

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
BIOLOGY B

B631/02

Unit 1 Modules B1 B2 B3 (Higher Tier)

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

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Thursday 19 May 2011
Afternoon

Duration: 1 hour



Candidate forename		Candidate surname	
Centre number		Candidate number	

INSTRUCTIONS TO CANDIDATES

- 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 **60**.
- This document consists of **24** pages. Any blank pages are indicated.

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3

Answer **all** the questions.**Section A – Module B1**

- 1 (a) Some people sneeze when they see bright lights.



This disorder is inherited and is called the photic sneeze reflex.

- (i) Which part of the eye contains the receptors for this reflex?

..... [1]

- (ii) Nerve impulses are sent from the receptors in the eye to the central nervous system (CNS) through the optic nerve.

Which type of neurones carry these impulses?

..... [1]

- (b) Scientists have discovered that this disorder is caused by a faulty allele.

This allele is dominant.

People who show the reflex can be either heterozygous or homozygous.

- (i) What is an **allele**?

.....
 [1]

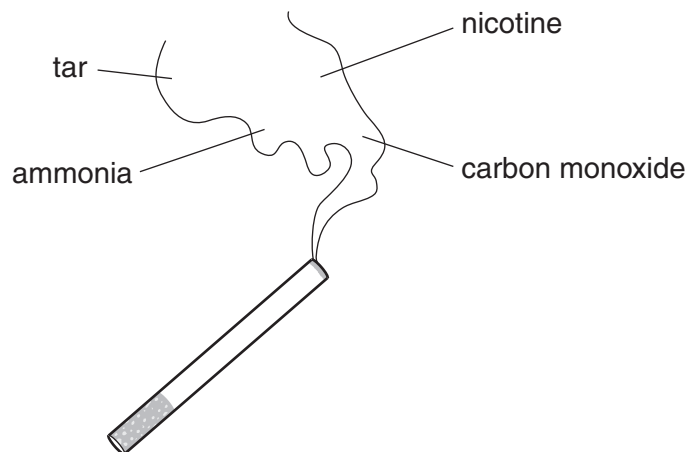
- (ii) If a person is heterozygous what does this tell you about their alleles?

.....
 [1]

[Total: 4]

4

- 2 (a) The diagram shows some of the substances that are produced by a burning cigarette.



- (i) Smoking cigarettes **reduces** the amount of oxygen that can be carried by red blood cells.

Which substance shown in the diagram is the main cause of this?

..... [1]

- (ii) Manufacturers have introduced cigarettes with lower tar levels.

The manufacturers thought this could reduce the number of deaths from cigarette smoking.

Explain why.

.....
 [1]

- (b) The nicotine in cigarette smoke is a stimulant.

It affects the passage of nerve impulses between neurones.

- (i) What is the name for the small gap between two neurones?

..... [1]

- (ii) An impulse in one neurone can trigger an impulse in the next neurone.

Describe how this happens.

