

Centre Number	Candidate Number	Name
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**BIOLOGY** **0610/03**

Paper 3 Extended May/June 2004

**1 hour 15 minutes**

Candidates answer on the Question Paper.  
There are no Additional Materials.

**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 in the spaces provided on the Question Paper.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

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.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
7	
<b>Total</b>	

- 1 In Africa, mammals called jackals are quite common. They feed on small herbivores such as young springboks and dik-diks, hunting in packs to catch their prey. They will also eat larger herbivores such as kudu that have been killed by larger predators such as lions.

A farmer in South Africa found that a number of his sheep, while feeding on grassland, were being killed by jackals. He noted that jackals always kill sheep by attacking their necks. He designed a plastic collar for the sheep that covered their necks. None of his sheep have been killed since fitting these collars. Other farmers are now buying the collars to protect their sheep from jackal attack.

- (a) The prey species of the jackal are usually primary consumers.

State the type of food that all primary consumers eat.

.....[1]

- (b) Name the two carnivores identified in the text.

1. ....

2. ....[1]

- (c) Construct a food chain for the jackal to show its relationship with sheep.

.....[2]

- (d) Suggest a reason why jackals survive better when they hunt in packs.

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

- (e) When the farmer started to use collars on his sheep, although none of his sheep were being killed, the population of jackals did not decrease.

Suggest why the number of jackals did not decrease.

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

- (f) Name two structures, found in the neck of a sheep, that could be damaged when jackals attack it.

1. ....

2. ....[2]

- (g) Some of the protected sheep die of old age and their remains are eaten by other animals.

Suggest and explain why the collars of the dead sheep could create an environmental problem.

.....

.....

.....[2]

[Total : 10]

- 2 Experts predict that 75% of the British population will be obese in 8 years time. The problem is blamed on the popularity of 'junk food'. This sort of diet is unbalanced.

(a) Define the term *balanced diet*.

.....

.....

.....[2]

A human diet consists of:

**carbohydrates    fats    fibre    minerals    proteins    vitamins    water.**

(b) Underline **two** foodstuffs from the list above that, when eaten in excess, would be most likely to lead to obesity. [2]

(c) Fig. 2.1 shows a chart to find a person's ideal mass.

