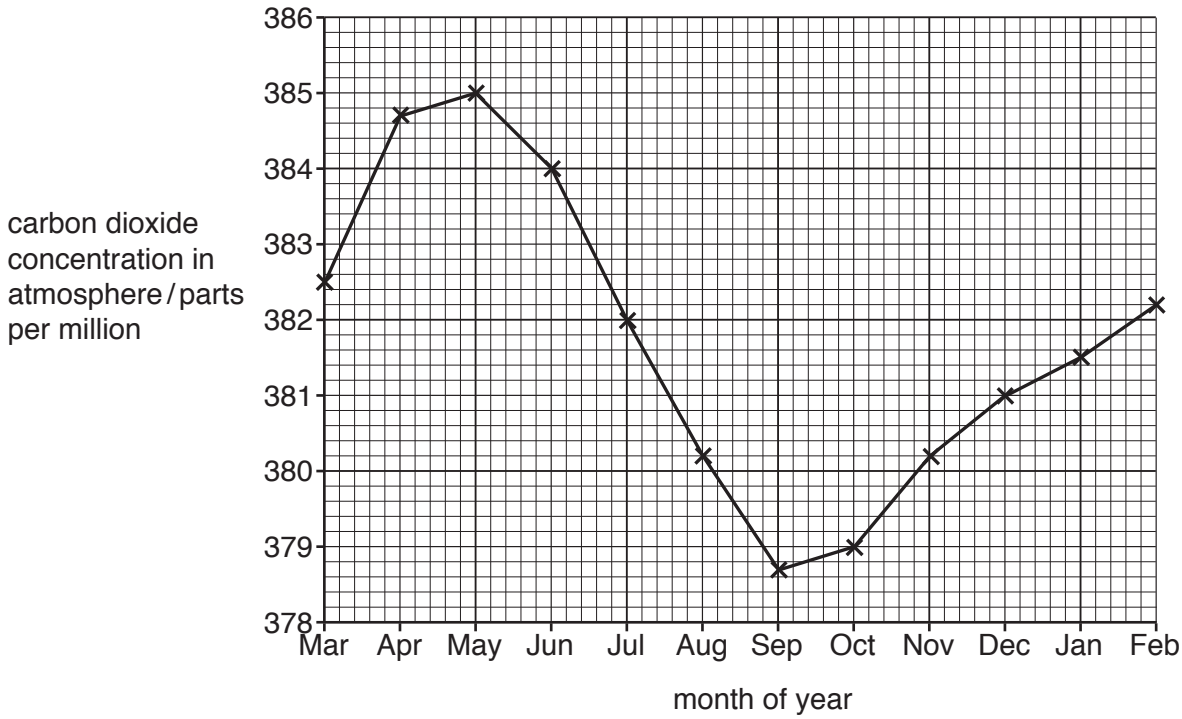
(b) The diagram shows two locations, **X** and **Y**, on the Earth.



The table shows the length of daylight at each location during a year.

	Mar	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**
length of daylight at location X	medium			long			medium			short		
length of daylight at location Y	medium			short			medium			long		

The graph shows the change in carbon dioxide concentration in the atmosphere measured during one year at **location X**.



(i) Suggest an explanation for the pattern of changes in the concentration of carbon dioxide in the atmosphere shown in the graph.

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..... [3]

(ii) Draw a line on the graph to suggest the change in carbon dioxide concentration in the atmosphere during the year at **location Y**. [2]

[Total: 9]

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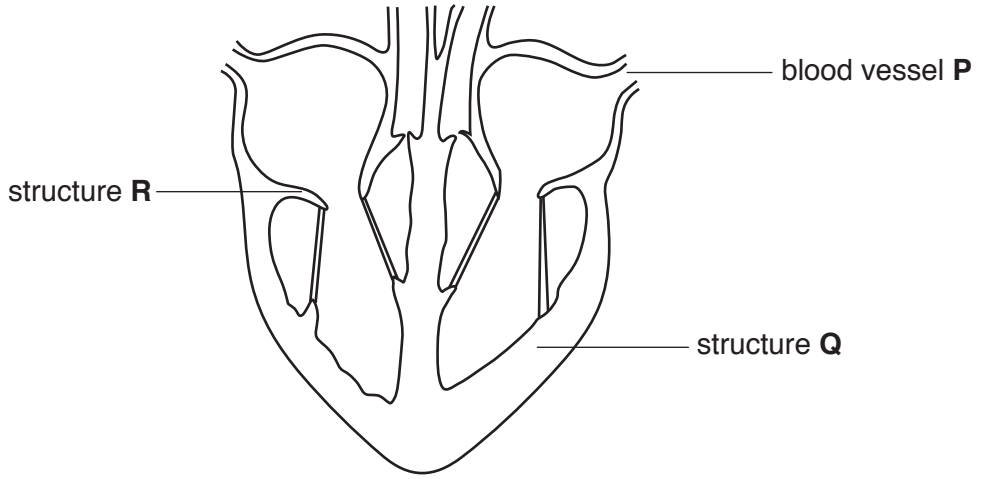
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Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 The diagram shows the internal structure of a human heart viewed from the front and its associated blood vessels.



Name and describe the function of each of the following:

(a) blood vessel **P**

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..... [3]

(b) structure **Q**

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..... [3]

(c) structure **R**.

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.....

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..... [4]

[Total: 10]

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7 The nervous system coordinates body functions.

(a) (i) Name the type of coordinated response that takes place as a result of a specific stimulus, such as the withdrawal of the hand from a hot object touching the skin.

..... [1]

(ii) Outline, **in the correct sequence**, the functions of each **named** type of neurone involved in producing this coordinated response.

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..... [7]

(b) Suggest why damage to a person's spinal cord may result in the person not being able to produce coordinated responses.

.....

.....

..... [2]

[Total: 10]

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[Turn over

Section C

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

Write your answers in the spaces provided.

8 **(a)** Name **and** describe each process that must take place in order to remove molecules of carbon dioxide from the blood of a person to the air in the atmosphere.

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..... [7]

(b) Plants absorb carbon dioxide from the atmosphere.

Outline how plants make the carbon in the molecules of carbon dioxide into a food substance.

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..... [3]

[Total: 10]

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9 **(a)** Describe the pathway of water molecules from the soil, through a plant and into the atmosphere.

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..... [7]

(b) Explain how variation in **one named** environmental factor would lead to an **increase** in the rate of water loss from a plant.

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..... [3]

[Total: 10]

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