Location Entry Codes

UNIVERSITY of CAMBRIDGE
International Examinations

From the June 2007 session, as part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

Question Paper	Mark Scheme	Principal Examiner's Report
Introduction	Introduction	Introduction
First variant Question Paper	First variant Mark Scheme	First variant Principal Examiner's Report
Second variant Question Paper	Second variant Mark Scheme	Second variant Principal Examiner's Report

Who can I contact for further information on these changes?
Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk

First variant Question Paper

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

6033089101

BIOLOGY **0610/03**

Paper 3 Extended **May/June 2007**

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	
6	
Total	

P This document consists of **14** printed pages and **6** blank pages.

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For Examiner's Use

1 **(a)** Name two structures, visible with a light microscope, which distinguish plant cells from animal cells.

1 .....

2 ..... [2]

Fig. 1.1 shows a plant cell.

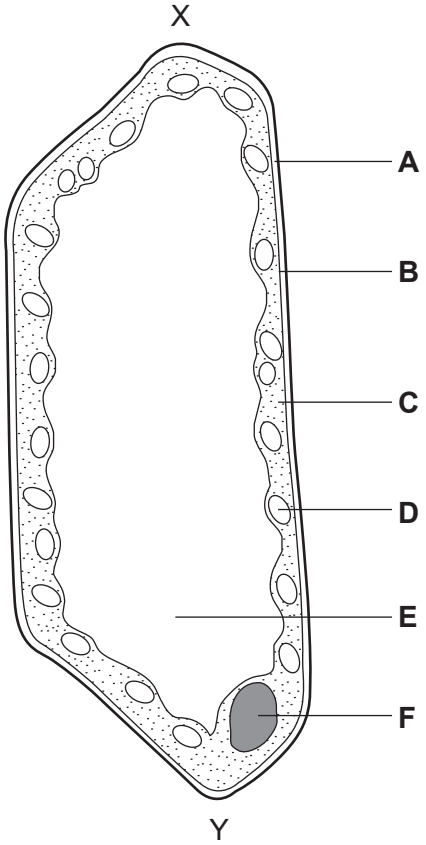

Fig. 1.1

(b) **(i)** Complete the table by matching each of the described functions to **one** of the cell parts, **A – F**.

description of function	cell part
controls the passage of nutrients into the cell	
increases in volume when the cell is placed in water	
contains genetic material	
prevents the cell bursting	
produces glucose during photosynthesis	

[5]

For Examiner's Use

(ii) The actual size of the cell from X to Y is 0.1 mm. Calculate the magnification of Fig. 1.1. Show your working.

magnification ..... [2]

(c) Name **one** animal cell and **one** plant cell that has no nucleus when fully developed. For each cell named, state its function.

animal cell .....

function .....

plant cell .....

function ..... [4]

[Total: 13]

For Examiner's Use

2 Over-consumption of alcohol is a problem in some countries.

(a) **(i)** State two long term effects on the body of drinking too much alcohol.

1 .....

2 ..... [2]

Some alcohol producers have started to promote 'responsible drinking'. Fig. 2.1 shows the label on a bottle of beer.

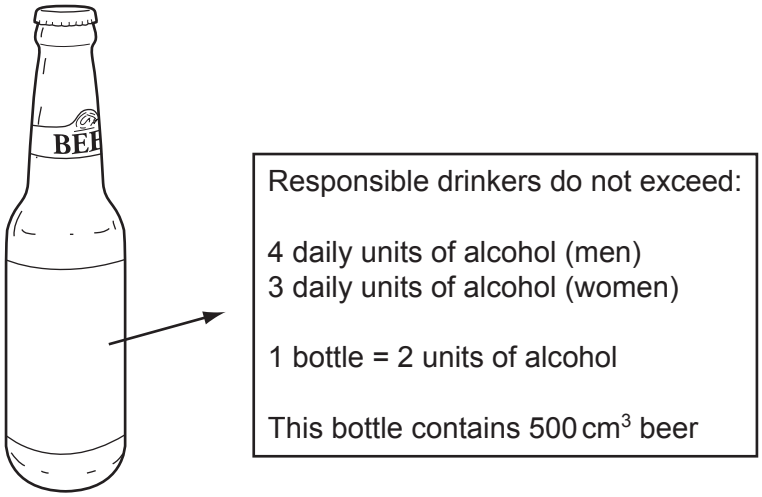

Fig. 2.1

(ii) Using information from this label, calculate the volume of beer which would provide the recommended daily maximum alcohol intake for a responsible male drinker.

