

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
TWENTY FIRST CENTURY SCIENCE  
BIOLOGY A**

**A223/02**

Unit 3: Ideas in Context plus B7 (Higher Tier)

**Wednesday 15 June 2011  
Morning**

**Duration: 1 hour**

Candidates answer on the question paper.  
A calculator may be used for this paper.

**OCR supplied materials:**

- Insert (inserted)

**Other materials required:**

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**MODIFIED LANGUAGE**

**INSTRUCTIONS TO CANDIDATES**

- The insert will be found in the centre of this document.
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **55**.
-  Where you see this icon you will be awarded a mark for the quality of written communication in your answer.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

**1 This question is based on the article ‘Anti-wrinkle cream causes stampede at shops’.**

Use the information in the article to answer this question.

**(a)** The anti-wrinkle cream contains different substances.

**(i)** It is not possible to say which of these substances is the effective ingredient.

Explain why it is not possible to say which is the effective ingredient.

.....  
..... [1]

**(ii)** Explain how the scientists should extend the study to find out which is the effective ingredient.

.....  
..... [1]

**(b)** Look at the pictures of the eyes in the article.

Suggest **two** reasons why you can **not prove** that the anti-wrinkle cream works just by looking at these pictures.

1 .....  
2 ..... [2]

**(c)** The research was funded by the manufacturer of the anti-wrinkle cream.

Suggest how funding by the manufacturer could have affected the findings of the research.

.....  
.....  
..... [2]

(d) Look at the comments made by the three members of the public.

(i) Use information in the article to suggest why **Peter's** comment is incorrect.

.....  
..... [2]

(ii) In what way has **Wendy** not understood the results of the trial?

.....  
.....  
..... [2]

(iii) Suggest why **Sue** may have wasted her money.

.....  
..... [1]

(e) Ageing skin and sun-damaged skin become wrinkled.

Suggest a mechanism to explain how this might happen.

.....  
.....  
..... [2]

[Total: 13]

2 Nearly all living organisms are ultimately dependent on a single source of energy.

(a) Put a ring around the correct ultimate source of energy for nearly all living organisms.

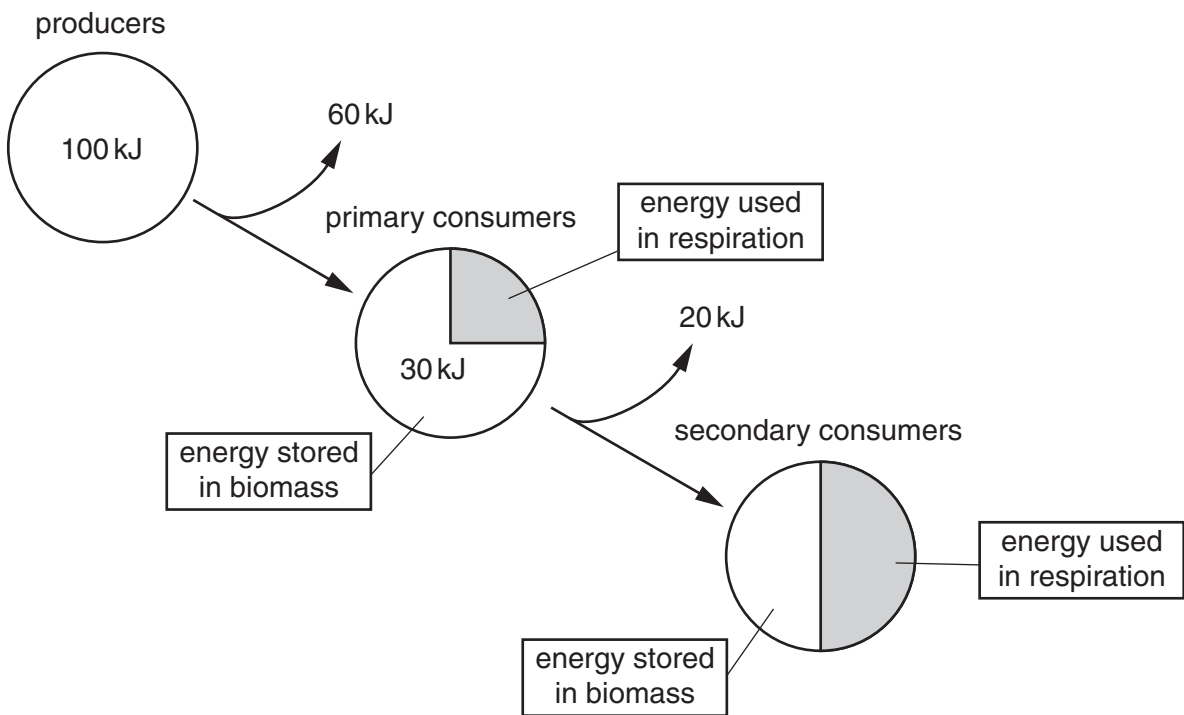
the Moon    other animals    the sea    the Sun    other plants    [1]

(b) Both autotrophs and heterotrophs are found in an ecosystem.

