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Pearson Edexcel International GCSE

Centre Number	Candidate Number
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Biology

Unit: 4BI0

Paper: 2B

Monday 11 June 2018 – Morning Time: 1 hour	Paper Reference 4BI0/2B
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You must have: Calculator Ruler	Total Marks
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Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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Answer ALL questions.

- 1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Desert plants

Desert plants are adapted to survive extremes of temperature and dryness. Some plants have structural adaptations and some plants use physiological mechanisms. Plants that have these features are called xerophytes.

- 5 Xerophytes, such as cacti, usually have methods of storing and conserving water. Cacti often have few or no leaves. They use chlorophyll in the outer tissue of their stems to produce carbohydrates by photosynthesis. Spines protect the plant from animals and shade it from the Sun. Extensive shallow root systems spread out just beneath the surface of the soil allowing quick absorption of large quantities of water when it rains. Because cacti store water in the centre of their stems and roots, they are well-suited to dry climates and can survive years of drought using the water collected from a single rainfall.

Some trees and shrubs are also adapted for life in deserts. They have very small leaves and thorns. Phreatophytes are plants that have adapted to very dry environments by growing extremely long roots.

- 15 Other desert plants use physiological mechanisms and have developed a lifestyle that fits in with the seasons of greatest moisture and coolest temperatures. These plants are annuals, plants that live for only one year.

- 20 Most annual desert plants germinate only after heavy seasonal rain and then complete their reproductive cycle very quickly. They flower for a few weeks in the spring. These plants are responsible for most of the annual increase in wildflower populations in deserts. Their heat-resistant and drought-resistant seeds then remain dormant in the soil until it rains again the following year.

- 25 Desert perennials are plants that live for several years. They survive by remaining dormant during dry periods of the year, then springing to life when water is available.

- 30 Some perennial plants use dormancy to survive drought by producing bulbs. The tops of these bulbs dry out completely and leave no trace of their existence above ground during dormant periods. They are able to store enough food to survive for long periods in poor soils. The Desert Lily, also known as the Ajo, has a bulb that is found at a depth of 50 cm or more. Winter rains can provide sufficient water to stimulate the bulb to grow after years of dormancy. Bulbs enable reproduction. Small bulbs grow on the side of a larger bulb and separate to produce new plants.

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(a) Explain how having few or no leaves helps cacti to reduce water loss (line 5).

(2)

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(b) Suggest how a desert plant may benefit from having extremely long roots (line 14).

(1)

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(c) Many desert trees or shrubs have very small leaves (lines 12 and 13).

(i) Explain why having small leaves would be a disadvantage for non-desert plants.

(2)

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(ii) Suggest why having small leaves is less of a disadvantage for desert plants.

(1)

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(d) Seeds remain dormant in the soil until it rains (line 22).

(i) Describe how rain enables germination to take place.

(2)

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(ii) Give two other conditions that are needed for germination to take place.

(2)

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(e) Suggest a reason why annual desert plants need to complete their reproductive cycle very quickly (lines 18 and 19).

(1)

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(f) Some plants, such as the Desert Lily, reproduce using bulbs (lines 32 and 33).

(i) Name this type of reproduction.

(1)

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(ii) Suggest an advantage of using this type of reproduction in the desert.

(1)

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(iii) Name another organ used in this type of reproduction.

(1)

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(Total for Question 1 = 14 marks)

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2 Waste water may contain sewage.

(a) What is meant by the term **sewage**?

(1)

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(b) Explain the consequences of sewage pollution in rivers.

(3)

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(Total for Question 2 = 4 marks)

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3 The photograph shows the flower of a species of chrysanthemum plant that only grows in East Africa.



©source KENPEI's photo

(a) Cells in these plants produce a natural pesticide called pyrethrin.

Suggest why cells in these plants produce a pesticide.

(2)

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(b) Scientists have grown genetically modified yeast cells in fermenters to produce large quantities of pyrethrin.

