Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

4031952520

BIOLOGY **5090/22**

Paper 2 Theory **October/November 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.

Section A

Answer **all** questions in this section.

Write your answers in the spaces provided.

1 Fig. 1 and Fig. 2 show transverse sections of two types of blood vessel.

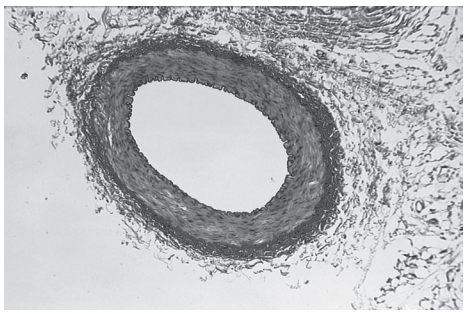

Fig. 1

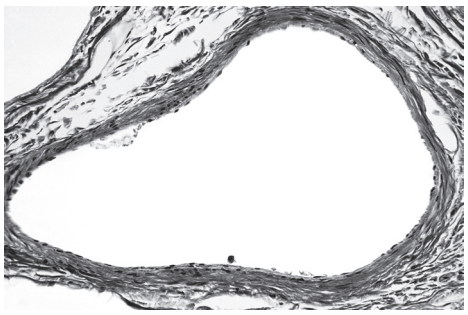

Fig. 2

(a) (i) Name the type of blood vessel shown in:

Fig. 1 .....

Fig. 2 ..... [2]

(ii) Describe the differences in the structures shown in Fig. 1 and Fig. 2 that helped you to identify these blood vessels.

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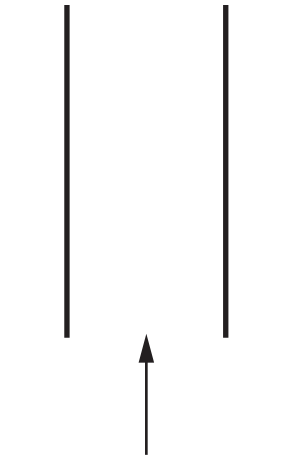
.....[2]

(b) The diagram below is of a simplified, incomplete longitudinal section from the type of blood vessel shown in Fig. 2. The direction of blood flow is shown.



(i) Complete the diagram by drawing **one** set of valves.

[2]

(ii) Describe the function of these valves.

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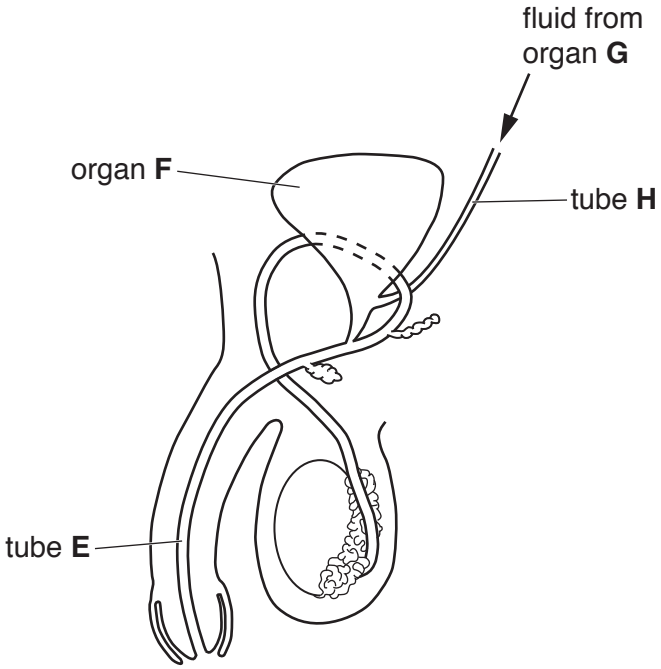
.....[2]

[Total: 8]

2 The diagram shows the human male reproductive organs and associated structures.



(a) (i) Identify each of the following:

tube **E** .....

organ **F** .....

organ **G** .....

tube **H** ..... [4]

(ii) State **one** difference between the fluids carried by tube **E** and tube **H**.

.....

.....[1]

(b) (i) State **one** way in which the fluid from organ **G** may be different in a person with diabetes compared to a person without diabetes.

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.....[1]

(ii) A person with diabetes may be treated with insulin produced by genetically modified bacteria.