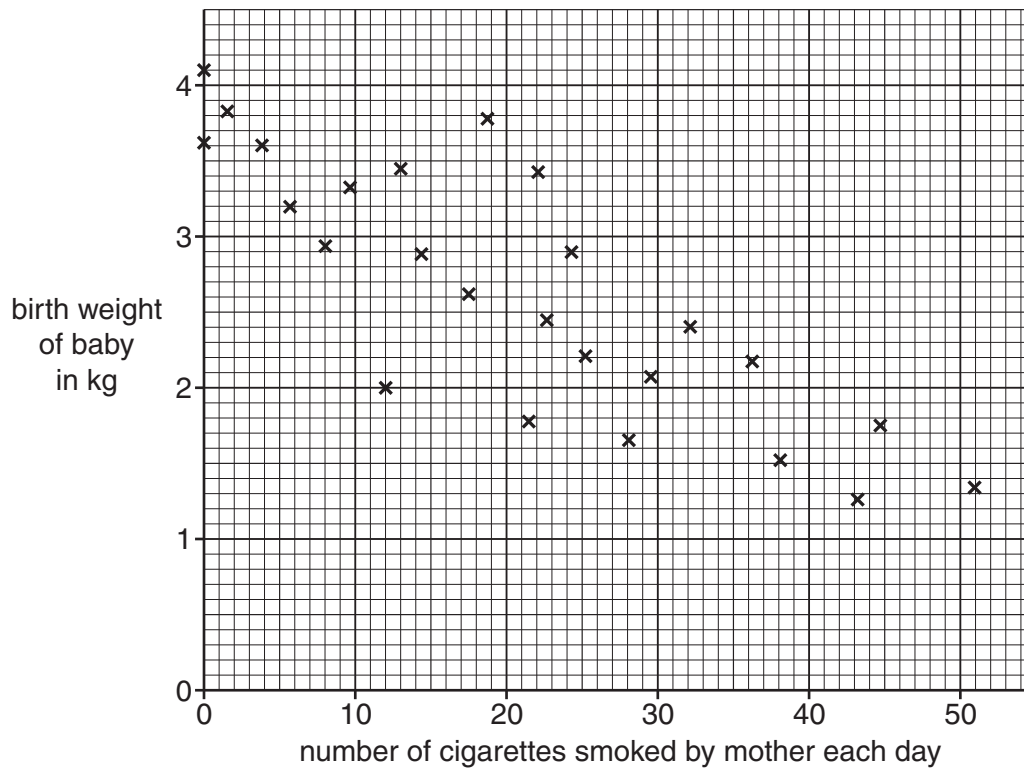
.....
 [1]

5

(c) Scientists recorded the birth weights of some babies.

They also recorded how many cigarettes each baby's mother smoked each day.

The results are shown on the graph.



Write down **two** things which the scientists' results show.

1

.....

2

..... [2]

[Total: 6]

- 3 Katie decides to make a note of all the food she eats in one day.

She works out some of the contents of her food.

These are shown in the table.

meal	energy content in kJ	protein in g	iron in mg	vitamin C in mg
breakfast	2000	5	5	15
lunch	2500	10	2	5
dinner	3000	25	1	10
supper	1000	5	2	5

- (a) Katie's breakfast is the best meal for preventing scurvy.

Use the data in the table to explain why.

..... [1]

- (b) Katie has a mass of 52 kg.

She reads that the recommended amount of protein that she needs each day is called her **RDA**.

This can be worked out using the formula:

$$\text{RDA of protein in g} = 0.75 \times \text{body mass in kg}$$

Katie decides that she is eating enough protein on this day.

Use the formula and the data in the table to explain why she thinks this.

.....

 [2]

- (c) Katie reads that many animal proteins are first class proteins.

These proteins are better for the body than most plant proteins.

Explain why.

..... [1]

7

(d) Katie sees an advertisement in a magazine.



Many people are concerned about this type of advertisement.

Explain why they are so concerned.

.....

.....

..... [2]

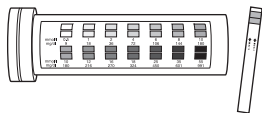
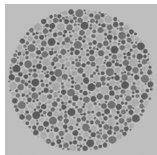
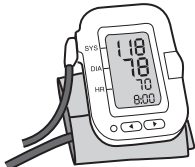
[Total: 6]

8

- 4 (a) Different parts of the body can fail to work properly.

Tests can be done to try and find out the problem.

Draw straight lines to join each **test** to the **problem** that it can detect.

test	problem
measuring blood sugar level 	lens is the wrong shape
using colour deficiency charts 	cells in the pancreas are not working
testing for short sightedness 	stress
measuring blood pressure 	cells in the retina are not working

[2]

- (b) Some scientists think that cells in the pancreas can be destroyed by the body's own immune system.

It would be very difficult to make a vaccine to stop this.

Put a tick (✓) in the box next to the main reason for this.

It is impossible to make a vaccine that stimulates the production of specific antibodies.

