First Variant Question Paper

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7692322713

BIOLOGY **0610/31**

Paper 3 Extended **October/November 2008**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
Total	

This document consists of **13** printed pages and **3** blank pages.

For Examiner's Use

1 The freshwater mussel, *Margaritifera margaritifera*, is a mollusc which lives in rivers and streams.

When the mussel reproduces, gametes are released into the water and fertilisation takes place.

The embryos, in the form of larvae, attach themselves to the gills of fish and develop there for a few months.

The larvae then release themselves and grow in sand in the river, feeding by filtering food from the water.

The number of mussels is falling due to human predation and the species is threatened with extinction.

(a) The mussel belongs to the group known as the molluscs. State two features you would expect the mussel to have.

1. .....

2. ..... [2]

(b) Explain how the species name of the freshwater mussel can be distinguished from its genus.

.....

..... [1]

(c) State the type of reproduction shown by the mussel.

Explain your answer.

type of reproduction .....

explanation .....

..... [2]

(d) **(i)** Fish gills have the same function as lungs. Suggest **one** advantage to a mussel larva of attaching itself to fish gills.

.....

..... [1]

(ii) The mussel develops on the fish gills. Define the term *development*.

.....

..... [1]

(e) The mussel is threatened with extinction. Name another organism which is also threatened with extinction and outline how it could be conserved.

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name of species .....

outline of conservation .....

.....

..... [3]

[Total: 10]

2 Fig. 2.1 shows crop productivity for a range of plants but the bar graph is incomplete.

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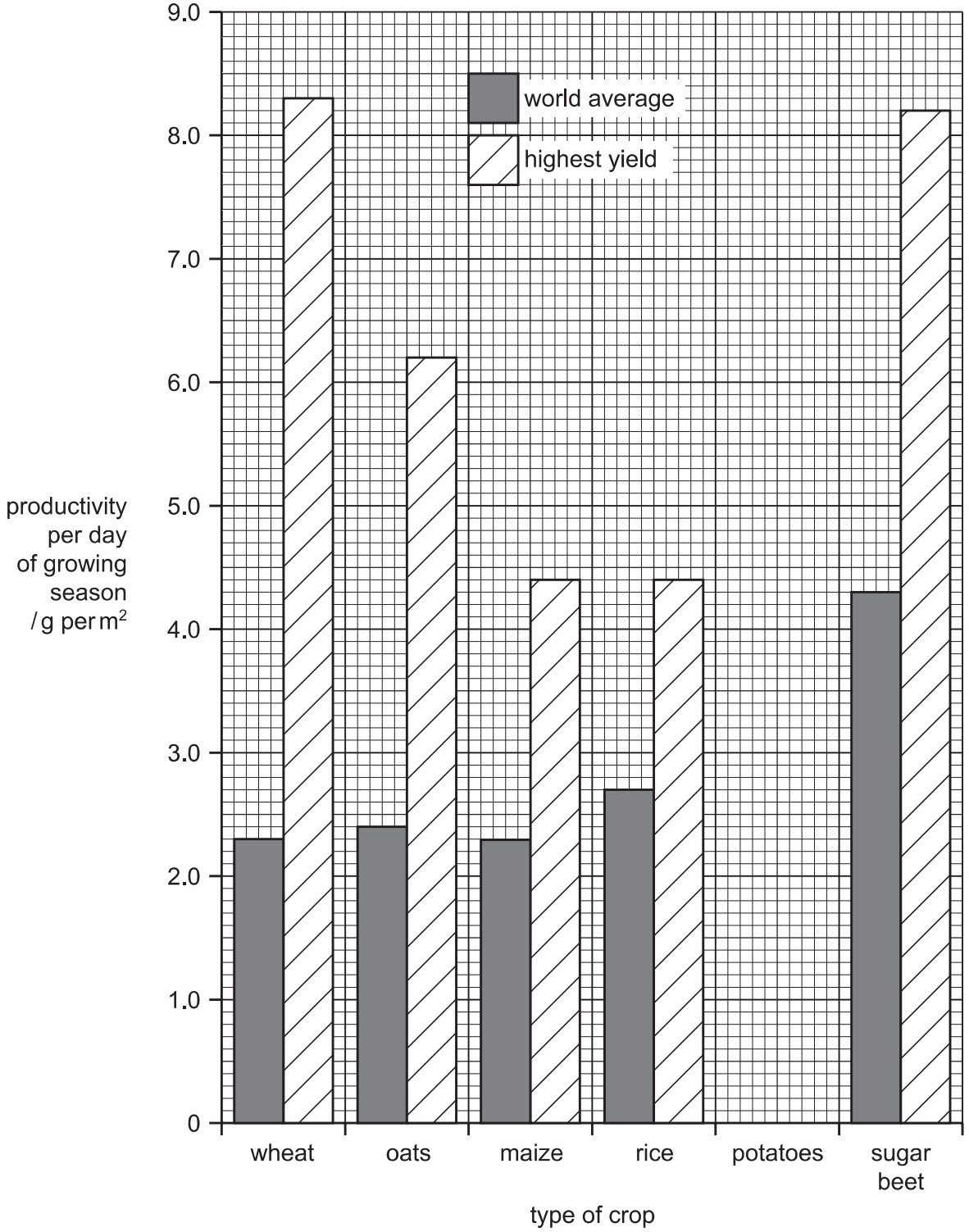

Fig. 2.1

For Examiner's Use

(a) Complete Fig. 2.1 using the following data.

crop	productivity per day of growing season / g per m^2	
	world average	highest yield
potatoes	2.6	5.6

[2]

(b) State which crop has

(i) the highest average productivity,

.....

