

New  
Specification



Rewarding Learning

**ADVANCED**  
General Certificate of Education  
2018

Centre Number

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Candidate Number

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# Biology

Assessment Unit A2 1

*assessing*

Physiology, Coordination and  
Control, and Ecosystems



**[ABY11]**

\*ABY11\*

**THURSDAY 7 JUNE, MORNING**

## TIME

2 hours 15 minutes.

## INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all nine** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Section A carries 82 marks. Section B carries 18 marks.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You are expected to answer Section B in continuous prose.

**Quality of written communication** will be assessed in Section B (Question 9).



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## Section A

1 In many plants, flowering is controlled by day length. This is known as photoperiodism.

(a) Name the light-sensitive pigment involved in photoperiodism.

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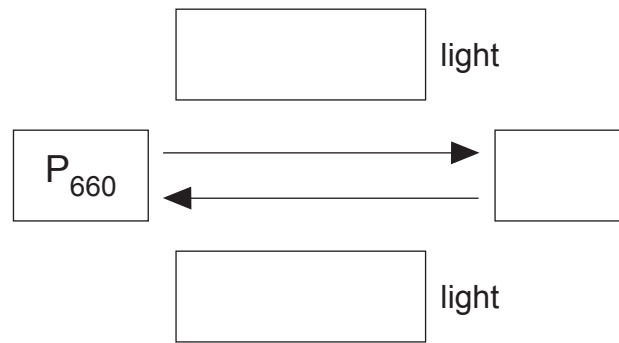
[1]

(b) State the location of this light-sensitive pigment in the plant.

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[1]

(c) Complete the diagram using the most appropriate words or terms.



[3]

































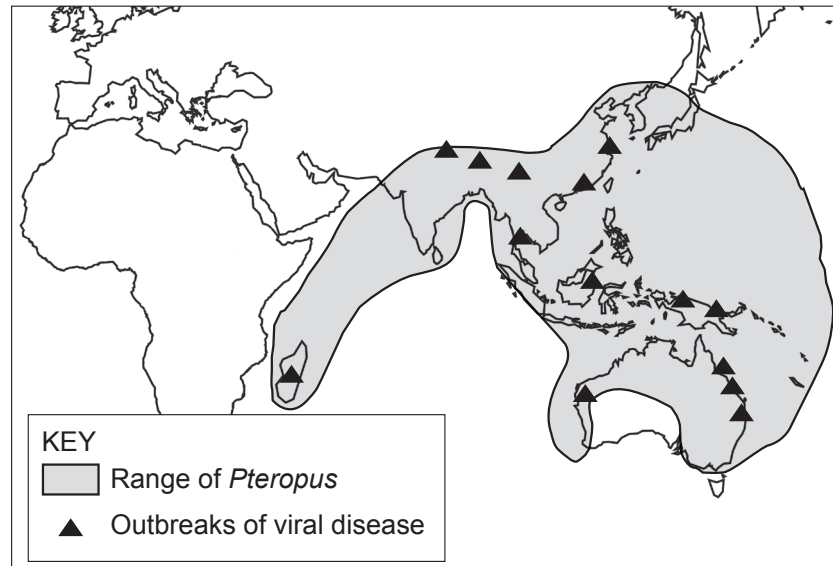






- (c) Some human diseases are caused by viruses that were originally found in other mammals, e.g. bats. These mammals can be referred to as 'reservoirs' for the virus concerned.

The map below shows both the locations of recent outbreaks of human diseases known to be caused by a number of these viruses and the distribution range of bats of the genus *Pteropus*.



Nipah Virus Distribution Map © Centers for Disease Control and Prevention

- (i) Using the map, suggest why *Pteropus* bats may have been identified as reservoirs for these viruses.

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[1]

- (ii) Suggest **two** reasons why viruses which are carried by bats may pass relatively easily to human populations.

1. \_\_\_\_\_

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2. \_\_\_\_\_

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[2]



Once a virus is transmitted to humans, it may mutate so that it can spread more easily to other humans. This could potentially cause a pandemic.

