Cambridge
O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

5744970961

BIOLOGY **5090/21**

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.

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

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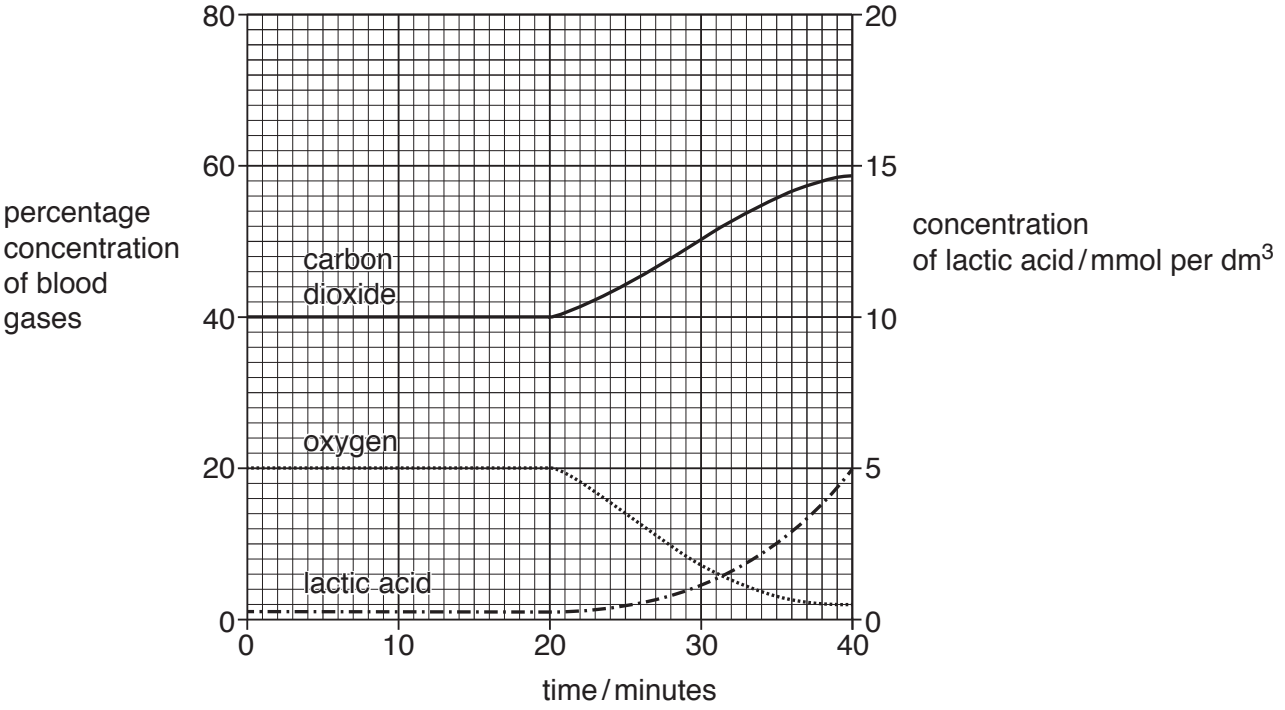
Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 A seal is a mammal that spends most of its time in the sea. It breathes and respires in a very similar way to a human, but when it dives to hunt and catch fish, it is capable of staying under water for up to 20 minutes.

The graph shows the percentage concentrations of oxygen and carbon dioxide, and the concentration of lactic acid in a seal's blood over a 40 minute period during which it dives to hunt and catch fish.



(a) State the chemical process that is taking place in the seal's muscles before it dives.

..... [2]

(b) (i) State how long after the start of the time period the seal begins its dive.

..... [1]

(ii) State the percentage of oxygen in the seal's blood 40 minutes after the start of the time period.

..... [1]

(c) Name the chemical process which starts to take place in the seal's muscles during its dive and explain how the graph supports your answer.

process .....

explanation .....

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[3]

(d) Suggest and explain what would happen to the concentration of lactic acid in the seal's blood when it returns to the surface of the sea after its dive.