..... cm^3 [1]

(b) Unlike most food nutrients, alcohol does not need to be digested. Instead, it is readily absorbed into the blood from, for example, the stomach.

(i) Explain why most food nutrients **do** need to be digested.

.....

.....

..... [2]

(ii) State the main site of absorption of most products of digestion.

..... [1]

(iii) Name **one** product of digestion which is **not** absorbed directly into the blood stream.

..... [1]

For Examiner's Use

Fig. 2.2 shows the relationship between blood alcohol content and the risk of having a road accident.

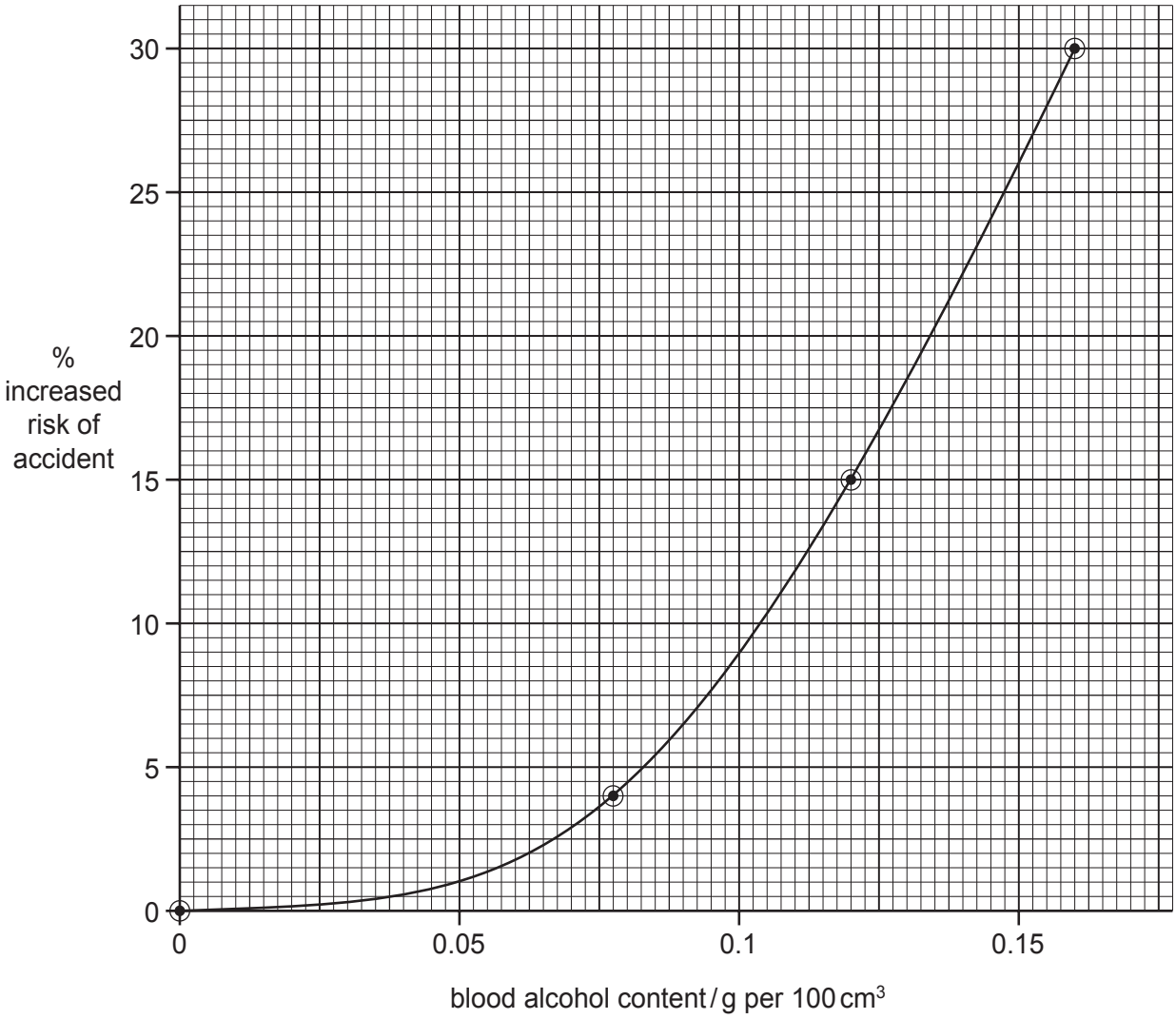

Fig. 2.2

(c) (i) Use the graph to predict the increased risk of a road accident if a driver had a blood alcohol content of 0.10 g per 100 cm^3.

increased risk ..... [1]

(ii) Describe the relationship shown by the graph between blood alcohol content and the risk of having a road accident.

