

Organisation of an Ecosystem

Question Paper 1

Level	GCSE (9-1)
Subject	Combined Science – Trilogy - Biology
Exam Board	AQA
Topic	4.7 Ecology
Sub-Topic	Organisation of an Ecosystem
Difficulty Level	Gold Level
Booklet	Question Paper 1

Time Allowed: 59 minutes

Score: / 59

Percentage: /100

Grade Boundaries:

Q1. The UK contains large areas of peat bogs that have been present for thousands of years.

- (a) Peat is removed from peat bogs.

The peat can be mixed with air and added to garden compost.

The release of carbon dioxide from peat is a problem.

Give **two other** reasons why gardeners should use less peat-based compost in the future.

1

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(2)

- (b) Explain why mixing peat with air leads to the release of carbon dioxide.

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(4)

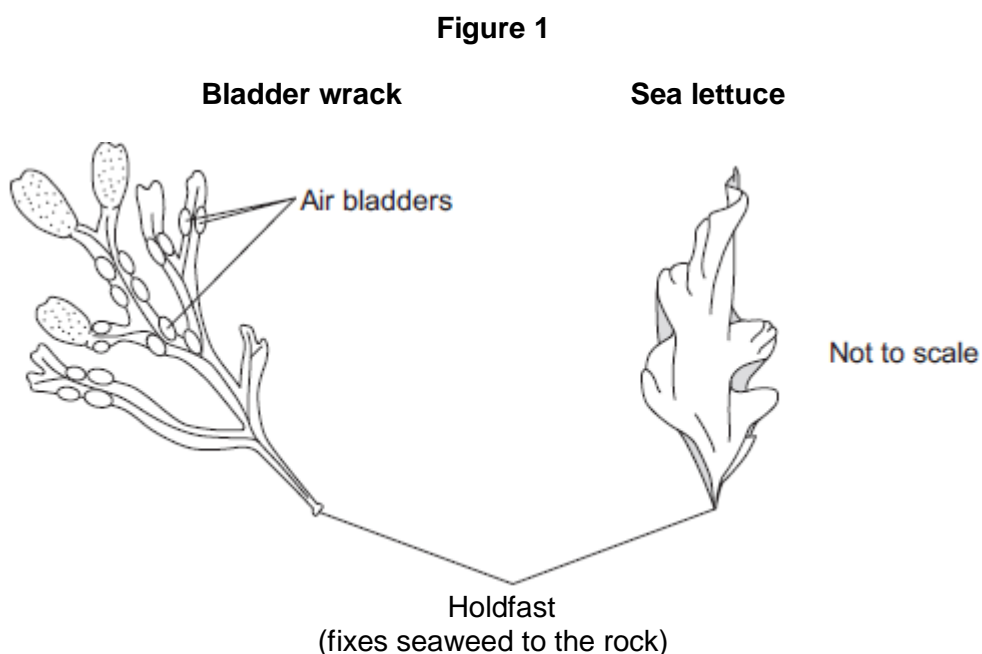
(Total 6 marks)

Q2. At the seashore, the tide comes in and goes out twice each day.

Some students investigated whether two different species of seaweed could live only at certain positions on a rocky shore.

Seaweeds are plant-like organisms that make their food by photosynthesis.

Figure 1 shows the two species of seaweed that the students investigated.



(a) The students:

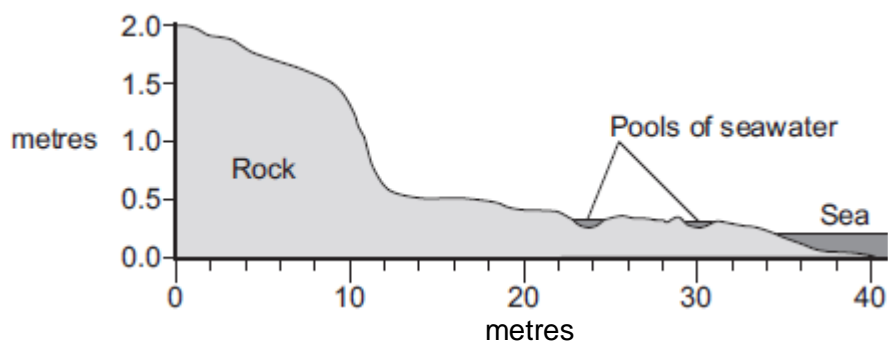
- 1 placed a 50-metre tape measure on the rocks at right angles to the sea
- 2 placed a quadrat next to the tape measure
- 3 recorded whether each species was present or not.

The students repeated steps 2 and 3 every metre down the shore.