Outline how such genetically modified bacteria may be produced and used to manufacture human insulin on a commercial scale.

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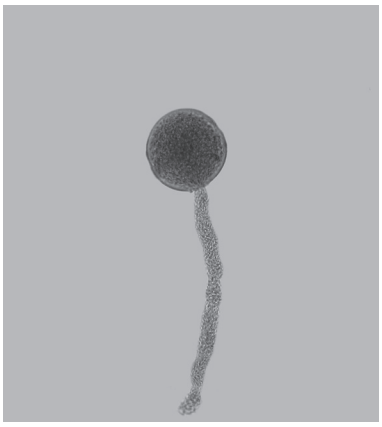
.....[4]

[Total: 10]

3 The diagram shows a pollen grain with a pollen tube growing from it.



Pollen grains from the same type of plant were placed in sucrose solutions of different concentrations for a fixed amount of time. After this time, the pollen grains and tubes were examined using a microscope. The following observations were made for each concentration of sucrose:

- the number of pollen grains that had germinated to produce a pollen tube,
- the length of each pollen tube.

The table shows the results of the investigation.

% sucrose concentration	% of pollen grains germinated	mean pollen tube length/mm
1	6	0.005
2	13	0.008
4	25	0.015
8	56	0.040
10	31	0.030
20	25	0.018
40	13	0.006

(a) (i) A total of 12 pollen grains were placed in the 20% sucrose solution.

Use the information in the table to calculate the number of pollen grains that germinated to produce a pollen tube in the 20% sucrose solution.

..... [1]

(ii) Suggest why the **mean** pollen tube length was calculated for each sucrose concentration.

.....

.....[1]

(iii) Use the information in the table to suggest the optimum (best) concentration of sucrose solution for pollen tube germination and growth.

..... %

Explain how the information in the table enabled you to reach this conclusion.

.....

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[3]

(iv) The germination of a pollen grain to form a pollen tube requires the movement of water into the pollen grain from its surroundings.

Suggest why placing a pollen grain in a solution with a higher sucrose concentration than in your answer to **(a)(iii)** may result in a lower percentage of germination.

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.....[3]

(b) Describe the route taken by a growing pollen tube in a plant and explain its importance in plant reproduction.

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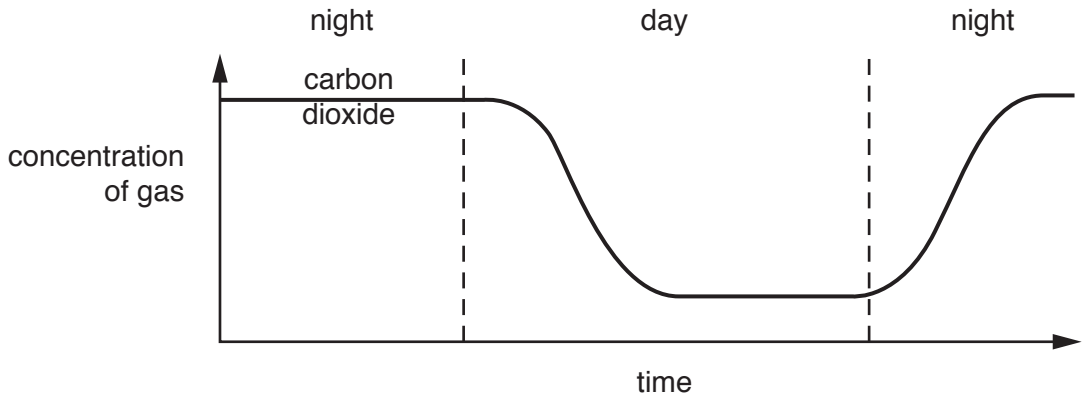
.....[4]

[Total: 12]

4 The graph shows the variation in the concentration of dissolved carbon dioxide in the water of a pond over a period of 24 hours.



(a) (i) Explain how plants that live in the water contribute to the changes in concentration of dissolved carbon dioxide shown in the graph.