.....

.....

..... [2]

For Examiner's Use

(iii) With reference to the nervous system, explain how drinking alcohol before driving increases the risk of having an accident.

.....

.....

.....

.....

..... [3]

[Total: 13]

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For Examiner's Use

3 Fig. 3.1 shows a female lion in a game reserve.

Fig. 3.1

(a) **(i)** State **one** feature, visible in Fig. 3.1, which identifies the lion as a mammal.

..... [1]

(ii) State **one** other feature, **not** visible in Fig. 3.1, which distinguishes mammals from all other vertebrate groups.

..... [1]

For Examiner's Use

(b) Study the eyes of the lion in Fig. 3.1.

(i) Suggest and explain what the light conditions were when the photograph was taken.

light conditions .....

explanation .....

..... [2]

(ii) Explain the importance of the eyes reacting to light in this way.

.....

..... [2]

(c) Scientists say that lions are unable to see in colour.

Suggest how a study of a lion's retina would provide evidence for this statement.

.....

..... [1]

(d) The lion in Fig. 3.1 was observing tourists nearby. It turned its head to see zebras moving in the distance.

Describe how the eyes of the lion would adjust to focus on the zebras.

.....

.....

.....

..... [3]

(e) The lion was photographed in a game reserve in Namibia.

Explain why the conservation of animals in game reserves is important.

.....

.....

.....

..... [3]

[Total:13]

For Examiner's Use

4 Transpiration and translocation are processes responsible for transporting materials around a plant.

(i) Complete the table by stating the materials moved by these processes, their sources and their sinks.

process	materials moved	source of materials in the plant	sink for materials in the plant
transpiration	1 ..... 2	.....	.....
translocation	1 ..... 2	.....	.....

[6]

(ii) State **two** reasons why the source and sink for translocation in a plant may change at different stages in the growth of a plant.

.....

.....

..... [2]

[Total: 8]

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For Examiner's Use

5 One variety of the moth, *Biston betularia*, has pale, speckled wings. A second variety of the same species has black wings. There are no intermediate forms.

Equal numbers of both varieties were released into a wood made up of trees with pale bark. Examples of these are shown in Fig. 5.1.

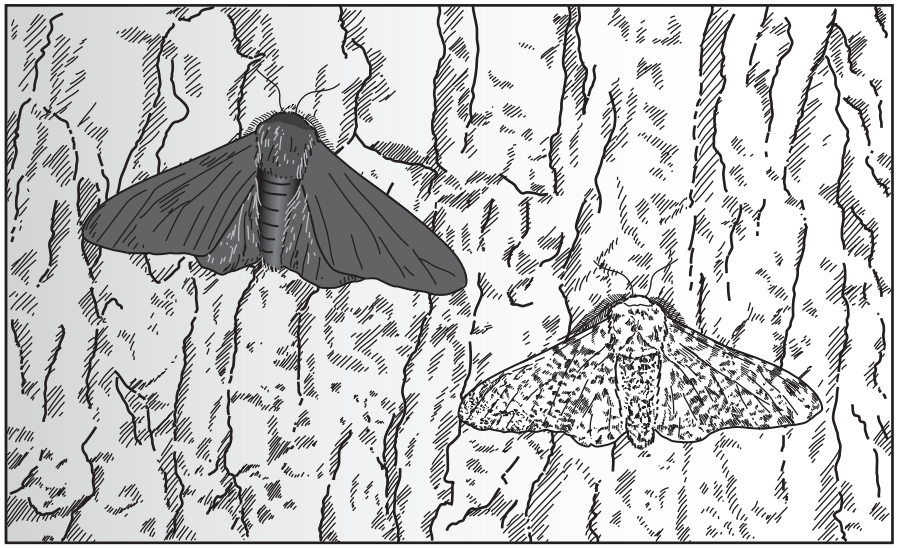

Fig. 5.1

After two weeks as many of the moths were caught as possible.
The results are shown in Table 5.1.