(d) (i) Define the term 'pandemic'.

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[2]

(ii) The viruses referred to in part (c) are retroviruses. State the type of genetic material contained within retroviruses and explain the significance of the enzyme reverse transcriptase in retroviruses.

Genetic material \_\_\_\_\_ [1]

Significance of enzyme \_\_\_\_\_

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[2]

(iii) State how an inhibitor of reverse transcriptase might help to prevent a pandemic.

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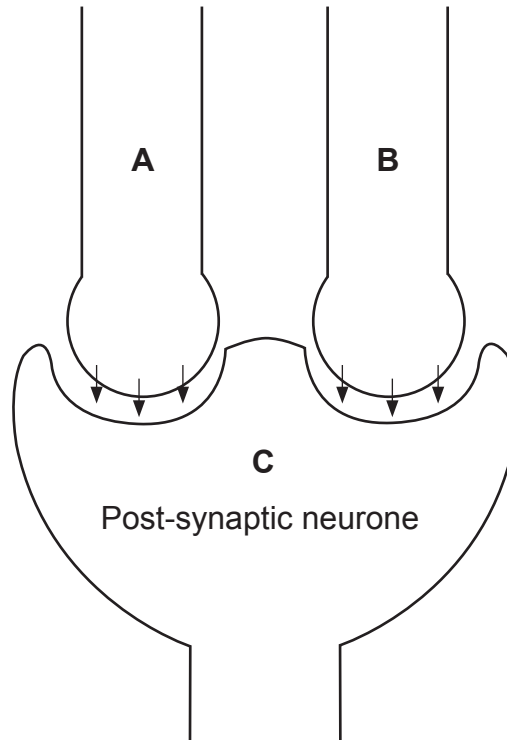
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- 7 Synapses allow coordination and integration in the nervous system. The diagram below shows how two neurones, **A** and **B**, synapse with a third neurone, **C**.

Neurone **A** releases the neurotransmitter acetylcholine and is excitatory. Neurone **B** releases a different neurotransmitter called GABA (gamma-aminobutyric acid) and is inhibitory. Neurone **C** is the post-synaptic neurone. Binding of GABA results in the movement of negative ions into the post-synaptic neurone.



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- (a) (i) Explain how the release of acetylcholine from neurone **A** causes an excitatory post-synaptic potential (EPSP) in the post-synaptic neurone **C**.

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[2]



(ii) Suggest why the arrival of an impulse in neurone **B** reduces the possibility of an EPSP forming in the post-synaptic neurone.

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[2]

(iii) The enzyme acetylcholinesterase acts in the synaptic cleft. Explain the role of this enzyme.

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[2]

[Turn over



DFP is a pesticide which interacts with the active site of acetylcholinesterase. It is a neurotoxin, causing paralysis and resulting in the death of an insect pest.

**(b) (i)** Suggest how DFP affects the post-synaptic neurone of an insect.

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[2]

DFP has been useful in controlling insect pest populations in the past. However, some populations now appear to have become resistant to DFP.

**(ii)** Explain how a population may become resistant to a pesticide such as DFP.

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[2]