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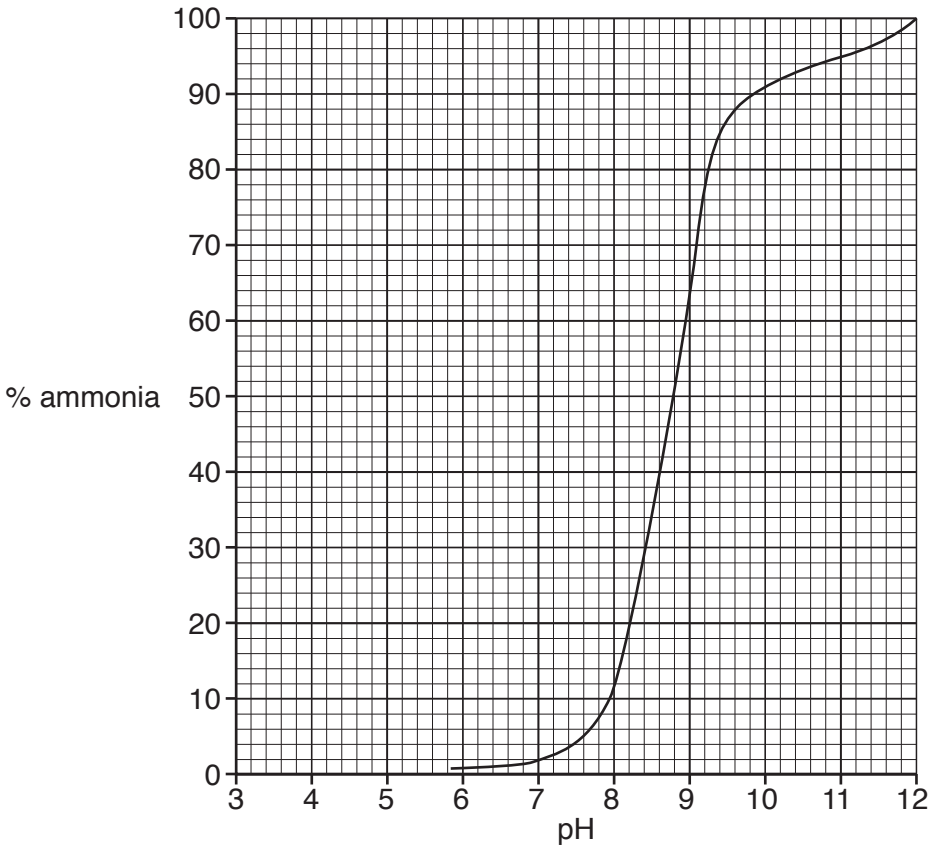
.....[4]

(ii) Draw a line on the graph above to show how the concentration of dissolved oxygen in the water of the same pond is likely to change over the same period of time. [2]

(b) Carbon dioxide dissolves in water to form an acidic solution. The higher the concentration of dissolved carbon dioxide, the lower the pH.

Ammonia is a toxic chemical found in ponds, that may harm fish.

The graph shows how the concentration of dissolved ammonia in the water of a pond changes as the pH changes.



Use this graph and the graph on page 8 to suggest and explain at which time of day fish that live in the pond are **most likely** to be affected by the toxic effects of ammonia.

Draw a (ring) around the correct time of day.

time of day **sunrise** **midday** **sunset**

explanation .....

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[4]

[Total: 10]

[Turn over

5 **(a)** Describe the role of each of the following hormones in the menstrual cycle:

FSH, ...

.....

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progesterone. .....

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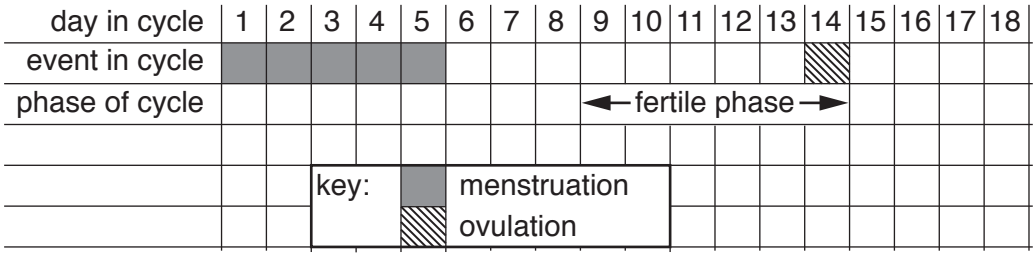
[4]

(b) The chart shows the timing and duration of events that take place during **part** of a menstrual cycle.