Table 5.1

wing colour of moth	number released	number caught
pale, speckled	100	82
black	100	36

(a) (i) Suggest and explain **one** reason, related to the colour of the bark, for the difference in numbers of the varieties of moth caught.

.....

.....

..... [1]

(ii) Suggest and explain how the results may have been different if the moths had been released in a wood where the trees were blackened with carbon dust from air pollution.

.....

.....

..... [2]

For Examiner's Use

Table 5.2 shows the appearance and genetic make-up of the different varieties of this species.

Table 5.2

wing colour	genetic make-up
pale, speckled	GG; Gg
black	gg

(b) (i) State the appropriate genetic terms for the table headings.

wing colour .....

genetic make-up ..... [2]

(ii) State and explain which wing colour is dominant.

dominant wing colour .....

explanation .....

..... [2]

(c) State the type of genetic variation shown by these moths. Explain how this variation is inherited.

.....

.....

.....

..... [3]

For Examiner's Use

(d) Heterozygous moths were interbred. Use a genetic diagram to predict the proportion of black winged moths present in the next generation.

proportion of black winged moths = ... [5]

(e) **(i)** Name the process that can give rise to different alleles for wing colour in a population of moths.

..... [1]

(ii) Suggest **one** factor which might increase the rate of this process.

..... [1]

[Total: 17]

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For Examiner's Use

6 Scientists are considering the use of a genetically engineered virus to kill a population of the cane toad, *Bufo marinus*, which is growing out of control in Australia.

This virus will introduce a modified form of genetic material, responsible for hormone production. The normal hormone causes the toads to mature in a similar way to hormones causing puberty in mammals. The modified genetic material will prevent toads maturing, leading to their death.

The toad was introduced into Australia because it eats scarab beetles, a pest of sugar cane plants. Sugar cane is an important crop plant.

Animals such as crocodiles and dingos are predators of the toad, but the toad can kill them by squirting a powerful toxin.

(a) Define the term *genetic engineering*.

.....

..... [2]

(b) State which part of the virus would carry the modified genetic material.

..... [1]

(c) **(i)** Name the hormone that causes puberty in male mammals.

..... [1]

(ii) State two characteristics that develop in a boy when this hormone is produced.

1 .....

2 ..... [2]

For Examiner's Use

The toad population is increasing out of control. In terms of a sigmoid growth curve, it is in the exponential phase.

(d) (i) 1. Sketch a sigmoid growth curve using the axes below.
2. Label the axes (units are **not** needed).
3. Label the exponential phase of the curve.

[4]

(ii) Suggest **one** limiting factor, other than viruses or predators, that could stop the toad population rising.

..... [1]

(e) (i) Construct a **food web** for the organisms named in this question.

[2]

(ii) Complete the table by writing each of the organisms you used in the food web in the correct column.

carnivore	herbivore	producer

[3]

[Total : 16]

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Second variant Question Paper

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

6919518464

BIOLOGY **0610/03**

Paper 3 Extended **May/June 2007**

1 hour 15 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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For Examiner's Use	
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Q

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UNIVERSITY of CAMBRIDGE International Examinations

For Examiner's Use

1 **(a)** Fig. 1.1 shows human blood cells.

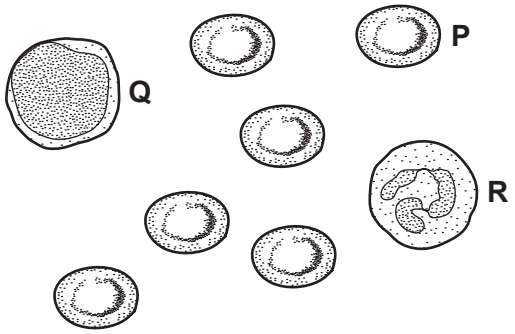

Fig. 1.1

(i) Name the blood cells **P**, **Q** and **R**.

P .....

Q .....

R ..... [3]

(ii) Describe the functions of cells **Q** and **R**.

Q .....

.....

.....

R .....

.....

..... [4]

For Examiner's Use

(b) A person suffering from skin burns may need the damaged skin replacing. The replaced skin is called a skin graft. This involves taking healthy skin from another person and using it to replace the damaged skin of the patient. However, the skin graft may be rejected unless powerful immunosuppressive drugs are given to reduce the activity of the immune system.

(i) Describe what happens during the process of tissue rejection.

.....

.....