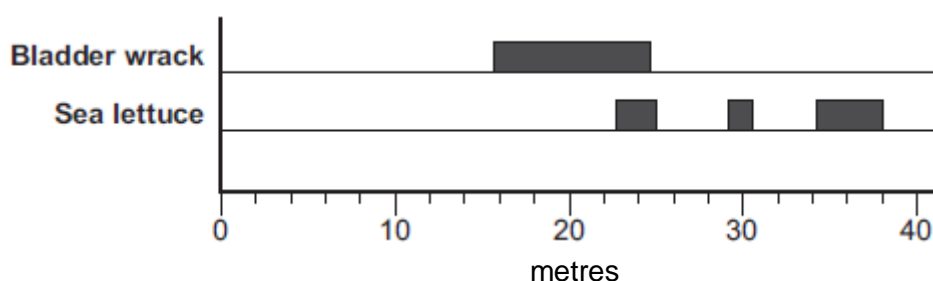
Figure 2 shows a section of the seashore and the students' results.

Figure 2

Section of the seashore



Students' results



- (i) The students placed the quadrat at regular intervals along a transect line rather than placing the quadrat at random positions anywhere on the rocky shore.

Explain why.

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(2)

- (ii) How could the students have improved their investigation to ensure that they produced valid data?

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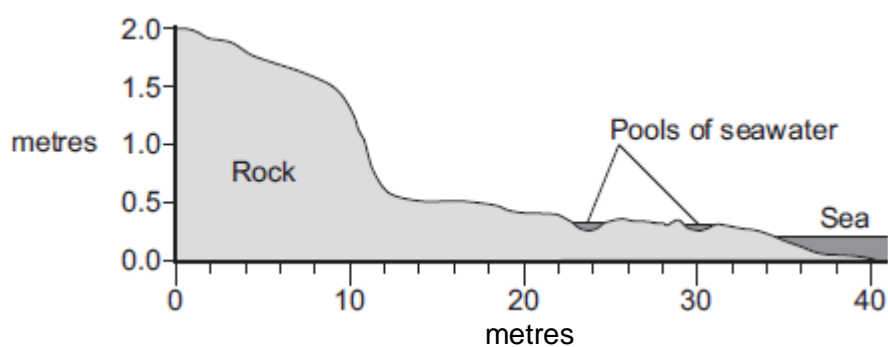
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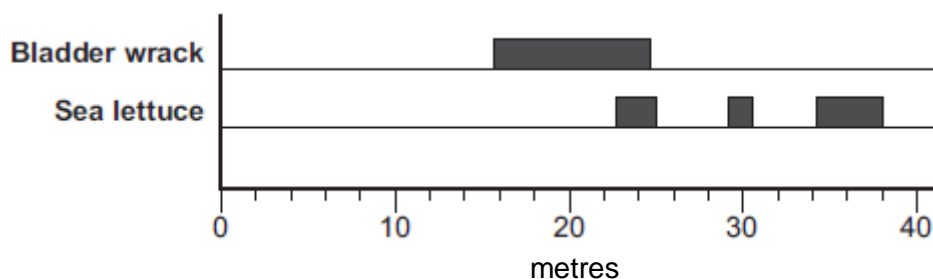
- (iii) **Figure 2** is repeated here to help you answer this question.

Figure 2

Section of the seashore



Students' results



The students concluded that bladder wrack is better adapted than sea lettuce to survive in dry conditions.

What is the evidence for this conclusion?

Use information from **Figure 2**.

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(2)

- (b) The bladder wrack has many air bladders.
The air bladders help the bladder wrack to float upwards when the sea covers it.

Suggest how this helps the bladder wrack to survive.

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(2)

(Total 8 marks)

Q3. On a rocky shore, when the tide goes in and out, organisms are exposed to the air for different amounts of time.

- (a) On hot, windy days when the tide is out the concentration of the salt solution in rock pools may become very high.

What term is used to describe organisms that can survive in severe conditions such as very high concentrations of salt solution?

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(1)

- (b) Periwinkles are types of snail.
Students surveyed the different types of periwinkle living on a rocky shore.

The diagram shows the results of the students' survey.

The highest position that the sea water reaches on the shore is called the high tide level.

Each bar represents the range of habitats for each type of periwinkle.

Position on shore	Small periwinkle	Rough periwinkle	Common periwinkle	Flat periwinkle
<p>High tide level</p> <p>↓</p> <p>Low tide level</p>	I	I	I	I

- (i) Which **two** types of periwinkle are likely to compete with each other to the greatest extent?

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(1)

- (ii) Explain your answer to part (b)(i).

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(1)

- (iii) The small periwinkle can survive much nearer to the high tide level than the flat periwinkle.