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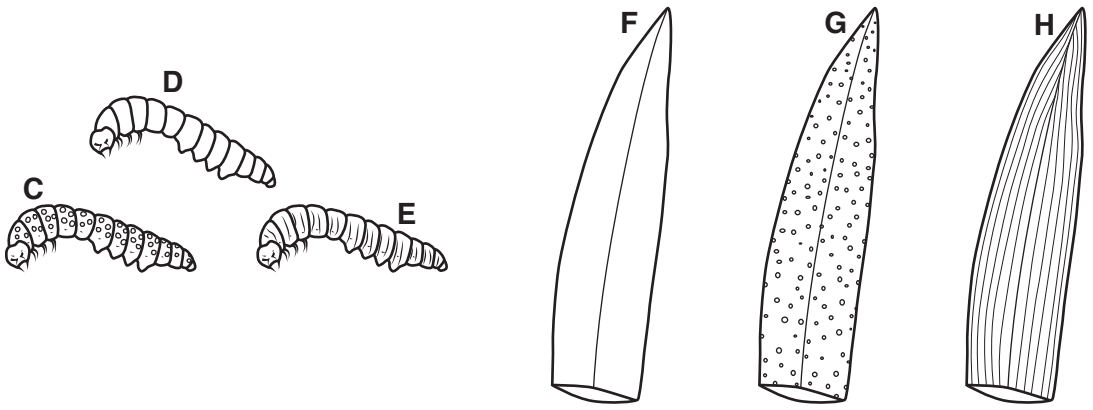
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2 The diagram shows three varieties, **C**, **D** and **E**, of the same species of insect, and three different leaf patterns, **F**, **G** and **H**, of the same species of plant on which the insect feeds.



(a) Suggest which variety of the insect is likely to be found in the greatest numbers in areas where leaf pattern **G** of the plant is found, and explain your answer.

variety of insect .....

explanation .....

.....

.....

[2]

(b) Over a period of many years, as they grow, the plants lose the dots and stripes on their leaves which become plain.

Suggest and explain what is likely to happen to the numbers of the different varieties of insect in an area where the majority of plants are old.

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..... [4]

(c) Two alleles, **T** and **t**, control the body pattern of the insects.
Insects with dots (**C**) are homozygous dominant.
Insects with stripes (**E**) are homozygous recessive.
Plain insects (**D**) are heterozygous.

Explain why all three varieties of insect will continue to be produced even in areas where all the plants have plain leaves.

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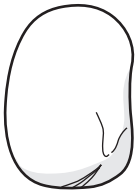
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..... [4]

[Total: 10]

