THIS IS A LEGACY SPECIFICATION

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Tuesday 24 January 2012 – Morning

GCSE GATEWAY SCIENCE
BIOLOGY B

B631/02 Unit 1 Modules B1 B2 B3 (Higher Tier)

B620800112

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)

Duration: 1 hour

B631021

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- 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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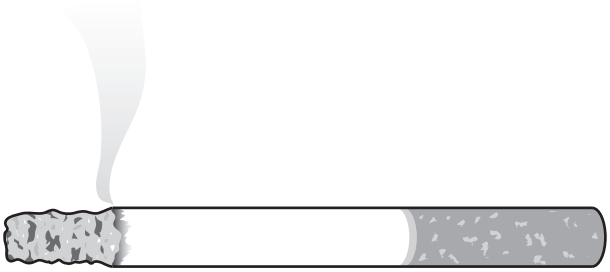
Answer **all** the questions.

Section A – Module B1

1 This question is about smoking.



(a) Cigarette smoke contains a drug called nicotine.

Different types of drug act in different ways.

Draw straight lines to connect each **type of drug** to the correct **action of the drug**.

One line has been drawn for you.

type of drug	action of the drug
alcohol	pain killer
aspirin	hallucinogen
LSD	stimulant
nicotine	depressant

[2]

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(b) (i) Smoking can affect the birth weight of babies born to mothers who smoke.

Look at the information in the table.

	baby born to mother who smokes	**baby born to mother who does not smoke**
mass at birth in kg	3.4	3.9
height at birth in m	0.50	0.52
BMI	.....	14.4

Body Mass Index (BMI) is calculated using the formula

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

Calculate the BMI of the baby born to the mother who smokes.

Show your working.

.....

.....

BMI ..... **[2]**

(ii) Nicotine makes it difficult to give up smoking.

Which word best describes this effect?

Put a (ring) around the correct answer.

accumulation **addiction** **irritation** **tolerance**

[1]

(iii) A new nicotine patch treatment has been developed to help smokers quit.

It must be tested before it can be used on humans.

Write down **one** reason why it must be tested.

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

(iv) Explain why some people have objections to certain forms of testing.

.....

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

[Total: 7]

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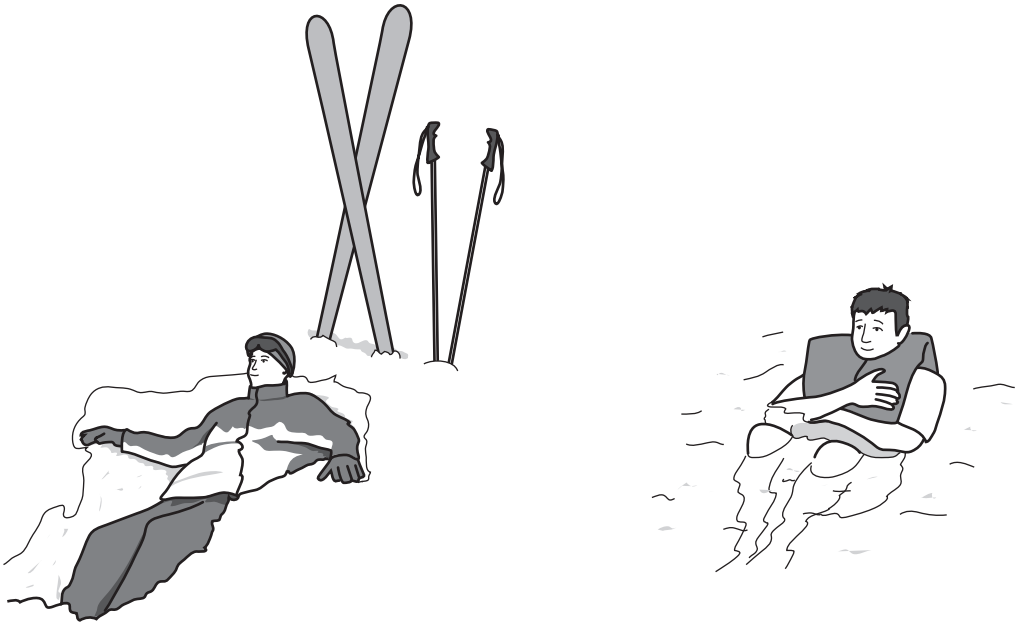
2 Look at the pictures of an injured skier and a man in cold water.