Suggest **two** reasons why the flat periwinkle cannot survive near to the high tide level.

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2.....

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(2)

(Total 5 marks)

Q4.The photographs show four different species of bird.

Great tit



© JensGade/iStock

Blue tit



© Marcobarone/iStock

Coal tit



© MikeLane45/iStock

Long-tailed tit



© Andrew Howe/iStock

The table gives information about the four species of bird in winter.

Bird species	Mean body mass in grams	Mean energy needed in kJ per day	Mean percentage of day spent feeding
Great tit	21	84.2	75
Blue tit	12	62.4	81
Coal tit	9	49.5	88
Lond-tailed tit	7	42.0	92

- (a) (i) Calculate the energy needed per day per gram of body mass for the blue tit.

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Answer = kJ per day per gram of body mass

(2)

- (ii) Describe the trend for energy needed per day per gram of body mass for the

four species of bird.

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(1)

(iii) Suggest an explanation for the trend you have described in part (a)(ii).

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(2)

(b) Describe and explain the trend shown by the data for the time spent feeding in winter for the birds.

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(2)

(Total 7 marks)

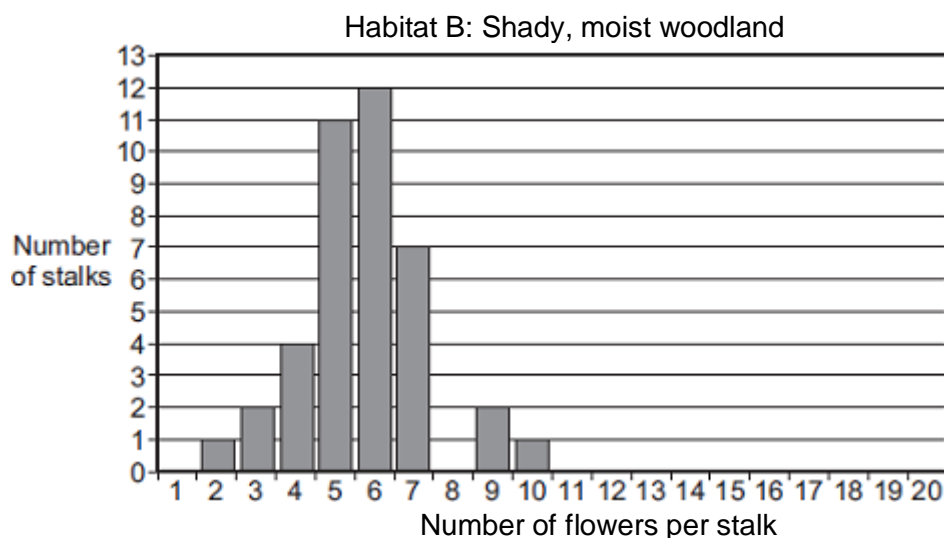
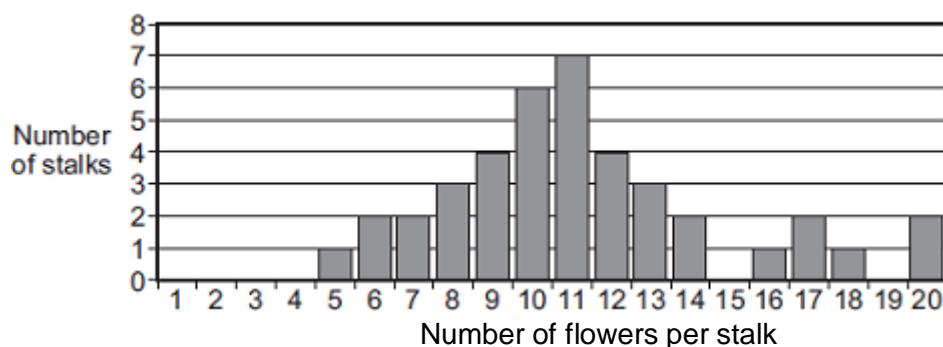
Q5.Some students studied bluebell plants growing in two different habitats.

Habitat **A** was a sunny field next to woodland.

Habitat **B** was a shady, moist woodland.

A bluebell plant can have several flowers on one flower stalk. The students counted the number of flowers on each of 40 bluebell flower stalks growing in each habitat. The bar charts show the results.

Habitat A: Sunny field next to woodland



- (a) The students wanted to collect valid data.
Describe how the students should have sampled the bluebell plants at each habitat to collect valid data.

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(2)

- (b) (i) The students used the bar charts to find the mode for the number of flowers per stalk in the two habitats.

The mode for the number of flowers per stalk in habitat **A** was 11.

What was the mode for the number of flowers per stalk in habitat **B**?

