



Resources available from

**kickstart
tutors**

Student number

--	--	--	--	--

Name _____

Date _____

Attempt/Time taken _____

GCSE BIOLOGY

Topic Paper: 7.1 Adaptations, interdependence and competition
Part 2

Time allowed: 40 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
 - is clear, logical, sensibly structured
 - fully meets the requirements of the question
 - shows that each separate point or step supports the overall answer.



34 Marks



Q8. (a) Explain, as fully as you can, how natural selection leads to evolution.

.....

.....

.....

.....

.....

.....

.....

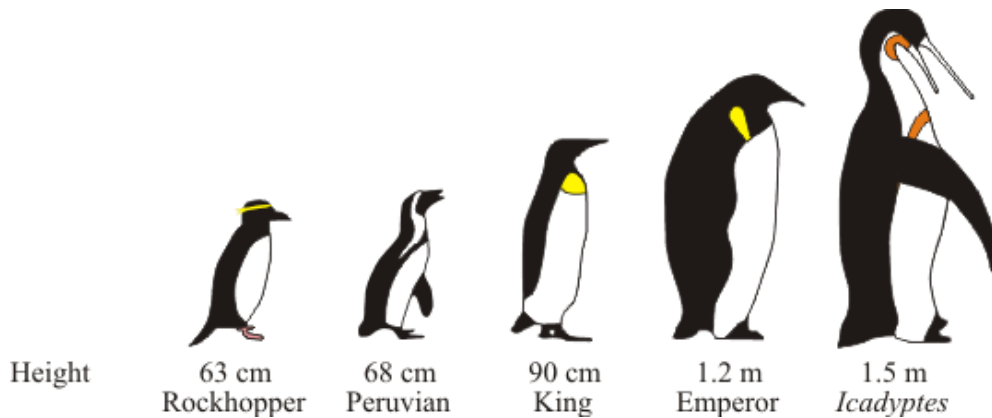
.....

(3)

(b) Most penguins live in cold climates. The modern penguin best adapted for cold conditions is the emperor penguin.

Scientists have found fossils of a 'giant' penguin which they have called *Icadyptes*.

The diagram shows how the size of modern penguins compares with *Icadyptes*.





The scientists were surprised to discover that *Icadyptes* lived in warm seas at a time when the Earth's climate was much warmer than it is now.

Explain why the scientists were surprised that *Icadyptes* lived in warm seas.

.....
.....
.....
.....
.....
.....
.....

(2)
(Total 5 marks)

Q9. The drawings show two different species of butterfly.



Amauris



Hypolimnas

Both species can be eaten by most birds.

Amauris has an unpleasant taste which birds do **not** like, so birds have learned **not** to prey on it.

Hypolimnas does **not** have an unpleasant taste but most birds do **not** prey on it.

(a) Suggest why most birds do **not** prey on *Hypolimnas*.

.....
.....
.....
.....

(2)



- (b) Suggest an explanation, in terms of natural selection, for the markings on the wings of *Hypolimnas*.

.....

.....

.....

.....

.....

.....

(3)
(Total 5 marks)

Q10. Squirrels live in woodland.

Table 1 shows:

- the total area of England, Scotland and Wales
- the area of different types of woodland in these countries.

Table 1

Country	Total area of country in thousands of km ²	Area of woodland in thousands of km ²		
		Coniferous woodland	Broadleaf woodland	Total
England	130	3.6	7.8	11.4
Scotland	79	10.4	3.0	13.4
Wales	21	1.9	0.9	2.8

- (a) Look at the data for the three countries. Estimate which country has the greatest proportion of its area suitable as a habitat for squirrels.

Support your answer with relevant figures.

.....

.....

.....

.....

.....

.....

(2)

- (b) The maps show the distribution of grey squirrels and red squirrels in England, Scotland and Wales.