..... [2]

(ii) Tissue rejection of the skin graft would appear to be a disadvantage to the patient. Suggest why a system has evolved which causes tissue rejection.

.....

..... [1]

(iii) Suggest a disadvantage to a transplant patient of being treated with immunosuppressive drugs.

.....

..... [1]

[Total: 11]

For Examiner's Use

2 Over-consumption of alcohol is a problem in some countries.

(a) **(i)** State two long term effects on the body of drinking too much alcohol.

1 .....

2 ..... [2]

Some alcohol producers have started to promote 'responsible drinking'. Fig. 2.1 shows the label on a bottle of beer.

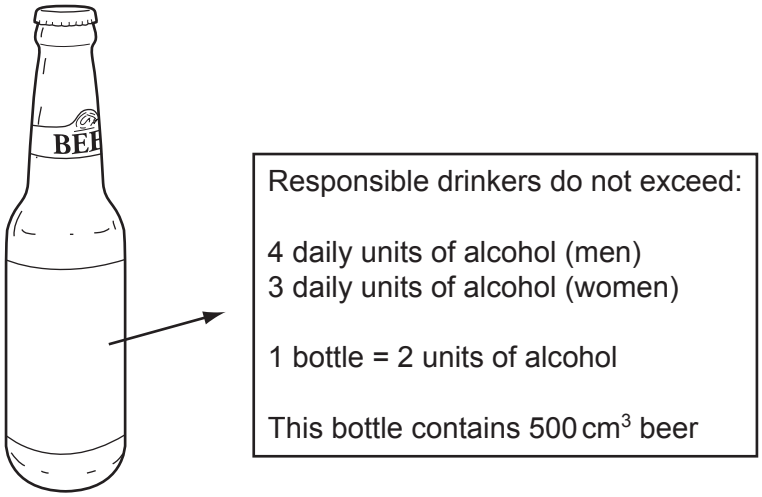

Fig. 2.1

(ii) Using information from this label, calculate the volume of beer which would provide the recommended daily maximum alcohol intake for a responsible male drinker.

..... cm^3 [1]

(b) Unlike most food nutrients, alcohol does not need to be digested. Instead, it is readily absorbed into the blood from, for example, the stomach.

(i) Explain why most food nutrients **do** need to be digested.

.....

.....

..... [2]

(ii) State the main site of absorption of most products of digestion.

..... [1]

(iii) Name **one** product of digestion which is **not** absorbed directly into the blood stream.

..... [1]

For Examiner's Use

Fig. 2.2 shows the relationship between blood alcohol content and the risk of having a road accident.