Both of these people face difficulty in keeping warm.



(a) (i) The normal core body temperature is 37 °C.

Why do body cells work best at this temperature?

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

(ii) Both men need to keep heat in their bodies so they do not cool down.

Changes take place to the blood flow in the skin to help keep heat in their bodies.

Describe the changes that happen and explain why they help keep heat in their bodies.

.....

.....

.....

.....

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

(iii) If the men do not keep enough heat in their bodies their core body temperatures will drop significantly below 37 °C.

Write down the word that describes this condition.

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

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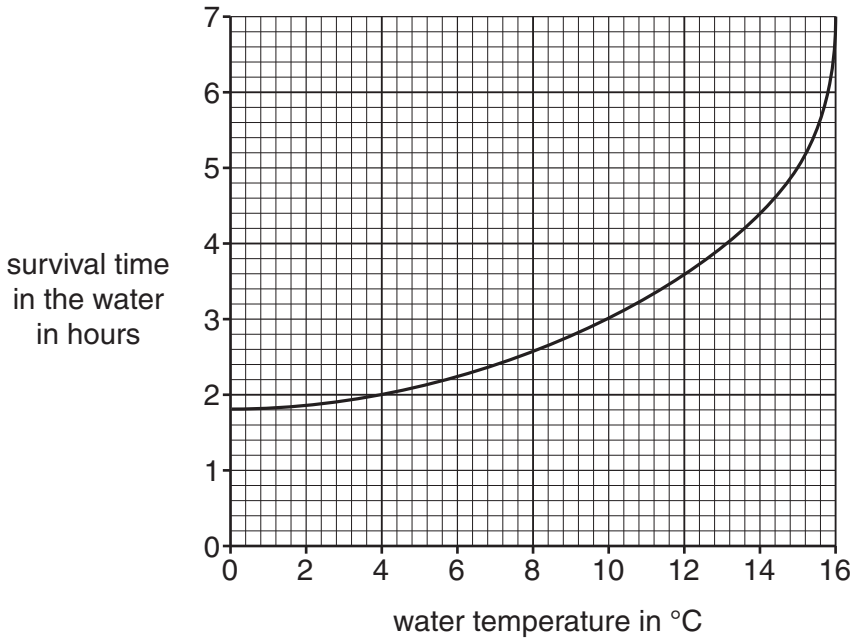
(b) Look at the graph.

It shows how long people survive in water at various temperatures.



How many hours longer is survival time in water at 15 °C than water at 10 °C?

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

[Total: 5]

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3 Look at Nicholas. He is a keen footballer.

(a) Nicholas eats a balanced diet which contains the right amounts of all the nutrients he needs.

Nicholas' diet would not be suitable for other members of his family.

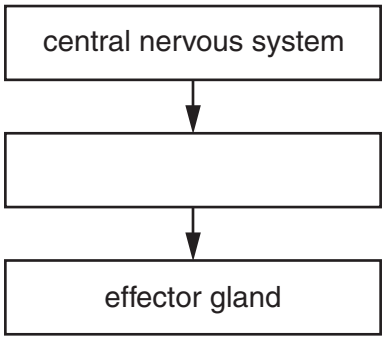
Suggest **one** reason why other members of his family will need different diets.

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

(b) **(i)** Enzymes are needed to digest the food Nicholas eats.

The release of digestive enzymes is controlled by a **reflex arc**.

Fill in the missing stage in this part of the reflex arc.



[1]

(ii) Synapses are gaps in a reflex arc.

Describe what happens when an impulse arrives at a synapse.

.....

.....

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

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(c) Nicholas' balanced diet includes glucose which is needed for **aerobic** respiration.

Write down the balanced symbol equation for aerobic respiration.

..... + ... → ..... + ... **[2]**

(d) Nicholas feels fatigue during a game of football.

He recovers after the game.

Describe what happens inside his body as he recovers.

.....

.....

.....

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

[Total: 8]

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Section B – Module B2

4 Look at the picture.

It shows an orangutan.

Orangutans live in rainforests.

(a) Orangutans are an **endangered** species.

(i) One reason orangutans are endangered is because the rainforest is being cut down.

Suggest **one other** reason why they might be endangered.