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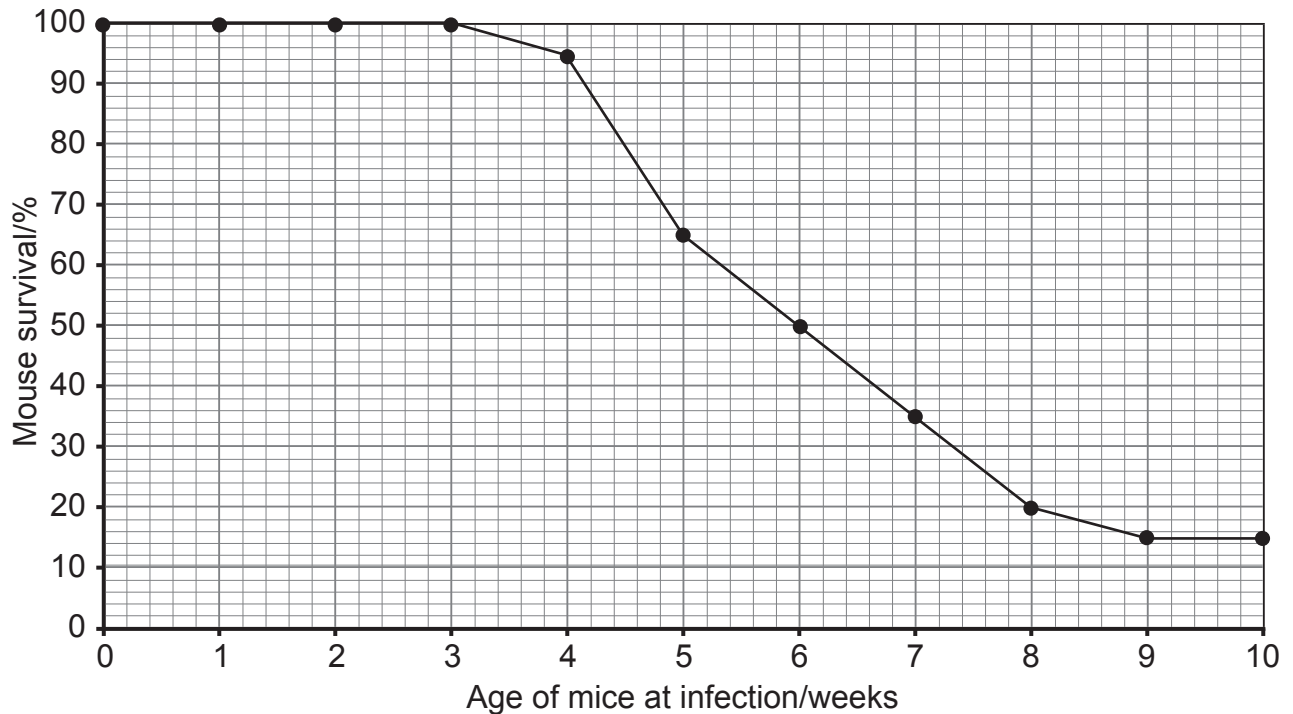
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\*40ABY1125\*

- 8 Young rabbits often die of a disease called rabbit haemorrhagic disease (RHD), caused by a virus. To learn more about this disease, young mice were used as models. Scientists investigated the survival rates of young mice following infection with the virus at different ages. The results are shown in the graph below.



- (a) (i) Given that young mice feed on milk produced by their mother, suggest a possible explanation for the high survival rates of mice infected during the three weeks following birth.

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[1]

- (ii) Suggest a reason why mice were used as disease models for this investigation.

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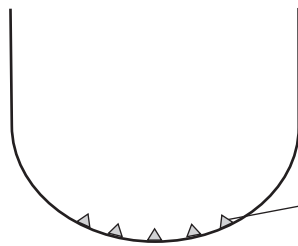
[1]





A test for RHD virus in rabbits detects the presence of RHD antibodies in the blood serum of infected rabbits. The technique is summarised below.

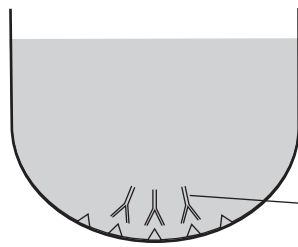
**Step 1**



Antigens are attached to the wall of a well (a small chamber)

antigen

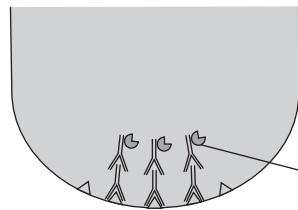
**Step 2**



Serum from a rabbit is added. If the serum contains RHD antibodies these will bind to the antigens

antibody

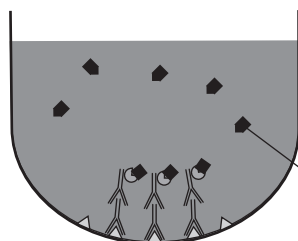
**Step 3**



A second antibody (with attached enzyme) is added and binds to the original RHD antibodies. The enzyme is only activated if the second antibodies are attached to RHD antibodies

antibody with attached enzyme

**Step 4**



A substrate is added which binds to activated enzymes and a coloured product is released

substrate

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(c) (i) Define the term antigen.