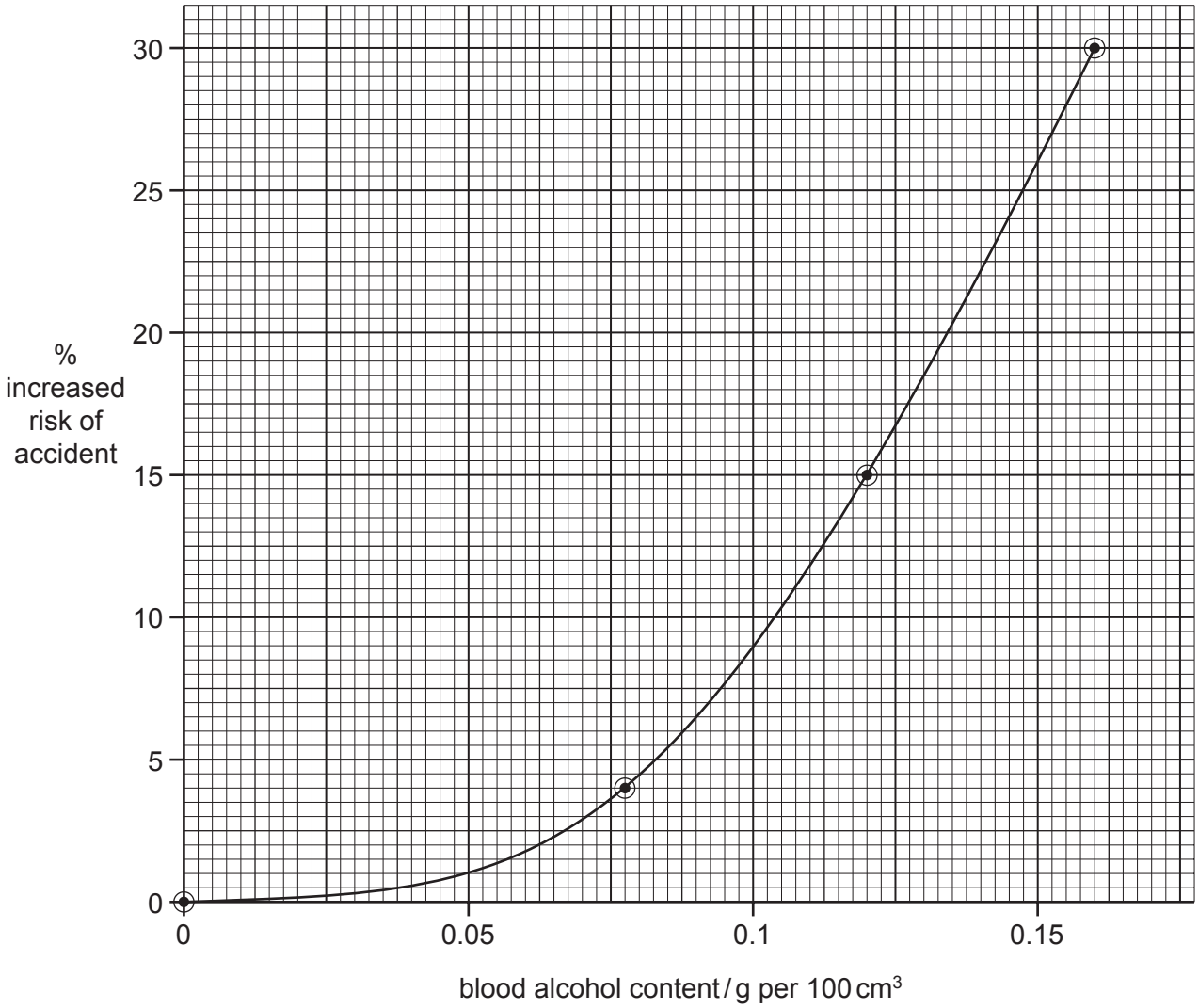

Fig. 2.2

(c) (i) Use the graph to predict the increased risk of a road accident if a driver had a blood alcohol content of 0.10 g per 100 cm^3.

increased risk ..... [1]

(ii) Describe the relationship shown by the graph between blood alcohol content and the risk of having a road accident.

.....

.....

..... [2]

For Examiner's Use

(iii) With reference to the nervous system, explain how drinking alcohol before driving increases the risk of having an accident.

.....

.....

.....

.....

..... [3]

[Total: 13]

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For Examiner's Use

3 Fig. 3.1 shows a female lion in a game reserve.

Fig. 3.1

(a) **(i)** State **one** feature, visible in Fig. 3.1, which identifies the lion as a mammal.

..... [1]

(ii) State **one** other feature, **not** visible in Fig. 3.1, which distinguishes mammals from all other vertebrate groups.

..... [1]

For Examiner's Use

(b) Study the eyes of the lion in Fig. 3.1.

(i) Suggest and explain what the light conditions were when the photograph was taken.

light conditions .....

explanation .....

..... [2]

(ii) Explain the importance of the eyes reacting to light in this way.

.....

..... [2]

(c) Scientists say that lions are unable to see in colour.

Suggest how a study of a lion's retina would provide evidence for this statement.

.....

..... [1]

(d) The lion in Fig. 3.1 was observing tourists nearby. It turned its head to see zebras moving in the distance.

Describe how the eyes of the lion would adjust to focus on the zebras.

.....

.....

.....

..... [3]

(e) The lion was photographed in a game reserve in Namibia.

Explain why the conservation of animals in game reserves is important.

.....

.....

.....

..... [3]

[Total:13]