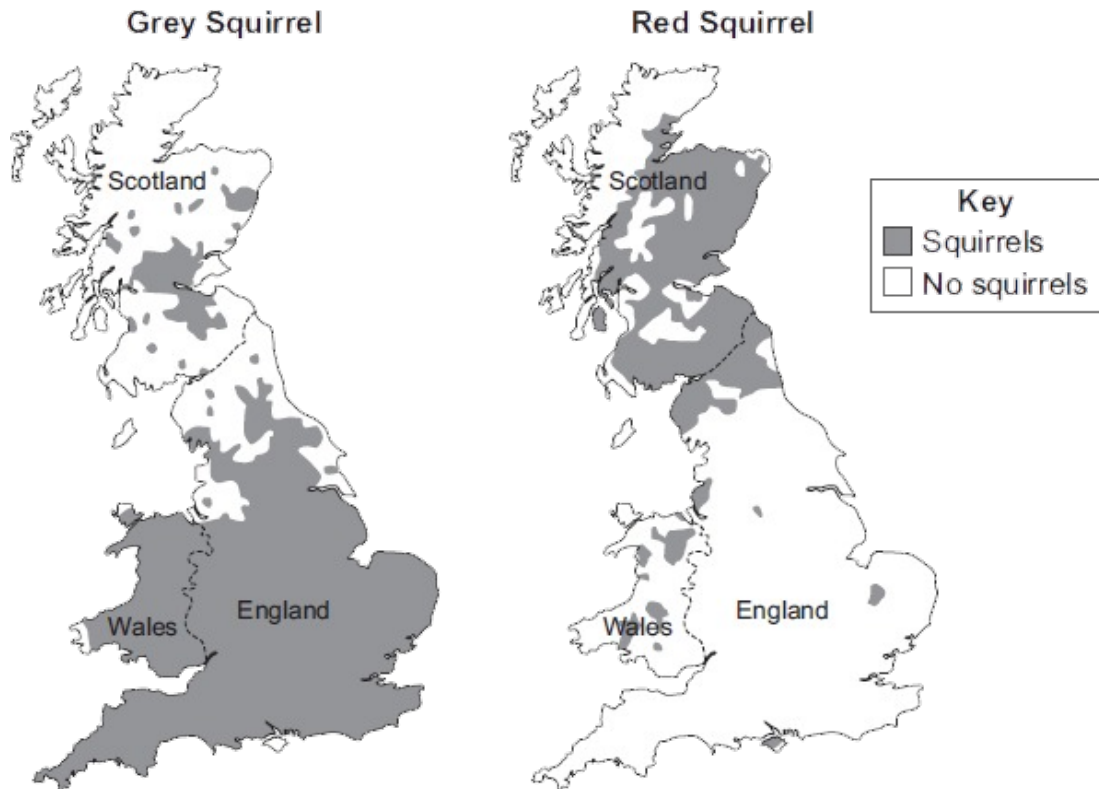


Image under Crown Copyright and courtesy of Pepper & Patterson, 2001.
Contains public sector information licensed under the Open Government Licence v1.0

Scientists suggested that the distribution of grey squirrels and red squirrels is linked to the type of trees in woodlands.

- (i) The information for England and Scotland supports this suggestion.

How?

.....
.....

(1)

- (ii) Give **one** piece of evidence that contradicts this suggestion.

.....
.....

(1)



- (c) Red squirrels are native to the UK.
Grey squirrels were introduced to the UK from the USA over 100 years ago.

Table 2 gives information about the two types of squirrel.

Table 2

	Grey squirrel	Red squirrel
Population in UK	2.5 million	140 000
Main food types	Seeds, nuts, tree bark, birds' eggs, young birds	Cones from coniferous trees, nuts, tree bark, berries
Health	Can become immune to parapox virus	Cannot become immune to parapox virus
Reproduction	Up to 9 young, twice a year	Up to 6 young, twice a year
Survival rate of young in mixed populations	41 %	14 %
Length of life	2 – 4 years	Up to 7 years

In most parts of the UK the population of grey squirrels is increasing, but the population of red squirrels is decreasing.

Suggest why.

Use information from **Table 2**.

.....

.....

.....

.....

.....

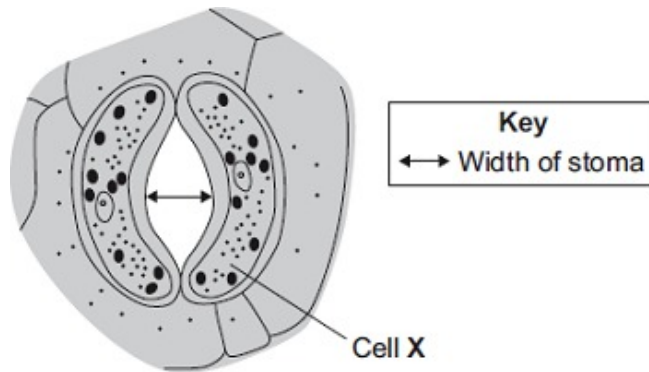
.....

.....

.....

(3)
(Total 7 marks)

Q11. Plant leaves have many stomata.
The diagram shows a stoma.



(a) Name cell **X**

(1)

(b) The table shows the mean widths of the stomata at different times of the day for two different species of plant.
Species **A** grows in hot, dry deserts.
Species **B** grows in the UK.

	Time of day in hours	Mean width of stomata as a percentage of their maximum width	
		Species A	Species B
Dark	0	95	5
	2	86	5
	4	52	6
Light	6	6	40
	8	4	92
	10	2	98
	12	1	100
	14	0	100
	16	1	96
	18	5	54
Dark	20	86	6
	22	93	5
	24	95	5



The data in the table show that species **A** is better adapted than species **B** to living in hot, dry deserts.