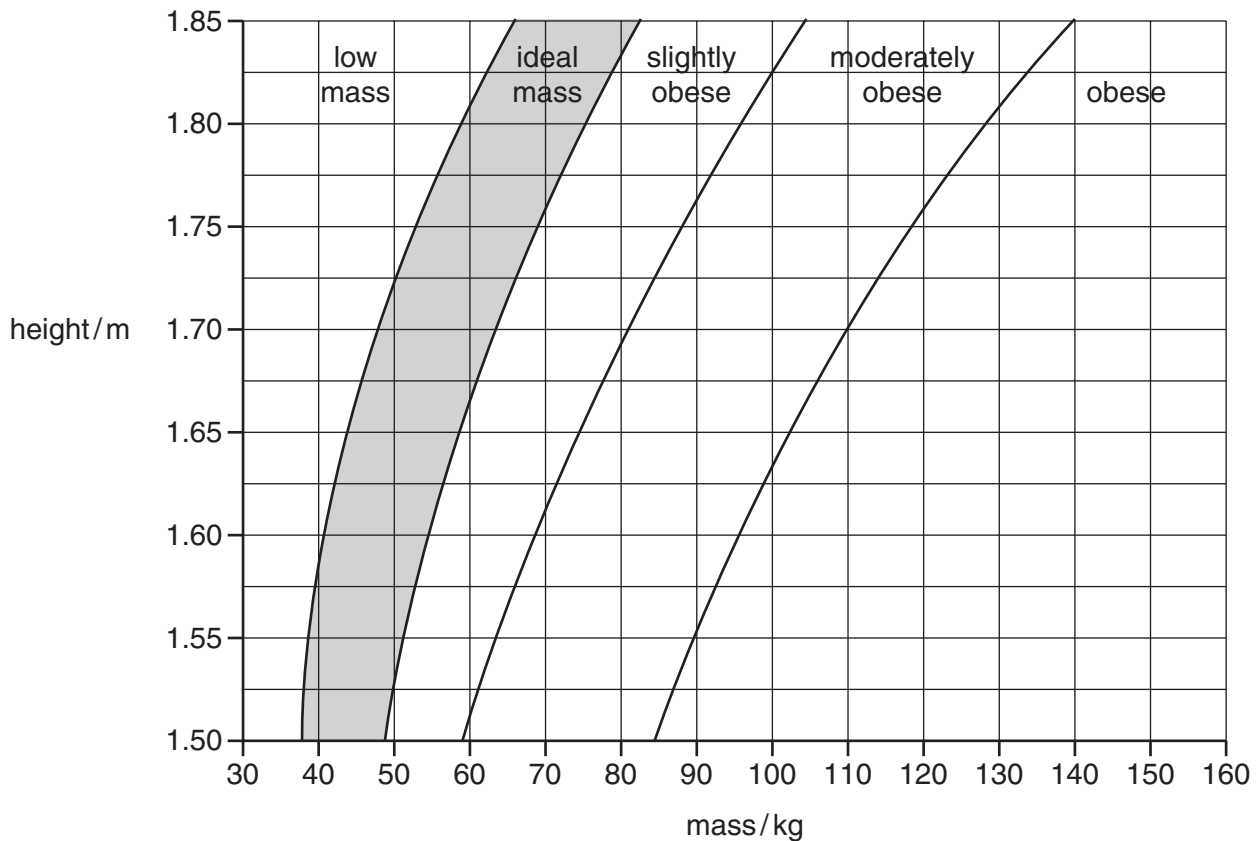


Fig. 2.1

The following data was collected for three students, **X**, **Y** and **Z**.

student	mass / kg	height / m
<b>X</b>	50.8	1.55
<b>Y</b>	63.8	1.85
<b>Z</b>	114.3	1.65

(i) Identify the student who is

1. obese; .....

2. of low mass; .....

3. of ideal mass. ....

[3]

(ii) Suggest two health problems that could be caused by obesity.

1. ....

2. ....[2]

(d) Large food molecules are made up of smaller units. Some of these smaller units are listed below.

**amino acids**

**fatty acids**

**glycerol**

**simple sugars**

Name the units that make up

1. starch; .....

2. fats; .....

3. protein. ....[4]

(e) Large food molecules are broken down to form smaller molecules in the digestive system.

(i) Name the type of chemical that speeds up digestion.

.....[1]

(ii) Explain why large molecules need to be broken down into small molecules in the digestive system.

.....

.....

.....[2]

[Total : 16]

- 3 Table 3.1 shows a student's daily water gains and losses.

**Table 3.1**

water gain / cm <sup>3</sup>		water loss / cm <sup>3</sup>	
drink	1650	urine	1500
food	800	faeces	100
water released in chemical reactions	350	expired air	400
		sweat	.....
total	2800	total	2800

- (a) **Complete the table** by calculating the volume of sweat lost by the student.

Show your working in the space below.

[1]

- (b) Name the **organ** responsible for

1. excreting water in expired air; .....
2. releasing water by sweating; .....
3. forming urine; .....
4. reabsorbing water from undigested food to form faeces. ....

[4]

- (c) On a hot day the student still took in 2800 cm<sup>3</sup> of water.

- (i) Suggest and explain what would happen to the volume of sweat and urine produced.

sweat .....

.....

..... [2]

urine .....

.....

..... [2]

The volume of water gained and lost by the student is balanced.

(ii) Name the term used for the maintenance of a constant internal environment.

.....[1]

(d) Use words from the list below to complete the paragraph.

**excretion    glucose    glycogen    insulin    liver    oestrogen**  
**pancreas    secretion    starch    stomach    sucrose**

The blood stream transports a sugar called .....

The blood sugar level has to be kept constant in the body.

If this level falls below normal, a hormone called glucagon is released into the blood by an endocrine organ called the .....

The release of a substance from a gland is called .....

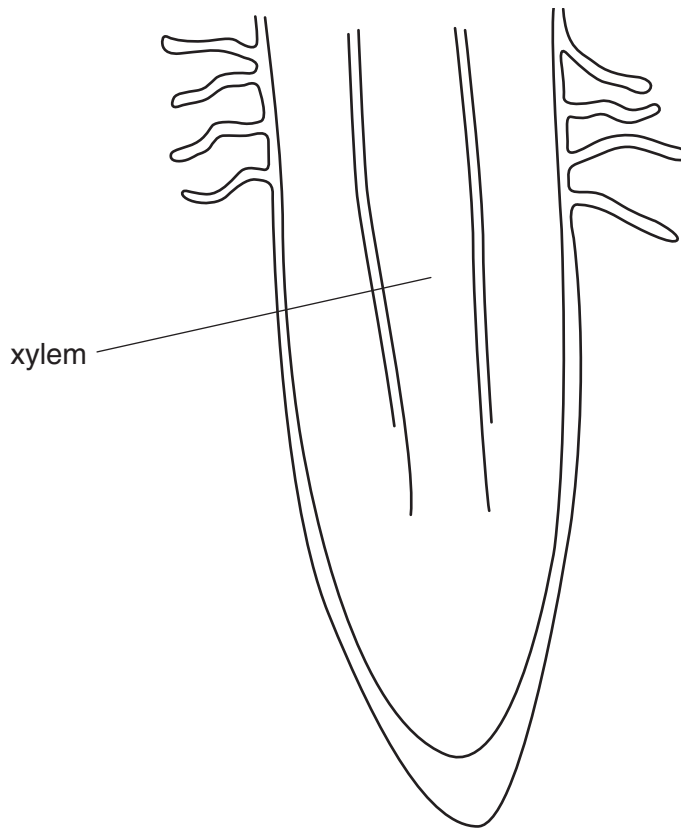
Glucagon promotes the breakdown of ..... to increase the blood sugar level.