3 The diagram shows a seed immediately after it is planted.

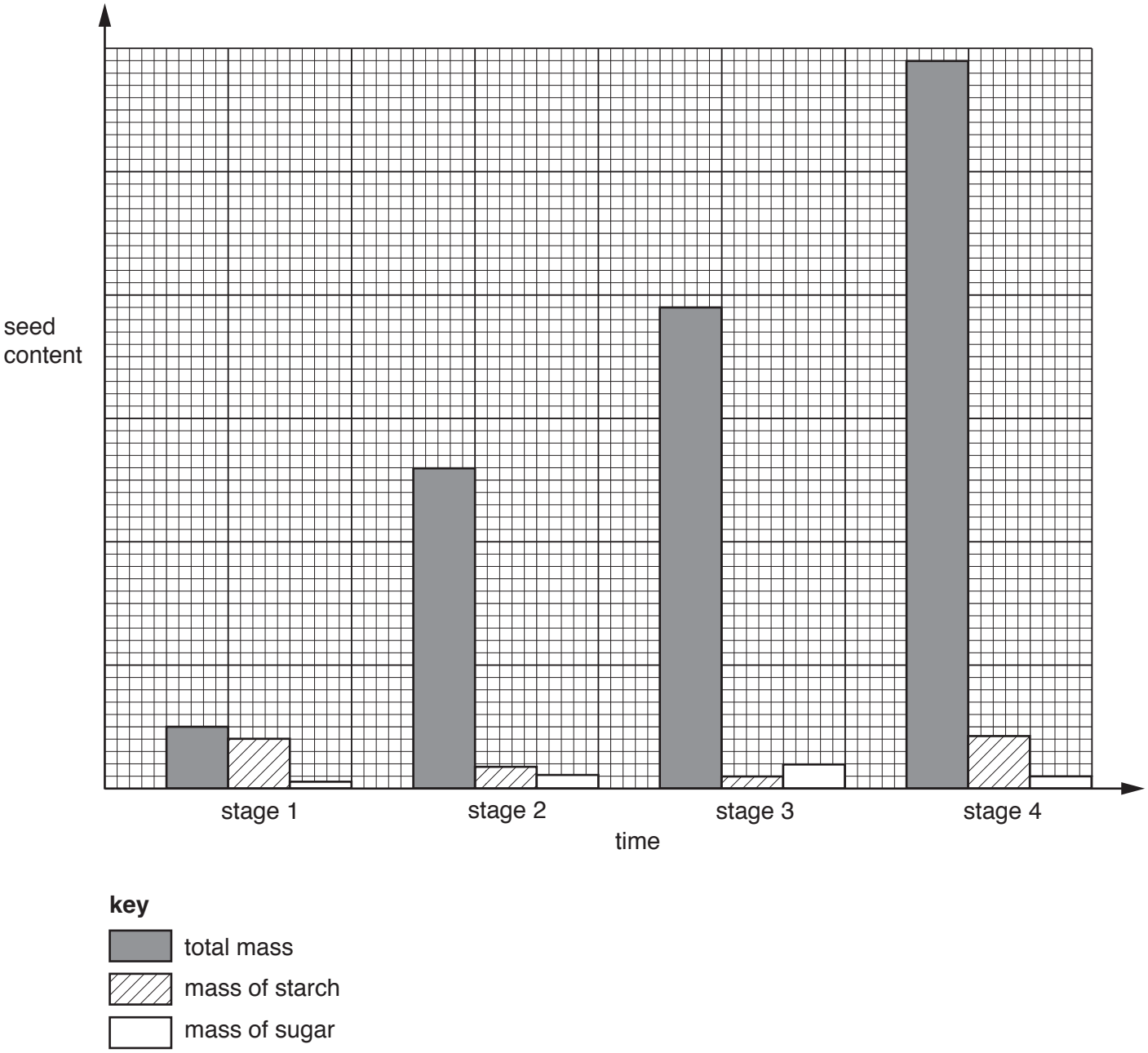


(a) Name **two** factors that **must** be present for the seed to germinate.

1 .....

2 ..... [2]

(b) The bar chart shows the total mass, the mass of starch and the mass of sugar in the seed immediately after it is planted (stage 1), and at three further stages in the development of the seedling.



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(i) State **two** substances, other than starch and sugar, that contribute to the total mass of the seed at stage 1.

1 .....

2 ..... [2]

(ii) State the stage at which the seedling starts to photosynthesise, and give your reasons.

stage .....

reasons .....

.....

.....

..... [3]

(c) Explain the difference in the amount of starch and sugar between stage 2 and stage 3.

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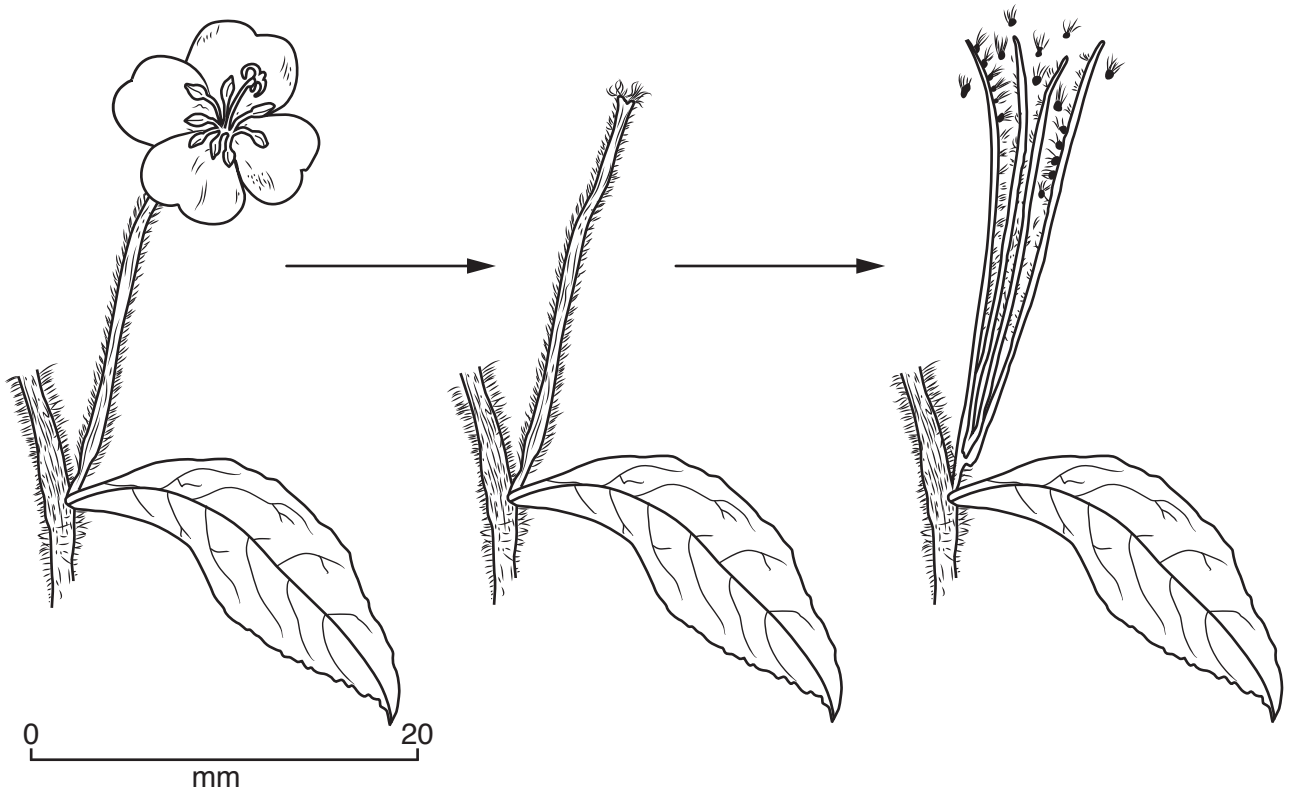
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..... [3]