(i) Explain how yeast cells can be genetically modified to produce pyrethrin.

(3)

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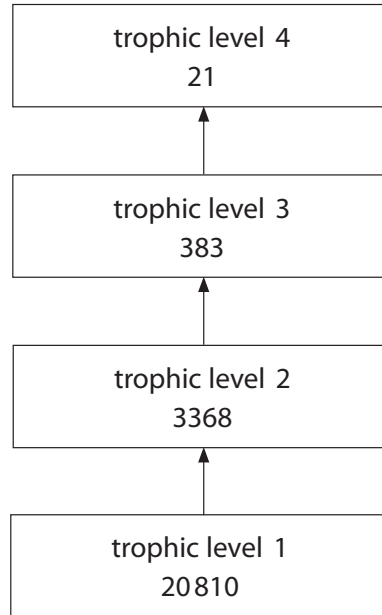
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4 The diagram shows the flow of energy through a food chain.

The numbers show the chemical energy contained in all the organisms at each trophic level in kJ per m² per year.



The energy contained at each trophic level is in the form of chemical energy.

(a) The organisms at trophic level 1 are plants.

Name two carbohydrates in plants that store chemical energy.

(2)

1

2

(b) The organisms at trophic level 4 are called tertiary consumers.

Give the name that describes the organisms at trophic level 3.

(1)

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(c) (i) Calculate the percentage of energy transferred from the plants to the tertiary consumers.

Show your working.

(2)

percentage of energy transferred =

(ii) Explain why not all of the energy contained in the plants is transferred to the tertiary consumers.

(3)

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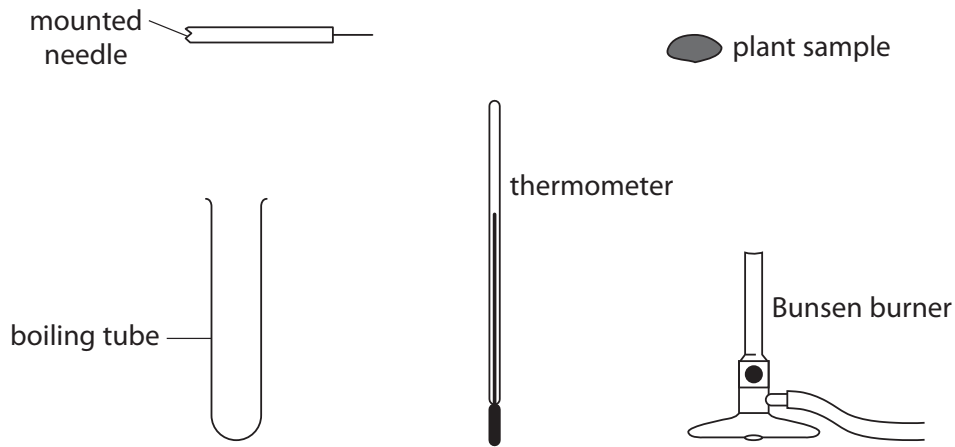
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(d) A student uses this apparatus to find the energy content of the plants.



Explain how the student could use this apparatus to find the energy content of the plants.

(5)

Area for writing the answer, consisting of multiple horizontal dotted lines.

(Total for Question 4 = 13 marks)