If the blood sugar level gets too high, the endocrine organ secretes another hormone called ..... into the blood.

This hormone promotes the removal of sugar from the blood and its conversion to glycogen in the ..... [6]

[Total : 16]

4 Fig. 4.1 shows part of a root.



**Fig. 4.1**

**(a)** Explain how the presence of root hair cells on roots enables the efficient absorption of water and minerals.

.....

.....

.....[2]

**(b)** Root hair cells can absorb mineral ions by diffusion and active transport.

**(i)** Define the term *active transport*.

.....

.....[2]

**(ii)** Explain why respiration rates may increase in root hair cells during the uptake of mineral ions.

.....

.....[1]



(c) Fig. 4.1 shows the position of xylem in the root.

(i) Describe how the structure of xylem tissue is adapted to its functions.

.....  
.....  
.....  
.....[3]

(ii) Describe the mechanism of water movement through the xylem.

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

[Total : 10]

- 5 Fig. 5.1 shows vehicles driving past a power station in Namibia and women carrying firewood they have cut.



**Fig. 5.1**

- (a) Describe how an increase of carbon dioxide in the atmosphere can affect the environment.

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

- (b) Without further reference to carbon dioxide, explain how each of the following may have undesirable effects on the environment:

- (i) the power station;

.....  
.....  
.....  
.....[3]

(ii) cutting down trees and burning the wood;

.....  
.....  
.....  
.....[3]

(iii) running motor vehicles such as the van or car.

.....  
.....  
.....  
.....[3]

[Total : 11]

- 6 One variety of cat can have short hair or long hair. The allele for short hair (**H**) is dominant to the allele for long hair (**h**).

A cat breeder has a short haired cat. Its genotype can be **HH** or **Hh**: there is no visible difference between these genotypes.

This short haired cat is crossed with a long haired cat, **hh**.

- (a) Construct genetic crosses to predict the ratios produced if the short haired cat is:

(i) heterozygous, **Hh**;

[3]

(ii) homozygous, **HH**.

[3]

- (b) Suggest how the offspring from (a)(ii) would be different if the alleles were co-dominant.

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

[Total : 7]

- 7 Breast milk contains all the nutrients a baby needs except for vitamin C and iron. However, the baby has sufficient iron stored in its liver for the first months of its life. The first milk a breast-fed baby receives is called colostrum. After a few days, normal breast milk is produced.

Table 7.1 compares the composition of colostrum and normal breast milk.

**Table 7.1**

	nutrient/g per 100 cm <sup>3</sup>		
	fat	protein	sugar
colostrum	2.5	8.0	3.5
normal breast milk	4.0	2.0	8.0

- (a) Use data from Table 7.1 to describe how the amounts of fat, protein and sugar are different in colostrum and normal breast milk.

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

- (b) A baby feeding on normal breast milk drinks one litre of milk per day. Calculate how much protein the baby receives per day. Show your working.

.....[2]

- (c) (i) Suggest a suitable fruit juice a mother could give her baby to provide vitamin C.

.....[1]

- (ii) Young children enjoy drinking fruit drinks with a high sugar content, sucked from a bottle with a teat. Explain how this habit can result in high levels of tooth decay.

.....  
.....  
.....  
.....  
.....[4]

- (d) Children sometimes develop an iron deficiency. Describe the symptoms they would show.

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

[Total : 10]





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*Copyright Acknowledgements:*

Question 2 Fig. 2.1 Applin, D and Williams, G; Height and Weight Chart in *Key Science Biology*, Stanley Thomas.

Question 5 Fig. 5.1 Tarr, P; *Namibia Environment*; vol. 1, MacMillan Press.

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