.....

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

(ii) Stopping the rainforest being cut down may help the orangutan species to survive.

Describe **one other** way the orangutans could be helped.

.....

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

(b) The rainforest is being cut down so the land can be used to grow palm trees.

Oil from palm trees is sold for use in the food industry.

However, there are also benefits to the local community from keeping the rainforest.

Suggest **two** benefits to the local community from keeping the rainforest.

1 .....

.....

2 .....

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

[Total: 4]

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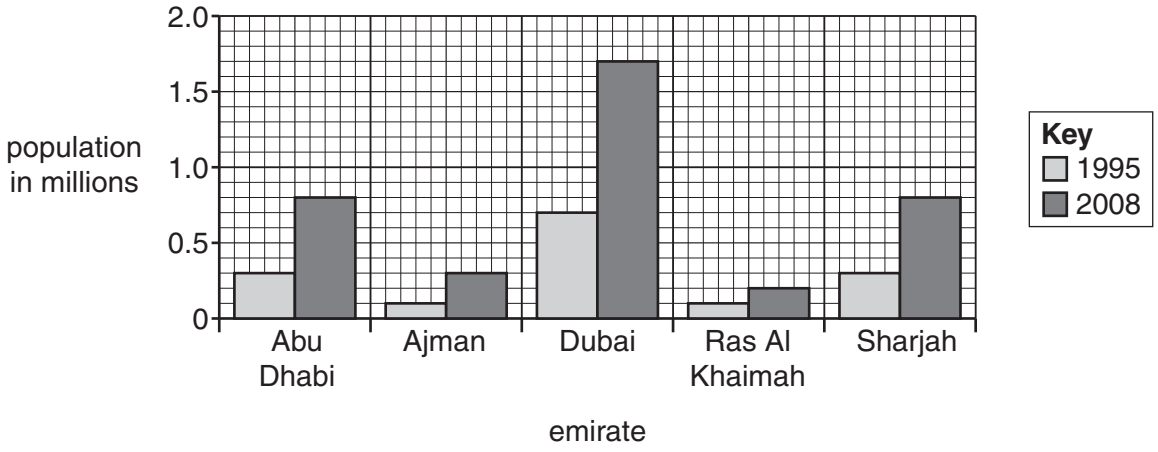
5 The UAE is a country made up of different areas called emirates.

The population of each emirate is increasing.

Look at the graph. It shows the population of five of the emirates.



(a) The graph shows the populations in 1995 and 2008.

The population of Dubai had the biggest increase during this time.

Calculate the increase in population of Dubai between 1995 and 2008.

Use your answer to calculate the **percentage increase** in population.

You should show your working.

.....

.....

answer .....% **[2]**

(b) The increase in population means that more fossil fuels are being burned.

This means more sulfur dioxide is being released.

Write down **one** effect of sulfur dioxide pollution.

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

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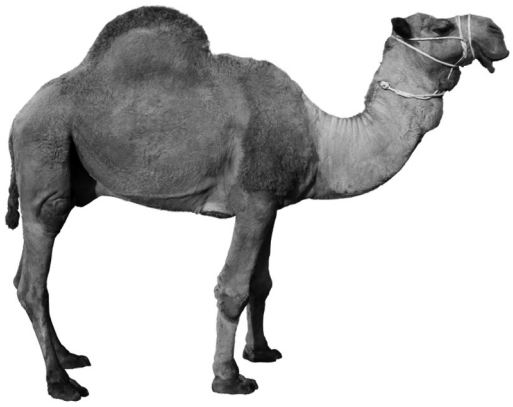
(c) The UAE is a desert country. There are camels living in the deserts.

Look at the picture of a camel.



(i) The fat on a camel is kept in the hump. This stops the fat insulating the whole body.

Write about **other** ways the camel is adapted to live in the desert.

.....

.....

.....

.....

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

(ii) Camels produce milk for their young.

Write down the name of the group of vertebrates that produce milk for their young.

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

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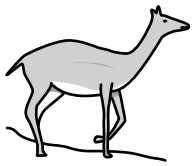
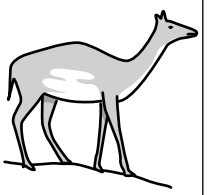
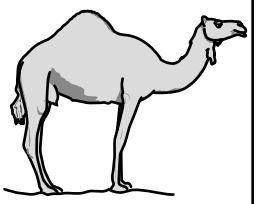
(d) Scientists think camels evolved from an animal that lived millions of years ago.