[Total: 10]

4 The diagram shows stages in the life cycle of the same plant.



(a) State the number of each of the following parts of the flower shown in the diagram.

petals ..... filaments ..... [2]

(b) **On the diagram of the flower** label the ovary (the structure containing ovules). [1]

(c) For this plant, state

(i) its method of pollination and give reasons for your answer

method of pollination .....

reasons .....

.....

.....

[3]

(ii) its method of seed dispersal and give reasons for your answer.

method of seed dispersal .....

reasons .....

.....

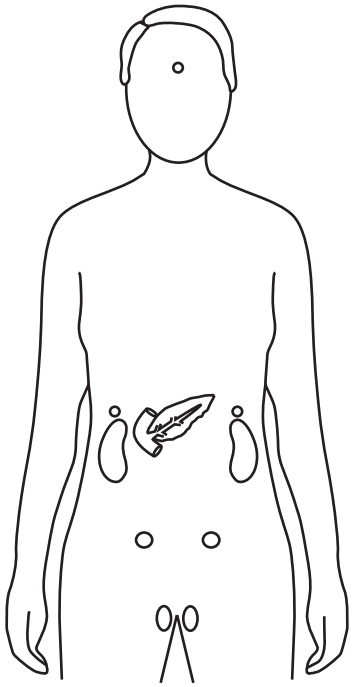
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[3]

[Total: 9]

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5 The diagram shows the position of some organs in the human body. The organs may be found in either a male or a female, or in both.



(a) Use the letters shown to label, **on the diagram**, the organs that produce the following hormones:

J – testosterone
K – insulin
L – progesterone
M – follicle stimulating hormone (FSH). [4]

(b) Explain how **one** of the hormones from **(a)** travels from the **named** organ that produces it to its **named** target organ.

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..... [4]

(c) Explain how the hormones progesterone and luteinising hormone (LH) are linked in the menstrual cycle.

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..... [3]

[Total: 11]

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Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 **(a)** Define osmosis and explain why osmosis is a special form of diffusion.

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..... [7]

(b) Explain the importance of active transport in the human alimentary canal.

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..... [3]

[Total: 10]

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[Turn over

7 **(a)** Describe the removal of **named** toxic materials and waste products of metabolism from the human body.

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..... [7]

(b) Explain how **named** waste products are removed from a plant.

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..... [3]

[Total: 10]

Section C

Answer **either** Question 8 **or** Question 9.

Write your answers in the spaces provided.

8 Describe and compare the following:

(a) gene and allele

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..... [5]

(b) continuous variation and discontinuous variation.

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..... [5]

[Total: 10]

9 Describe and compare the following:

(a) antibodies and antibiotics

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..... [5]

(b) viruses and bacteria.

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[Total: 10]

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