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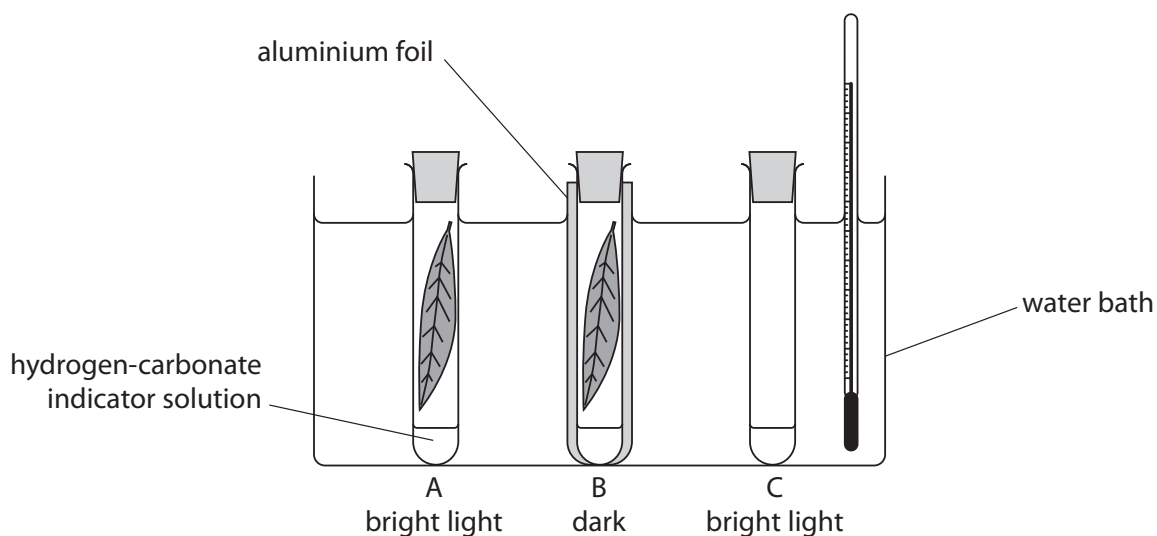
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5 A student investigates how light affects photosynthesis by looking at changes in carbon dioxide levels.

The student uses this method.

- Step 1 Place 2 cm³ of orange hydrogen-carbonate indicator solution into each of three test tubes, A, B and C.
- Step 2 Put a leaf in tube A and a leaf in tube B.
- Step 3 Wrap tube B in aluminium foil.
- Step 4 Seal all three tubes with bungs.
- Step 5 Place the tubes in a water bath for two hours.



(a) (i) Explain the purpose of tube C.

(2)

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(ii) Why is it necessary to measure the temperature of the water bath?

(1)

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(iii) Name the independent variable in this investigation.

(1)

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(b) The table shows the student's results.

Test tube	Colour of indicator solution at start	Colour of indicator solution after two hours
A	orange	red
B	orange	yellow
C	orange	orange

(i) Explain the change in colour of the indicator in tube A.

(2)

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(ii) Explain the change in colour of the indicator in tube B.

(2)

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(c) Suggest a different method that the student could use to show that light affects photosynthesis in leaves.

(4)

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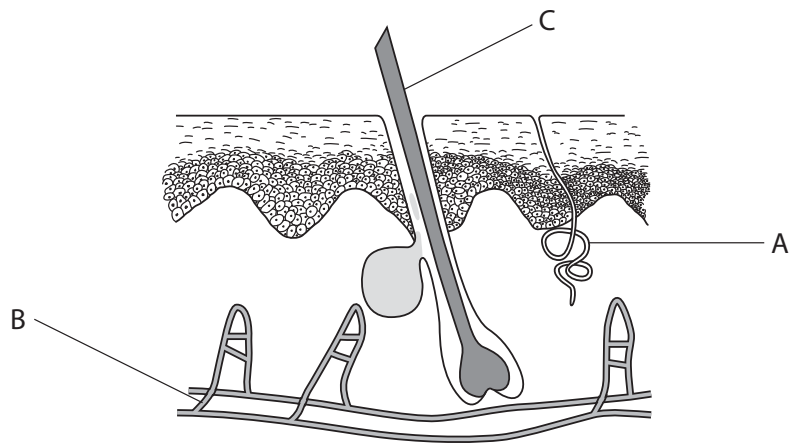
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(Total for Question 5 = 12 marks)



6 The diagram shows a section through the skin.



(a) Name the structures labelled A, B and C.

(3)

A

B

C

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