For Examiner's Use

4 Fig 4.1 shows a green plant, *Nuphar lutea*, which grows in lakes.

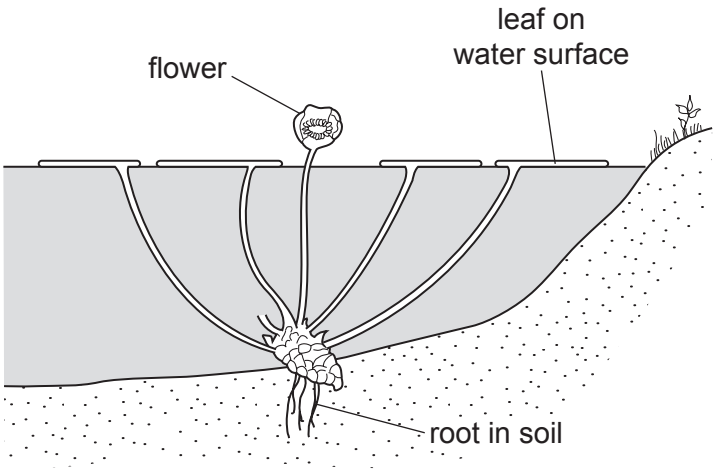

Fig. 4.1

Fig 4.2 is a vertical section cut from one of the leaves to show its structure.

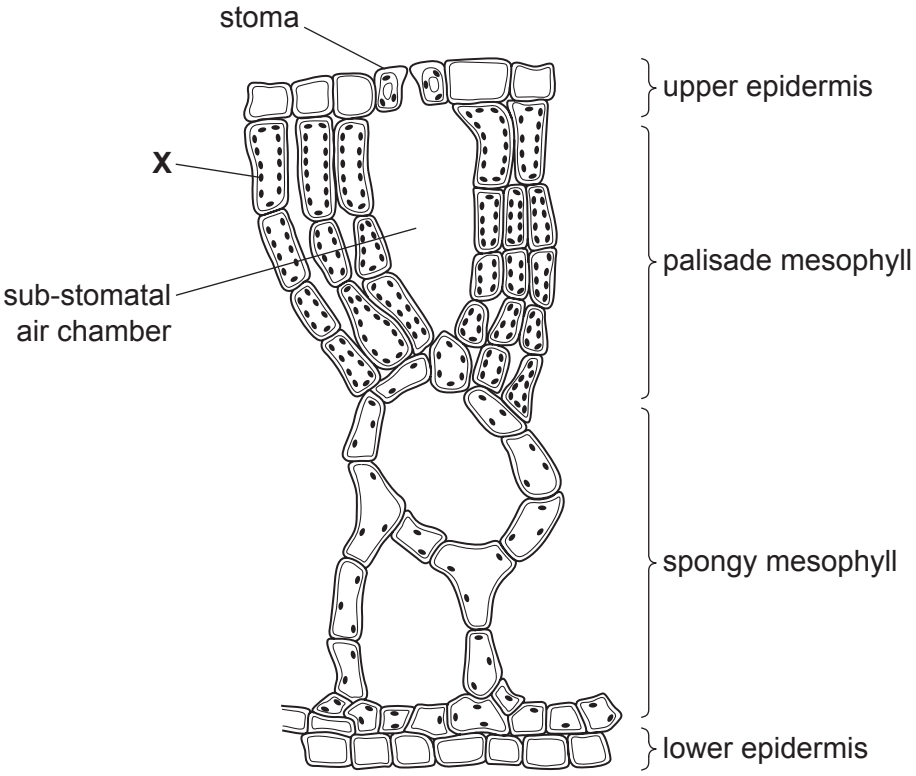

Fig. 4.2

For Examiner's Use

(a) (i) Many of the leaf cells in Fig. 4.2 have organelles, labelled **X**.

Name organelle **X.** ..... [1]

(ii) Outline the function of organelle **X.**

.....

.....

..... [2]

(b) (i) There are many large air spaces in this leaf.
Suggest how these air spaces help *Nuphar lutea* to survive in its habitat.

.....

.....

..... [2]

(ii) The stomata in this plant are all on the upper surface of the leaves.
Suggest why there are no stomata on the lower surface.

.....

.....

..... [2]

(c) The air spaces in the leaves of some water plants continue through the leaf stalks and the main stems all the way to the roots. Gases diffuse through these spaces. The plant absorbs minerals from the soil in the bottom of the lake through its roots. Explain how the arrangement of air spaces helps the plant do this.

.....

.....

.....

..... [3]

[Total: 10]

For Examiner's Use

5 Scientists are considering the use of a genetically engineered virus to kill a population of the cane toad, *Bufo marinus*, which is growing out of control in Australia.

This virus will introduce a modified form of genetic material, responsible for hormone production. The normal hormone causes the toads to mature in a similar way to hormones causing puberty in mammals. The modified genetic material will prevent toads maturing, leading to their death.

The toad was introduced into Australia because it eats scarab beetles, a pest of sugar cane plants. Sugar cane is an important crop plant.