☐

Vaccines stimulate the production of antibodies and it is antibodies that are destroying the cells.

☐

The antibiotics produced by vaccines would kill other types of cells as well.

☐

The body's immune system can easily become resistant to vaccines.

☐

[1]

9

- (c) Short sight can be corrected by wearing glasses.

What type of lens should be used in these glasses?

..... [1]

[Total: 4]

Section B – Module B2

- 5 Look at the picture of a seal.



- (a) Seals are mammals belonging to a larger group of animals called vertebrates.

Finish the sentences about seals by writing a word in each space.

Seals are vertebrates because they have a

They are mammals because the females produce

The seal in the picture belongs to a group of seals called *Halichoerus grypus*.

Halichoerus grypus is the name for the grey seal. [3]

- (b) Seals compete with humans for fish.

Fish can be described as a sustainable resource.

This means it is possible to catch fish such as cod but still maintain their population.

- (i) Describe **one** way of maintaining fish populations as a sustainable resource.

.....
 [1]

- (ii) Maintaining a fish population needs international agreement.

Explain why.

.....
 [1]

[Total: 5]

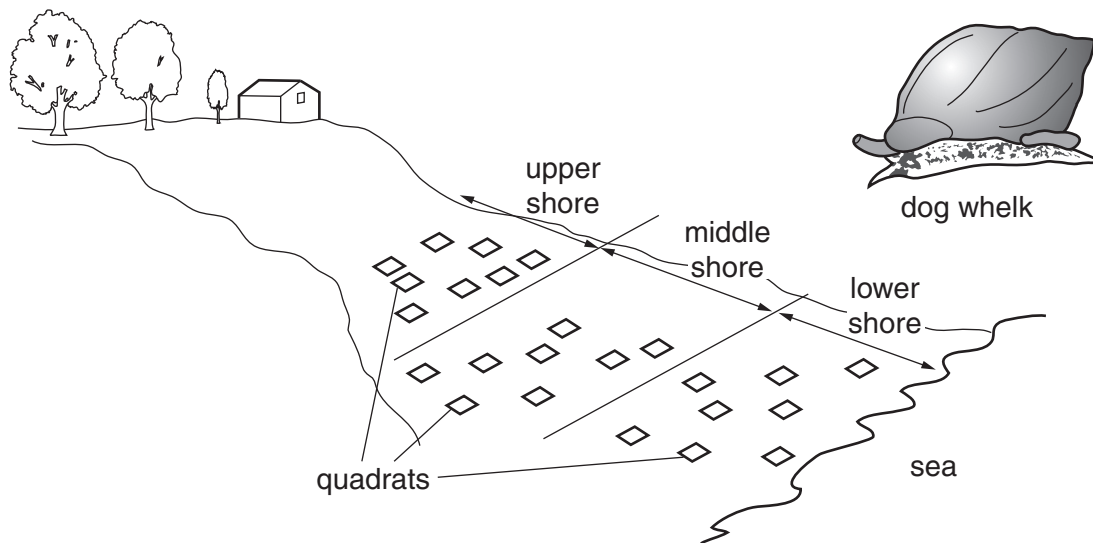
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Question 6 begins on page 12.

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- 6 Hannah and Alice investigate a group of shellfish called dog whelks on a rocky shore.



They divide the shore into three areas: upper, middle and lower.

They count the number of dog whelks in 8 quadrats in each area.

The table shows their results.

part of shore	number of dog whelks in each quadrat								average
upper	0	0	1	0	1	2	0	0	0.5
middle	2	3	4	3	2	3	3	4	
lower	1	1	2	0	2	0	1	1	1.0

- (a) Calculate the average number of dog whelks in each quadrat in the middle shore.

You are advised to show your working.

.....

.....

.....

answer

[2]

13

(b) Hannah uses their results to conclude that more dogwhelks live on the lower shore than the upper shore.

(i) Suggest **two** reasons why more dogwhelks might live on the lower shore than the upper shore.

1

.....