Explain how.

.....

.....

.....

.....

.....

.....

.....

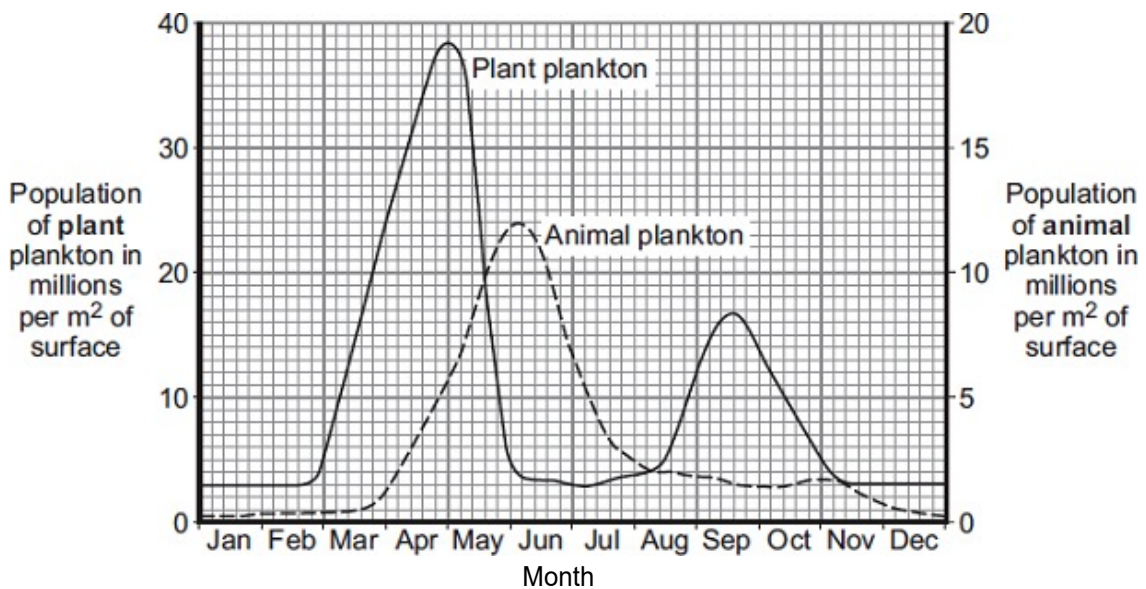
.....

(4)
(Total 5 marks)

Q12. Plankton live in the sea.
Animal plankton eat plant plankton.

Graph 1 shows how the populations of the plankton change through the year in the seas around the UK.

Graph 1



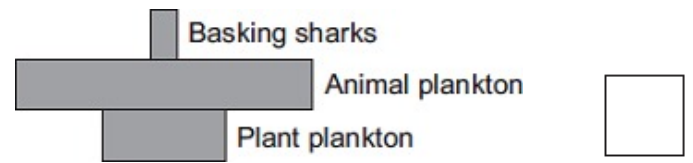
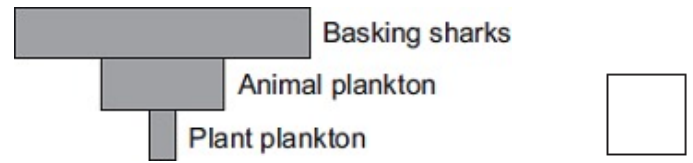
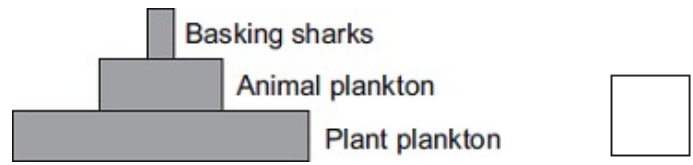
(a) Basking sharks eat animal plankton. Basking sharks grow up to 8 metres long.

Look at the diagram and **Graph 1**.

Which is the correct shape for the pyramid of biomass to show the relationship between plant plankton, animal plankton and basking sharks, in June?