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[1]



- (ii) Describe and explain the result you would expect if the rabbit was **not** infected by the RHD virus.

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[3]

It is sometimes necessary to carry out a dilution of the serum sample using a buffer.

- (iii) Calculate the volume of undiluted serum in  $\mu\text{l}$  ( $1000 \mu\text{l} = 1 \text{ ml}$ ), which must be added to a buffer to give 10 ml of solution at a final dilution of 1/500. (Show your working.)

\_\_\_\_\_  $\mu\text{l}$  [2]

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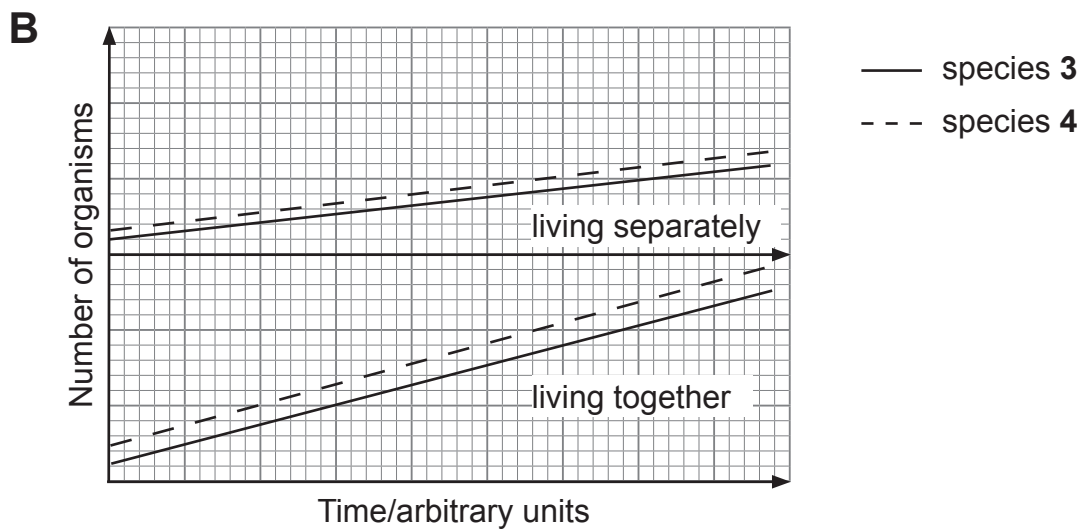
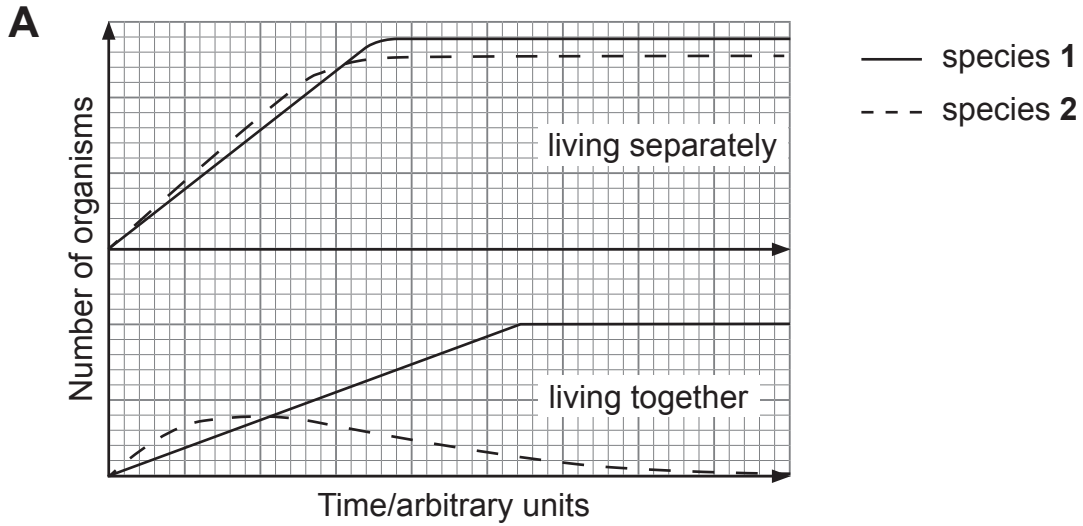