Mode =

(1)

- (ii) The students suggested the following hypothesis:

‘The difference in the modes is due to the plants receiving different amounts of sunlight.’

Suggest why.

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(2)

- (iii) Suggest how the students could test their hypothesis for the two habitats.

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(2)

- (c) Suggest how receiving more sunlight could result in the plants producing more flowers per stalk.

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(2)

(Total 9 marks)

Q6. Human activities affect the environment.

- (a) Deforestation results in an increase in carbon dioxide levels in the atmosphere.

Give **two** reasons why.

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(2)

- (b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

A dairy farmer washes out his cow shed each day. The waste water contains urine and faeces. The waste water overflows into a stream by mistake.

The waste water will have an effect on the plants and invertebrates living in the stream.

Explain why.

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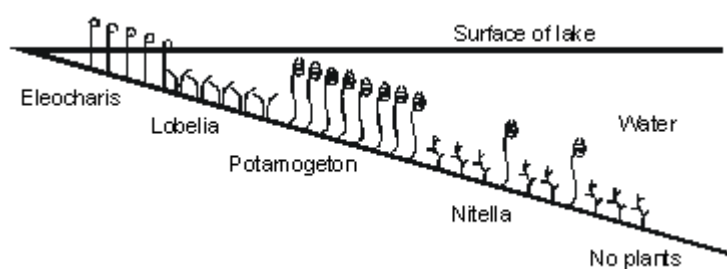
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(6)
(Total 8 marks)

- Q7.** This is a diagram of a belt transect showing the major types of plants growing on the bottom of a lake.



- (a) Suggest, and explain, **two** reasons why a much smaller population of Nitella plants is found amongst the Potamogeton plants than further down in the lake.

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(4)

- (b) Describe how you would use the belt transect technique to measure the abundance and distribution of plants which live on the bottom of a shallow lake.

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(3)
(Total 7 marks)

Q8. Read the passage.



Glutton up a gum tree

Along the banks of the Cygnet River on Kangaroo Island, the branches of the dying gum trees stretch out like accusing fingers. They have no leaves. Birds search in vain for nectar-bearing flowers.

The scene, repeated mile upon mile, is an ecological nightmare. But, for once, the culprit is not human. Instead, it is one of the most appealing mammals on the planet – the koala. If the trees are to survive and provide a food source for the wildlife such as koalas that depend on them, more than 2000 koalas must die. If they are not removed the island's entire koala population will vanish.

Illegal killing has already started. Worried about soil erosion on the island, some farmers have gone for their guns. Why not catch 2000 koalas and take them to the mainland? "Almost impossible," says farmer Andrew Kelly. "Four rangers tried to catch some and in two days they got just six, and these fought, bit and scratched like fury."

Use the information from the passage and your own knowledge and understanding to give the arguments for and against killing koalas to reduce the koala population on Kangaroo Island.

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(Total 4 marks)

Q9. Read the passage.



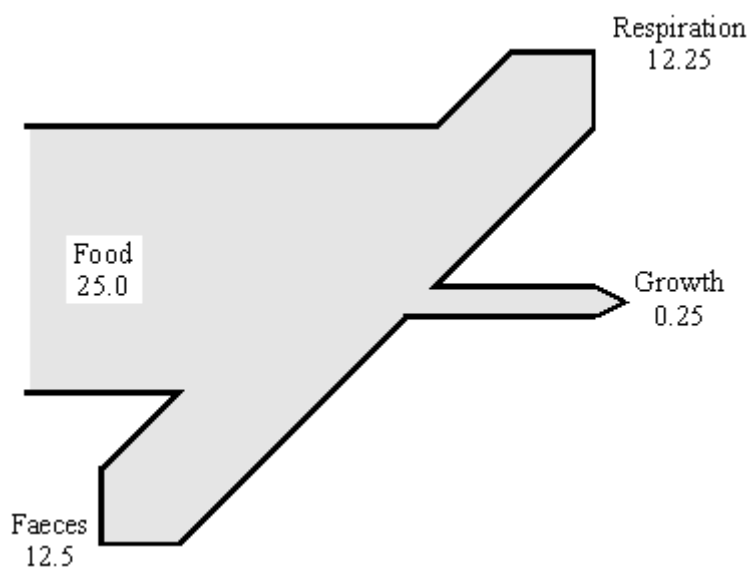
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The diagram shows the flow of energy through a koala.
The numbers show units of energy.



- (i) Calculate the percentage of the food intake which is converted into new tissues for growth. Show your working.

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(2)

- (ii) Give **three** different ways in which the koala uses the energy released in respiration.

1

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2

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3

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(3)
(Total 5 marks)

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