2

..... [2]

(ii) Alice tells Hannah that her conclusion **might not** be reliable.

Suggest **two** reasons why Hannah's conclusion might not be reliable.

1

.....

2

..... [2]

[Total: 6]

- 7 Look at the picture of a sweetcorn flower.



Sweetcorn flowers are pollinated by the wind.

Write about how flowers are adapted for wind pollination.

.....

.....

.....

..... [2]

[Total: 2]

- 8 Read the information about the Petrified National Park in America.

The Petrified National Park

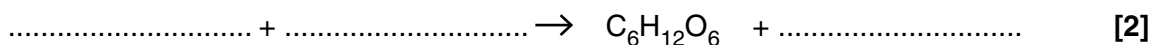
This is a park with a difference.
It contains the world's most colourful petrified wood.
Petrified wood is another name for fossilised wood.

200 million years ago large trees grew on the site.
The trees fell into rivers and were buried in mud.
Over time the wood changed into a hard mineral called quartz.
The trees had become fossils.



- (a) The trees growing 200 million years ago made glucose by photosynthesis.

- (i) Finish the balanced symbol equation for photosynthesis.



- (ii) The trees change the glucose into other substances, such as starch for storage.

Write down **one other** substance that trees change glucose into.

Write down what this substance is used for.

Glucose is changed into

The new substance is used for [2]

- (b) The trees were buried in mud.

They became fossilised as minerals replaced the wood.

Organisms can be preserved without being replaced by minerals.

Write down **one other** way organisms can be preserved for thousands of years.

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

[Total: 5]

- 9 Look at the picture of a narwhal.



The tusk of the narwhal evolved from a tooth.

Charles Darwin believed that the tusk of a male narwhal helps it to attract a female.

The longer its tusk the more likely a male narwhal is to attract a mate.

Use Darwin's theory of natural selection to explain how the tooth evolved into a tusk.

.....

.....

.....

.....

..... [2]

[Total: 2]

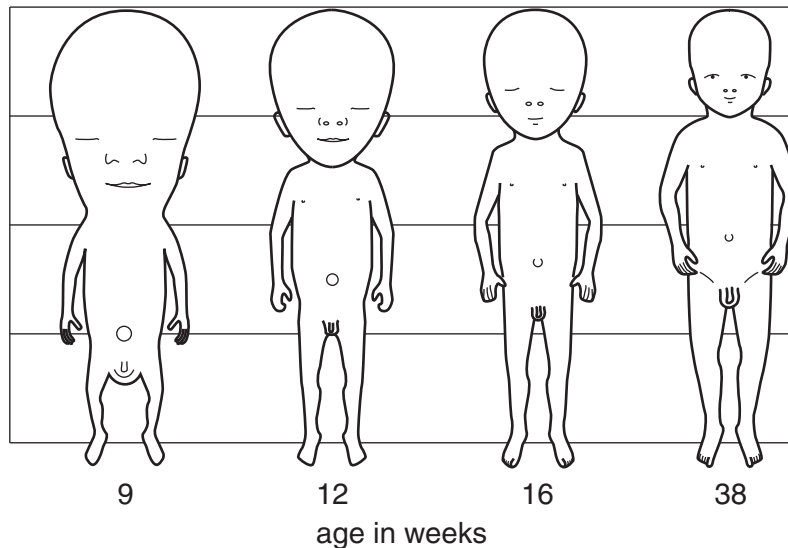
Section C – Module B3

10 This question is about growth in humans.

Look at the diagrams of a developing foetus during pregnancy.

The diagrams are **not** drawn to scale.

The diagrams show how the proportions of the body parts change during pregnancy.



(a) Different parts of the foetus grow at different rates.

Look at the statements about the developing foetus.

Put a tick (✓) in the box next to the correct statement.

The head is the last part of the body to develop.

☐

During weeks 16 to 38 the head grows slower than the arms and legs.

☐

The legs are always longer than the arms.