Look at the table.

It shows how scientists think camels evolved.

Age	**Paleocene 65 million years ago**	**Eocene 54 million years ago**	**Oligocene 33 million years ago**	**Miocene 23 million years ago**	**Present**
Organism					
Skull and teeth					
Limb bones					

Scientists have a good idea about what these animals looked like because they have found fossils of their bones.

To become fossilised the animal remains were buried by sediment.

(i) After burial the bones gradually formed fossils.

Describe how fossils formed from the bones.

.....

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

(ii) The camel has a longer neck than its ancestor.

Lamarck's theory suggests this is because the ancestor stretched its neck then passed on this change.

Why do scientists now think that Lamarck's theory is incorrect?

.....

.....

.....

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

[Total: 10]

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6 Look at the picture of some cactus plants.

(a) Plants make food by the process of photosynthesis.

(i) Write down the word equation for photosynthesis.

..... + ... → ..... + ... **[2]**

(ii) The glucose from photosynthesis is turned into starch for storage.

Why is starch better for storage than glucose?

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

(b) The cactus is adapted to live in hot dry conditions.

Look at the statements about the cactus.

Put a tick (✓) in a box next to each statement to show whether it is true or false.

	true	**false**
green stem for respiration	☐	☐
long roots to store carbon dioxide underground	☐	☐
rounded shape to decrease surface area to volume ratio	☐	☐
spines increase surface area for photosynthesis	☐	☐
thick cuticle to support the plant	☐	☐

[1]

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(c) Fred lives near a population of small cactus plants.

He wants to find out the number of cactus plants in the area. He uses a quadrat to collect some data.

He places the quadrat on the ground and counts the number of cactus plants inside the quadrat.

He repeats this five times and records the number of cactus plants he finds.

Suggest **two** limitations of Fred's method for collecting data.

1 .....

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

[Total: 6]

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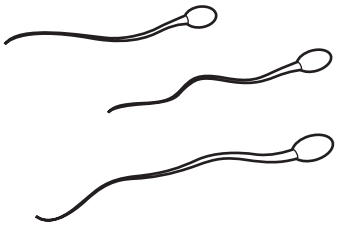
Section C – Module B3

7 This article appeared in a newspaper.

Read the article carefully.

A group of scientists claim to have made gametes from human stem cells.



The stem cells were taken from an embryo which had been made by cloning.

The stem cells were diploid but they were made to divide to produce sperm cells.

One of the scientists said,
"This is amazing and very exciting. The sperm cells all have a large nucleus and a tail.

Their shape is not quite normal but they contain all the proteins needed for fertilisation."

(a) The sperm cells were produced from **stem** cells.

What is a stem cell?

.....

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

(b) The stem cells are diploid.

They can divide to make sperm cells.

What name is given to this type of cell division?

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

(c) Why is it important that sperm cells are haploid?

.....

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

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(d) The stem cells were taken from embryos that had been made by cloning.

Some people think that it is wrong to make embryos to supply stem cells.

Write down **one** reason why they might think this.

.....

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

(e) A protein found in sperm cells, sp56, is needed for fertilisation.

It contains 579 amino acids.

How many DNA base pairs code for this protein?

.....

.....

answer = ... base pairs **[1]**

[Total: 5]

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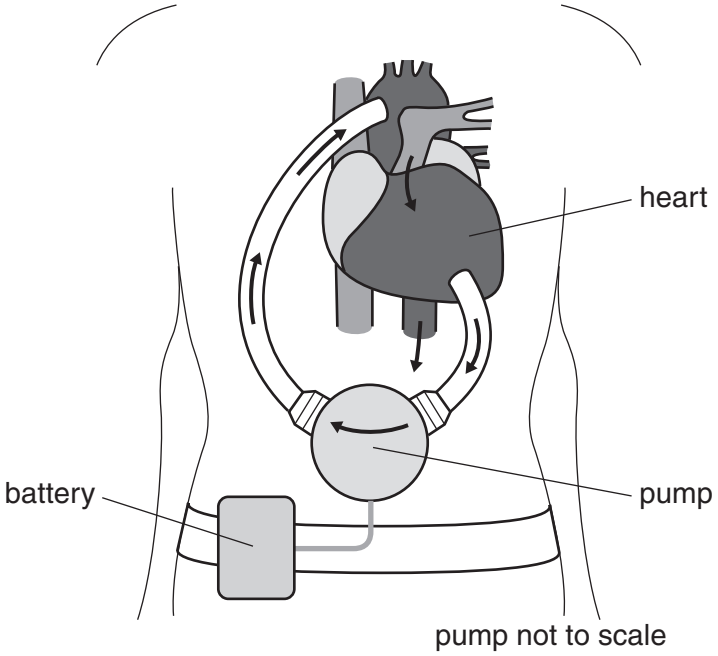
8 The heart has two ventricles that pump blood to different parts of the body.