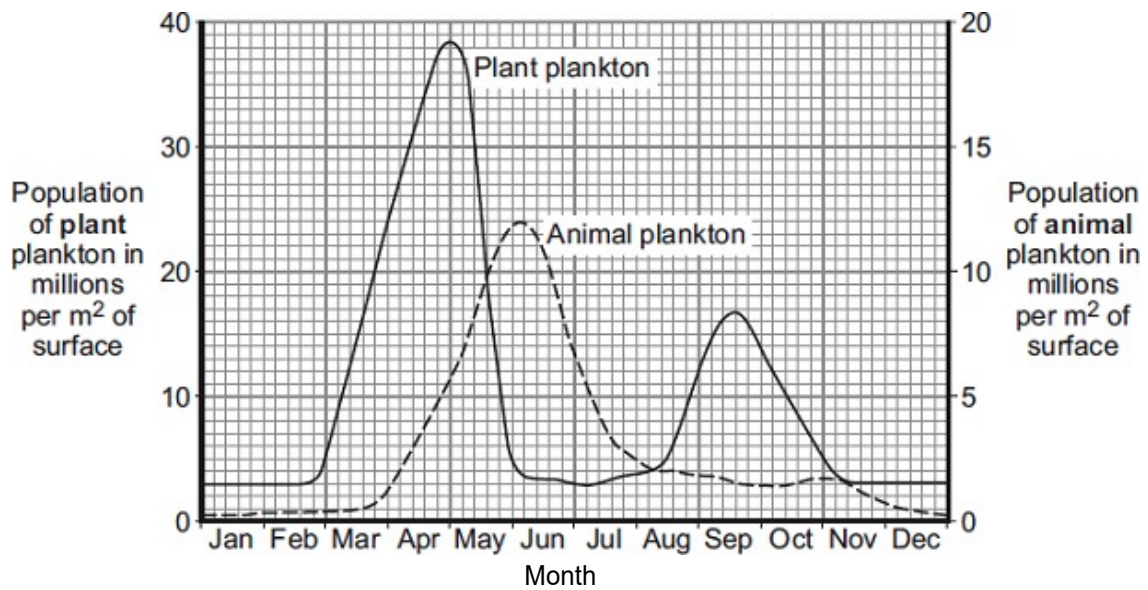


Tick (✓) one box.



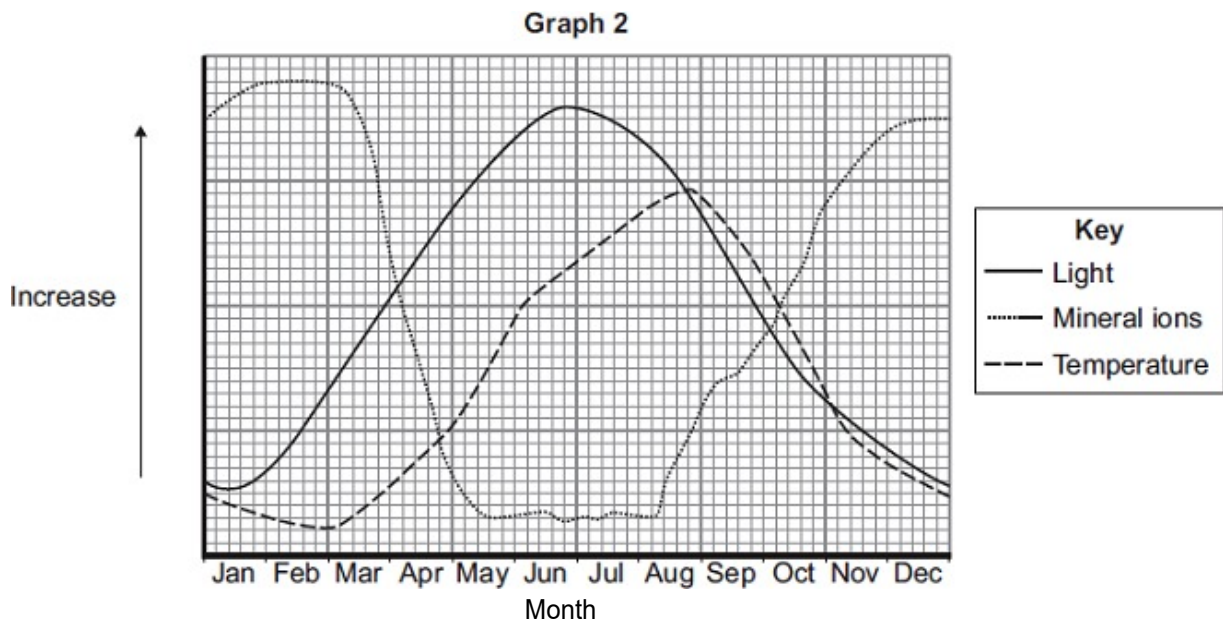
(1)

Graph 1 is repeated here to help you answer the following questions.





Graph 2 shows changes in some of the conditions in the upper layers of the sea around the UK.



(b) The population of plant plankton increases between February and April.

Suggest **one** reason for the increase.

Explain your answer.

.....

.....

.....

.....

(2)

(c) The population of animal plankton changes between April and July.

Suggest explanations for the changes.

.....

.....

.....

.....

.....

(2)



- (d) The concentration of mineral ions changes between February and December.
Suggest explanations for the changes.

.....

.....

.....

.....

.....

.....

.....

(3)
(Total 8 marks)