(ii) the greatest difference between the average yield and the highest yield.

..... [2]

(c) Outline how modern technology could be used to increase the productivity of a crop from the average yield to a high yield.

.....

.....

.....

..... [3]

(d) When the yield is measured, dry mass is always used rather than fresh mass.

Suggest why dry mass is a more reliable measurement than fresh mass.

.....

..... [1]

For Examiner's Use

(e) Maize is often used to feed cows, which are grown to provide meat for humans.

Explain why it is more efficient for humans to eat maize rather than meat from cows that have been fed on maize.

.....

.....

..... [3]

(f) **(i)** Complete the equation for photosynthesis.

$$6CO_2 + 6H_2O \xrightarrow{\text{light energy}} C_6H_{12}O_6 + ...$$

[1]

(ii) Describe how leaves are adapted to trap light.

.....

.....

..... [2]

(iii) With reference to water potential, explain how water is absorbed by roots.

.....

.....

.....

..... [3]

(iv) Explain how photosynthesising cells obtain carbon dioxide.

.....

.....

..... [2]

[Total: 19]

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3 Mycoprotein is similar to single cell protein and is sold as an alternative to meat such as beef.

Table 3.1 shows the composition of mycoprotein and beef.

Table 3.1

nutrient	dry mass / g per 100 g	
	mycoprotein	uncooked beef
protein	49.0	51.4
fat	9.2	48.6
fibre (roughage)	19.5	0.0
carbohydrate	20.6	0.0

(a) (i) State two differences in composition between mycoprotein and beef.

1. .....

2. ..... [2]

(ii) Using data from Table 3.1, suggest two reasons why eating mycoprotein is better for health than eating beef.

Explain your answers.

reason 1 .....

explanation .....

.....

reason 2 .....

explanation .....

..... [4]

(b) (i) Calculate the dry mass of mycoprotein **not** represented by protein, fat, fibre or carbohydrate.

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Show your working.

Answer .....g [2]

(ii) Suggest **one** nutrient that this dry mass might contain.

..... [1]

(c) The antibiotic penicillin is produced by fungi that are grown in a fermenter, as shown in Fig. 3.1. The process is similar to the manufacture of enzymes.