Animals such as crocodiles and dingos are predators of the toad, but the toad can kill them by squirting a powerful toxin.

(a) Define the term *genetic engineering*.

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..... [2]

(b) State which part of the virus would carry the modified genetic material.

..... [1]

(c) **(i)** Name the hormone that causes puberty in male mammals.

..... [1]

(ii) State two characteristics that develop in a boy when this hormone is produced.

1 .....

2 ..... [2]

For Examiner's Use

The toad population is increasing out of control. In terms of a sigmoid growth curve, it is in the exponential phase.

(d) (i) 1. Sketch a sigmoid growth curve using the axes below.
2. Label the axes (units are **not** needed).
3. Label the exponential phase of the curve.

[4]

(ii) Suggest **one** limiting factor, other than viruses or predators, that could stop the toad population rising.

..... [1]

(e) (i) Construct a **food web** for the organisms named in this question.

[2]

(ii) Complete the table by writing each of the organisms you used in the food web in the correct column.

carnivore	herbivore	producer

[3]

[Total : 16]

For Examiner's Use

6 One variety of the moth, *Biston betularia*, has pale, speckled wings. A second variety of the same species has black wings. There are no intermediate forms.

Equal numbers of both varieties were released into a wood made up of trees with pale bark. Examples of these are shown in Fig. 6.1.

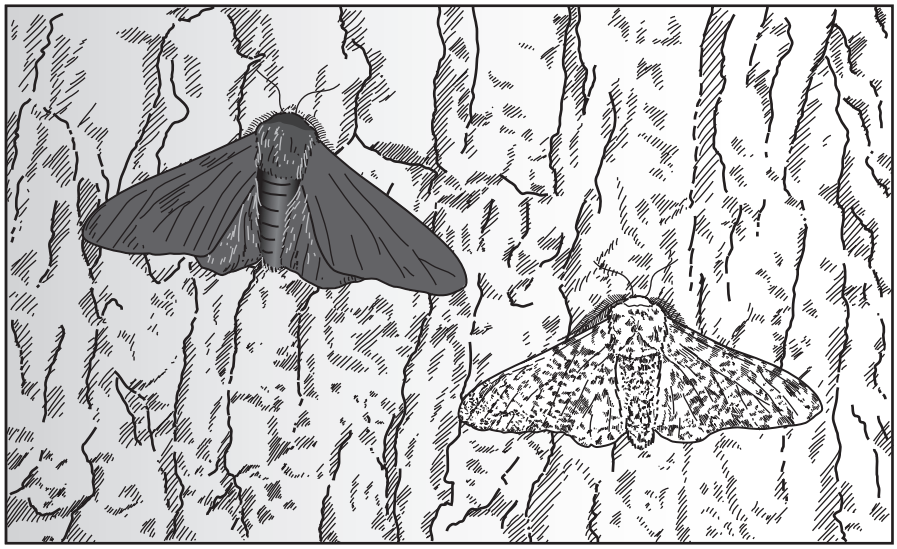

Fig. 6.1

After two weeks as many of the moths were caught as possible.
The results are shown in Table 6.1.

Table 6.1

wing colour of moth	number released	number caught
pale, speckled	100	82
black	100	36

(a) (i) Suggest and explain **one** reason, related to the colour of the bark, for the difference in numbers of the varieties of moth caught.

.....

.....

..... [1]

(ii) Suggest and explain how the results may have been different if the moths had been released in a wood where the trees were blackened with carbon dust from air pollution.

.....

.....

..... [2]

For Examiner's Use

Table 6.2 shows the appearance and genetic make-up of the different varieties of this species.

Table 6.2

wing colour	genetic make-up
pale, speckled	GG; Gg
black	gg

(b) (i) State the appropriate genetic terms for the table headings.

wing colour .....

genetic make-up ..... [2]

(ii) State and explain which wing colour is dominant.

dominant wing colour .....

explanation .....

..... [2]

(c) State the type of genetic variation shown by these moths. Explain how this variation is inherited.

.....

.....

.....

..... [3]

For Examiner's Use

(d) Heterozygous moths were interbred. Use a genetic diagram to predict the proportion of black winged moths present in the next generation.

proportion of black winged moths = ... [5]

(e) **(i)** Name the process that can give rise to different alleles for wing colour in a population of moths.

..... [1]

(ii) Suggest **one** factor which might increase the rate of this process.

..... [1]

[Total: 17]

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