Explain how an **autotroph** is different from a heterotroph.

.....  
 ..... [2]

(c) The pie charts show how 100 kJ of energy is transferred through a food chain.



- (i) What percentage of the energy in the producers is used in respiration in the primary consumers?

Show your working.

answer = ..... % [2]

- (ii) Energy is transferred from the producers to the biomass of the secondary consumers.

What is the energy efficiency of this transfer?

answer = ..... % [1]

- (d) Describe ways in which energy is lost from a food chain.



One mark is for correct spelling, punctuation and grammar.

.....

.....

.....

..... [3+1]

[Total: 10]

3 Plants produce glucose by photosynthesis.

(a) Although plants produce glucose they convert it into starch.

Explain why plants convert glucose into starch.

.....  
 .....  
 ..... [2]

(b) Plants can convert starch into proteins by the addition of nitrogen from nitrates.

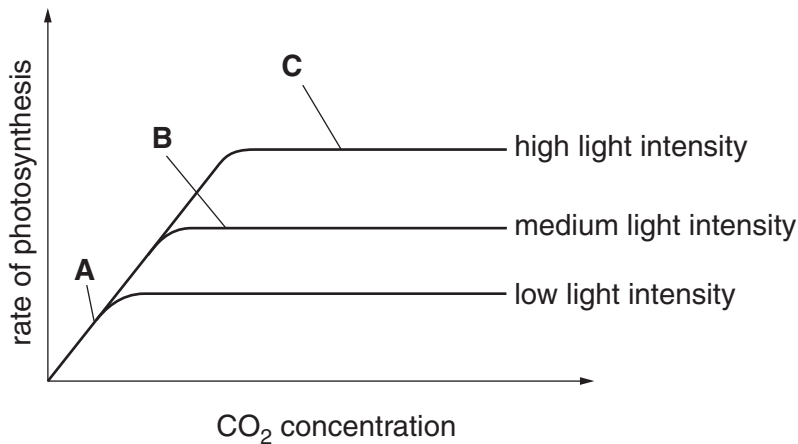
Plants absorb nitrates from the soil by **active transport**.

Explain what is meant by active transport.

.....  
 .....  
 ..... [2]

(c) The production of glucose by photosynthesis is affected by limiting factors.

Look at the graph.



(i) What is the limiting factor at **A**?

..... [1]

(ii) What is the limiting factor at **B**?

..... [1]

(iii) What **other** factor is most likely to be limiting at **C**?

..... [1]

[Total: 7]

4 Symbiosis, commensalism and parasitism are all examples of types of relationships between organisms.

(a) Explain what is meant by symbiosis and commensalism.

symbiosis .....

.....

commensalism .....

.....

[2]

(b) Parasitism is a close relationship between the parasite and its host.

Explain the effect of this relationship on the **parasite** and its **host**.

.....

.....

..... [2]

(c) *Plasmodium* is the parasite that causes malaria.  
*Plasmodium* has certain features that allow it to be successful.

For one **other** named parasite, explain a feature that allows it to be successful.

name of parasite .....

feature .....

explanation .....

..... [3]

(d) Carriers of sickle-cell anaemia have some protection from malaria.

(i) Describe the symptoms of sickle-cell anaemia.

.....

..... [2]

(ii) Explain why **carriers** of sickle-cell anaemia do not have the full symptoms of the condition.

.....

..... [2]

[Total: 11]

Turn over

5 Jessica is training for the London Olympics.



(a) Jessica’s muscles respire both aerobically and anaerobically when she is exercising.

Describe **three** ways in which aerobic respiration is different from anaerobic respiration.

**difference 1** .....

.....

**difference 2** .....

.....

**difference 3** .....

.....

[3]

(b) Anaerobic respiration can lead to an oxygen debt.

Explain what is meant by an oxygen debt.

.....

.....

.....

.....

[2]

[Total: 5]



6 Human blood groups can be **A**, **B**, **AB** or **O**.

(a) Complete these sentences about the inheritance of blood groups.

Choose words from this list.

- one      three      four      five**  
**co-dominant      dominant      opposite      recessive**

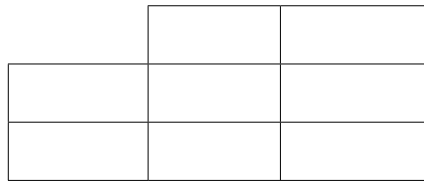
Human **ABO** blood type is determined by ..... gene(s) with  
..... possible allele(s).

**A** and **B** are .....

**O** is ..... to both **A** and **B**. [4]

(b) A person who has blood group **AB** marries a person who has blood group **O**.

(i) Complete this genetic diagram to show possible genetic combinations of any children that they might have.



[3]

(ii) Write down the possible **blood groups** of their children.

..... [2]

[Total: 9]

**END OF QUESTION PAPER**

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