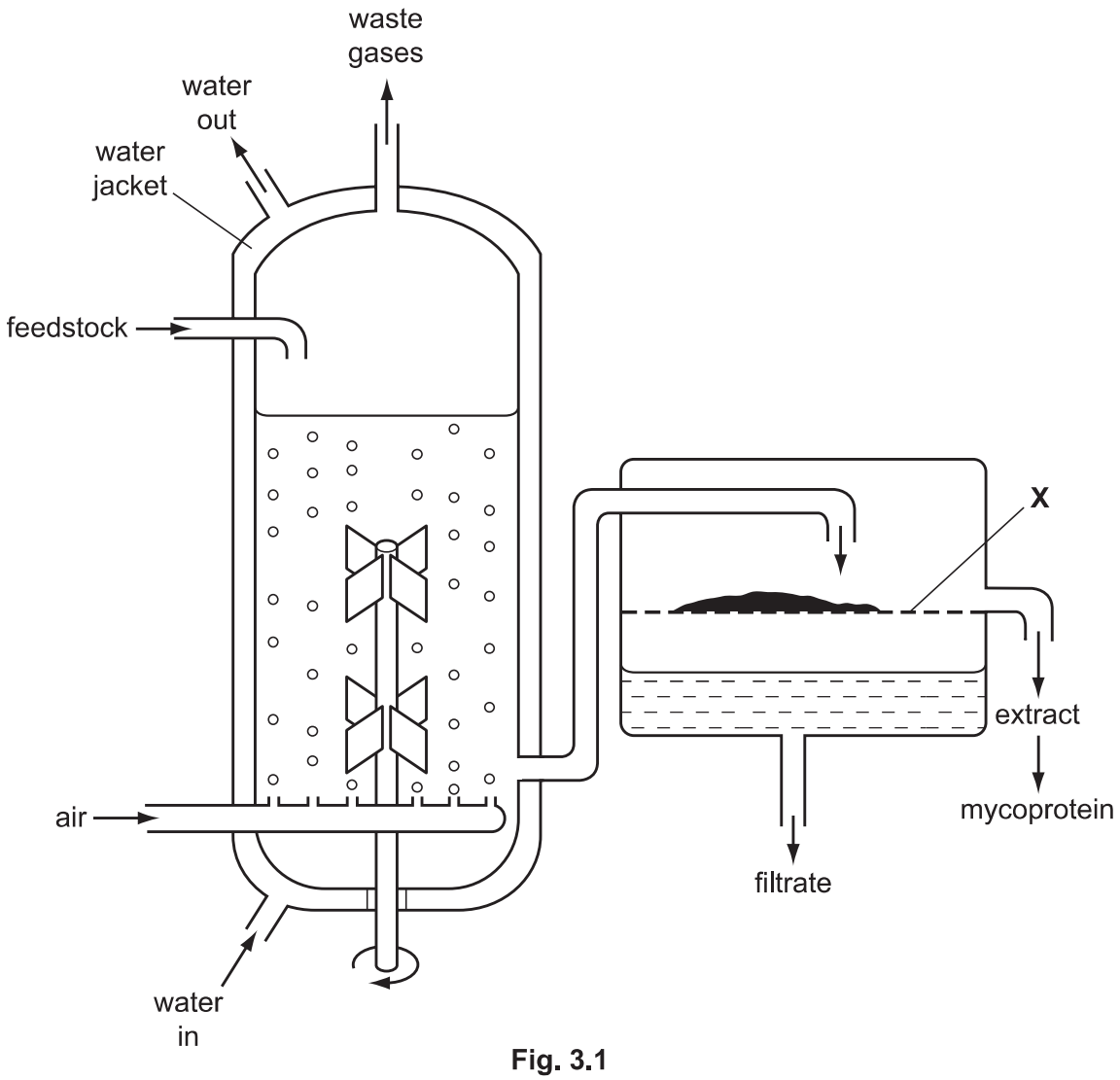

Fig. 3.1

For Examiner's Use

(i) Name the two raw materials likely to be present in the feedstock.

1. .....

2. ..... [2]

(ii) State the function of **X.**

..... [1]

(iii) Suggest the name of the main gas present in the waste gases.

..... [1]

(d) During the fermenting process, the temperature in the container would rise unless steps are taken to maintain a constant temperature.

(i) Suggest a suitable temperature for the feedstock.

..... [1]

(ii) Explain why the temperature rises.

.....

..... [2]

(iii) Explain why a constant temperature has to be maintained.

.....

.....

..... [2]

(iv) Using the information from Fig. 3.1, suggest **how** a constant temperature is maintained.

.....

..... [1]

[Total: 19]

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4 A newspaper headline incorrectly stated, "The use of condoms can result in erectile dysfunction".

Erectile dysfunction is a medical problem which results in problems with sexual intercourse.

Scientists are concerned that this incorrect statement could lead to an increase in HIV.

(a) Describe the process of sexual intercourse in humans.

.....

.....

..... [2]

(b) Condoms are used as one form of birth control.

(i) What name is used to describe this method of birth control?

..... [1]

(ii) Explain how a condom acts as a method of birth control.

.....

.....

..... [2]

(c) Some readers of the newspaper may believe the newspaper and stop using condoms during sexual intercourse.

(i) Explain how a decrease in the use of condoms may lead to an increase in the incidence of HIV.

.....

.....

..... [2]

(ii) State two ways by which a person who does not have sexual intercourse might still become infected with HIV.

1. .....

2. ..... [2]

(iii) Explain why the immune system is less effective in a person with HIV.

For Examiner's Use

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.....

..... [3]

(d) Another sexually transmitted disease is gonorrhoea.

For this disease, state

(i) one sign or symptom,

.....

(ii) one effect on the body,

.....

(iii) the treatment.

.....

..... [3]

[Total: 15]

5 Table 5.1 shows the energy reserves for skeletal muscles in an athlete.

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Table 5.1

energy reserve	mass / g	energy / kJ	time the reserve would last / min	
			walking	marathon running
blood glucose	3	48	4	1
liver glycogen	100	1660	86	20
muscle glycogen	350	5800	288	71
fat in skin	9000	337 500	15 500	4018

(a) (i) Compare the effect of walking and marathon running on energy reserves.

.....

..... [2]

(ii) Suggest which two energy reserves would be most readily available to muscles during exercise.

1. .....

2. ..... [1]

(iii) Underline the **two** food groups to which the energy reserves in Table 5.1 belong.

protein mineral fibre fat carbohydrate [1]

(iv) Calculate the energy per gram of glycogen.

Show your working.

energy = ... kJ [2]

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(b) Suggest why athletes eat foods high in

(i) proteins, during training;

.....

..... [1]

(ii) carbohydrates, for three days before a marathon race.

.....

.....

..... [2]

(c) During a fast race (a 100 metre sprint), 95% of the energy comes from anaerobic respiration.

During a marathon, only 2% of the energy comes from anaerobic respiration.

(i) State the equation, in symbols, for anaerobic respiration in muscles.

..... [2]

(ii) Suggest and explain why a sprinter can use mainly anaerobic respiration during the race, while a marathon runner needs to use aerobic respiration.

.....

.....

.....

.....

..... [4]

(iii) Explain how, during a marathon race, the blood glucose concentration stays fairly constant, but the mass of glycogen in the liver decreases.

.....

.....

..... [2]

[Total: 17]

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