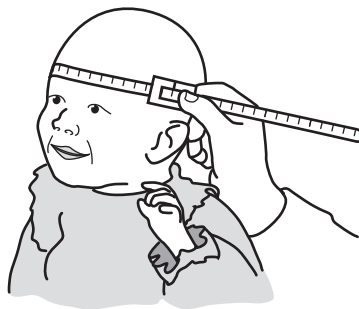
☐

The size of the head decreases as the foetus develops.

☐

[1]

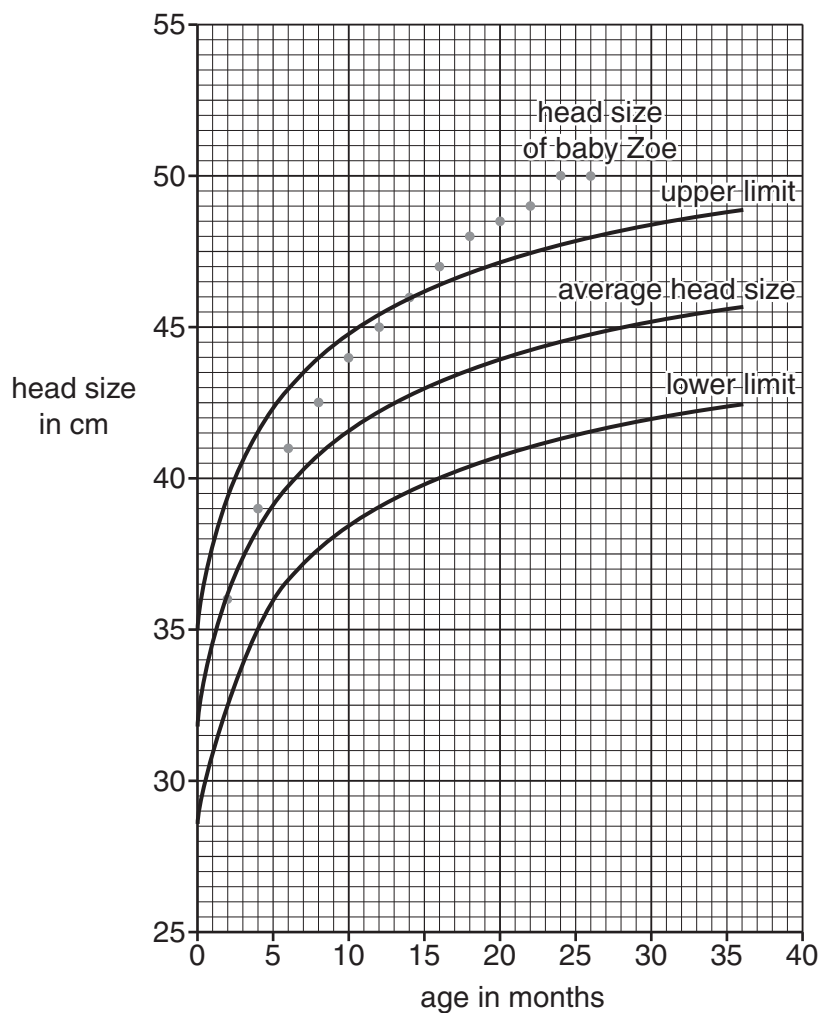
(b) Zoe is a baby girl.



A doctor measures her head size every two months from birth.

The doctor plots the measurements on a growth chart.

Look at the growth chart.



The chart shows the average head size for girls between birth and 36 months.

The upper and lower limits are shown for healthy girls between these ages.

19

- (i) How old is Zoe when she reaches the upper limit for head size?

answer months [1]

- (ii) Between 12 and 26 months Zoe's head size increases by 5 cm.

Calculate what percentage this is of Zoe's head size at 12 months old.

.....

answer % [2]

- (iii) Why is it important that the head size of young children is measured regularly?

.....
 [1]

- (c) The doctor says that Zoe's increased head size is due to a mutation.

- (i) What can cause a mutation to occur?

.....
 [1]

- (ii) Genetic material changes during mutation.