(i) Suggest why pregnancy may occur if sexual intercourse takes place several days before ovulation.

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.....[2]

(ii) Name the method of birth control that makes use of the information in a chart like this. Explain how this method of birth control is used to prevent pregnancy.

name of method .....

explanation.....

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[3]

(iii) Suggest why the method of birth control that you have named in **(b)(ii)** is considered to be unreliable.

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.....[1]

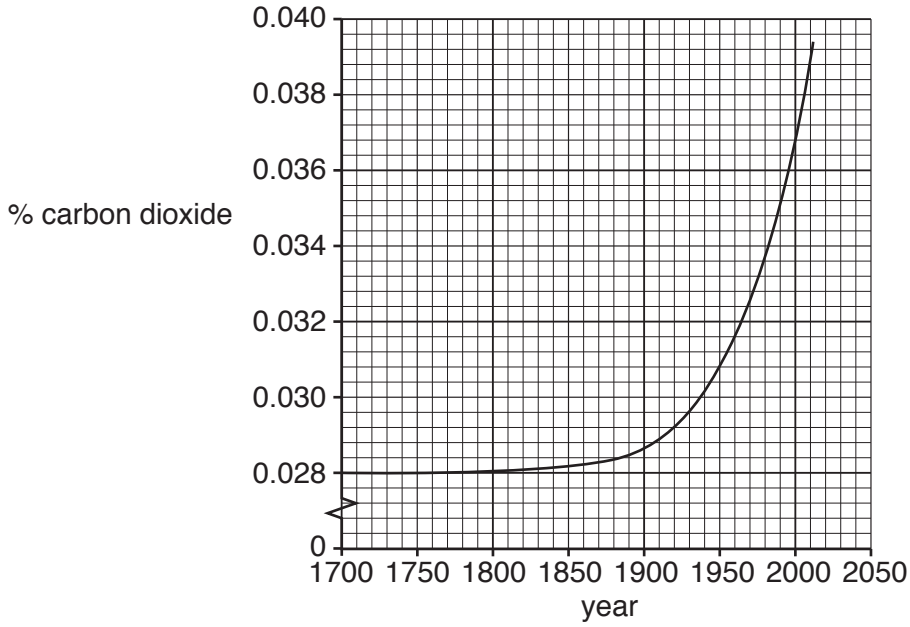
[Total: 10]

Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

6 The graph shows how the percentage of carbon dioxide in the atmosphere has changed since the year 1700.



(a) Explain how human activity is likely to have contributed to the change in the percentage of carbon dioxide.

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.....[5]

(b) Describe and evaluate the effects of this change in the percentage of carbon dioxide.

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[Total: 10]

7 Fig. 1 shows a leaf immediately after falling from a growing plant. Fig. 2 shows a leaf from the same plant several months after falling from the plant onto the soil below.

Fig. 1

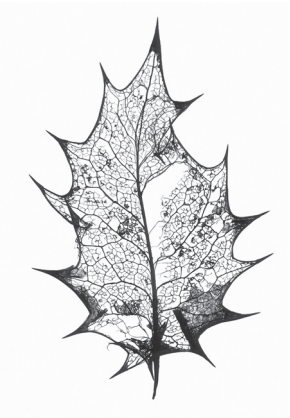

Fig. 2

(a) (i) Name the process that has taken place to cause the leaf in Fig. 2 to appear different from that in Fig. 1.

..... [1]

(ii) Explain how **named** types of microorganism have carried out this process.

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.....[5]

(b) Explain how the plant benefits from this process taking place in the large number of leaves that fall from the plant onto the soil below.

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.....[4]

[Total: 10]

Section C

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

Write your answers in the spaces provided.

8 **(a)** Explain what is meant by each of the following terms and describe **one** example of each:

discontinuous variation, ...

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continuous variation. .....

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[7]

(b) Name the molecule that controls production of proteins in each body cell of a human and describe its importance in inheritance.

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.....[3]

[Total: 10]

9 **(a)** Explain what is meant by each of the following terms and describe **one** example of each in either a plant **or** an animal:

diffusion, ...

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active transport. .....

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[7]

(b) Starch is a carbohydrate stored inside plant cells.

Explain why starch is a more suitable storage substance than glucose.

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.....[3]

[Total: 10]

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