## Section B

Quality of written communication is assessed in this section.

9 The interactions of some populations are shown in graphs **A**, **B** and **C**.

Graphs **A** and **B** summarise the results of two separate investigations into the growth of populations of four different species, **1**, **2**, **3** and **4**.



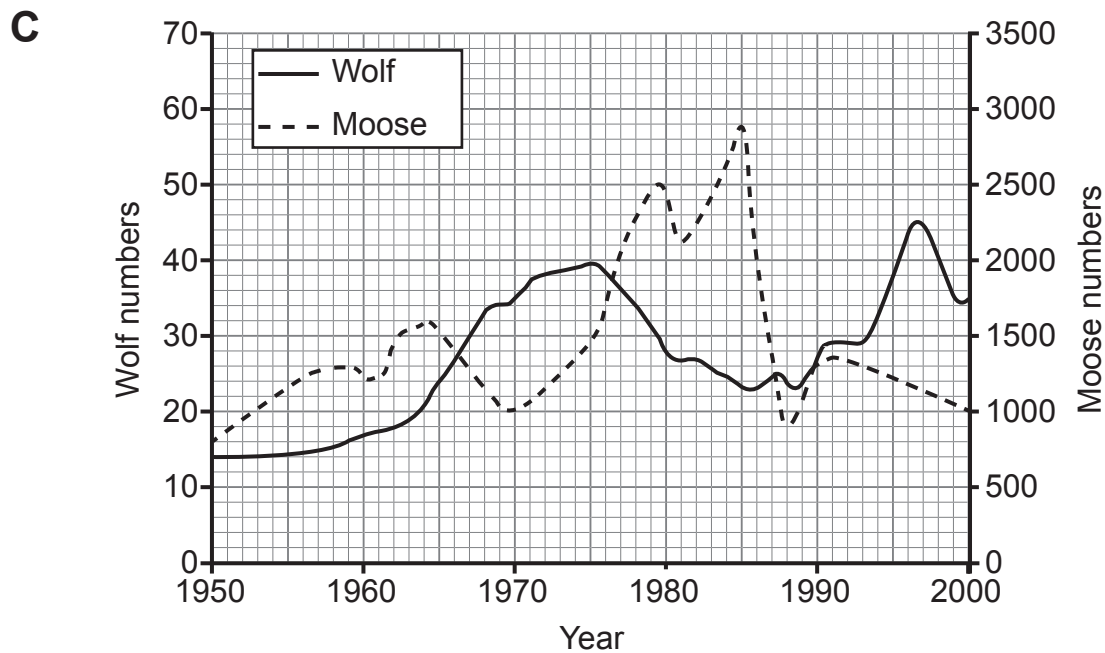
(a) Identify the population interactions shown in graph **A** and graph **B**. Explain reasons for your choices.

[9]





Graph C shows a predator–prey interaction.



© Wolves & Moose of Isle Royale

(b) Comment on the predator–prey interaction shown and contrast this type of interaction with grazing and with parasitism.

[9]

\_\_\_\_\_

(a) Identify the population interactions shown in graph A and graph B. Explain reasons for your choices.

Graph A \_\_\_\_\_

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Question Number	Marks
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<b>Total Marks</b>	
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Examiner Number

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