The diagram shows a new type of artificial heart pump.

It is connected to the left ventricle.

It helps the left ventricle pump blood into a blood vessel.



(a) What is the name of the blood vessel that takes blood away from the **left** ventricle?

Put a (ring) around the correct answer in this list.

aorta **pulmonary artery** **pulmonary vein** **vena cava**

[1]

(b) The left ventricle is more likely to need the use of a pump than the right ventricle.

Suggest why.

.....

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

(c) The pump is implanted inside the body.

The pump is connected by a wire to the power supply which is outside the body.

Suggest **one** problem that this might cause.

.....

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

[Total: 3]

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9 The table shows the concentration of different substances in the blood.

The concentrations are shown for the blood of a pregnant woman and her foetus.

substance	concentration in the woman's blood in mg/100 cm^3	concentration in the foetus's blood in mg/100 cm^3
carbon dioxide	30	32
haemoglobin	12000	17000
glucose	90	63
fats	1000	600
oxygen	100	30
urea	22	25

(a) Three of the substances shown in the table will diffuse from the woman's blood to the foetus.

(i) Write down the names of these **three** substances.

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

(ii) How can you tell from the table which direction the substances diffuse?

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

(iii) The substances diffuse across the placenta.

Write down **one** way that the placenta is adapted to increase the rate of diffusion.

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

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(b) (i) Doctors can measure the mass of haemoglobin (Hb) in 100 cm^3 of red blood cells that are packed together.

For pregnant women this is 35 000 mg (35 g).

Doctors calculate the percentage of red blood cells in blood using the formula:

$$\text{percentage} = \frac{\text{mass of Hb in g per 100 cm}^3\text{ of blood}}{\text{mass of Hb in g per 100 cm}^3\text{ of packed cells}} \times 100$$

Use the table to work out this percentage for a pregnant woman.

.....

.....

answer = ...% **[1]**

(ii) Red blood cells make up 50% of the blood in a foetus.

The foetus has to maintain a large oxygen supply to its tissues.

Explain how it does this.

Use your answer to part **(i)** and your knowledge of haemoglobin to help you.

.....

.....

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

[Total: 6]

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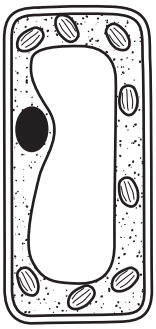
10 This question is about rice.

(a) Look at the diagram of a cell from a rice plant.



Write down two structures found in rice plant cells that are **not** found in animal cells.

..... and ..... **[1]**

(b) When rice seeds start to grow, their shoots grow upwards, towards light.

What is the name given to this response?

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

(c) About 100 years ago in Japan, the rice crops often failed.

The shoots would grow too quickly and then collapse.

(i) Some scientists thought that this must be due to a mutation in the genes of the rice plant.

How could a mutation in the DNA of a plant alter how the plant grows?

.....

.....

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

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(ii) Scientists then discovered that the crops failed due to a disease.

This disease was caused by a fungus.

The fungus was releasing a plant hormone.

This hormone is usually present in lower concentration in plants and enables them to grow in height.

What is the **main** way that plants gain height?

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

The cells in the tip of the shoot divide.	☐
The cells in the shoot enlarge.	☐
The roots grow, pushing the shoot upwards.	☐
The leaves grow.	☐

[1]

(d) Scientists have produced a new variety of rice by putting the gene for beta-carotene from carrots into rice.

Why is this useful?

.....

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

[Total: 6]

END OF QUESTION PAPER

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