How does it change?

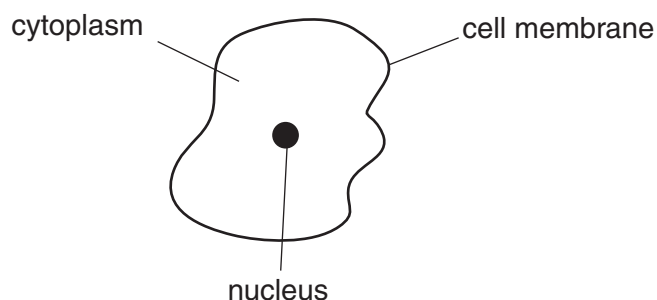
.....
 [1]

- (iii) Why does this change in genetic material affect the cell?

.....
 [1]

[Total: 8]

- 11 (a) The diagram shows a human cheek cell.



The cheek cell needs glucose.

Blood carries glucose molecules to the cheek cell.

By what process do glucose molecules move from the blood into the cheek cell?

..... [1]

- (b) The diagram shows a human sperm cell.



- (i) Sperm cells are specialised.

Each sperm cell has many **mitochondria** and an **acrosome**.

Explain how these **two** features help a sperm cell fertilise an egg.

mitochondria

.....

acrosome

..... [2]

- (ii) What type of cell division makes sperm cells?

..... [1]

21

- (c) Sperm cells have half the normal number of chromosomes found in other body cells.

What word **best** describes a cell that has half the normal number of chromosomes?

Put a ring around the correct answer.

diploid

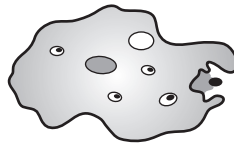
embryo

haploid

zygote

[1]

- (d) An amoeba is a single-celled organism.



Single-celled organisms are limited to a small size.

Explain why.

.....

..... [1]

[Total: 6]

12 This question is about plant growth.

Anita is a keen gardener.

She takes a cutting from her favourite plant.



(a) Taking plant cuttings is a form of **cloning**.

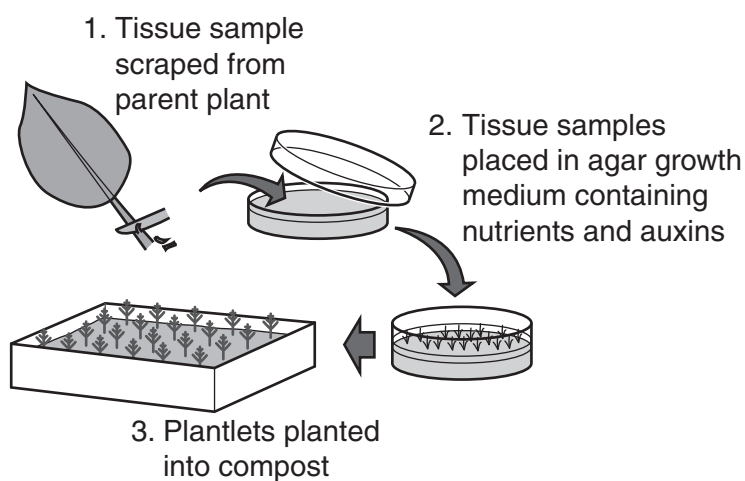
Anita could produce more plants by growing them from seeds.

Write down **one** advantage of using cloning instead of using seeds.

.....
 [1]

(b) The diagram shows plant tissue culture.

This is a different way of cloning plants.



(i) Stage 1 is done under **aseptic** conditions.

Explain why this is important.

..... [1]

23

- (ii) The agar contains auxins.

Auxins are chemicals usually made by plants.

The tissue samples cannot make auxins.

Explain why.

..... [1]

- (iii) As the plantlets grow, their cells divide.

Describe what happens to the chromosomes during this type of cell division.

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

- (c) Cloning plants is easier than cloning animals.

Explain why.

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

[Total: 6]

END OF QUESTION PAPER

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