

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
SCIENCE A**

A213/01

Unit 3: Modules B3 C3 P3 (Foundation 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)

**Friday 18 June 2010
Afternoon**

Duration: 40 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- 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).

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 **42**.
- This document consists of **20** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Using radioactive materials to treat cancer is called radiotherapy.

One material used for radiotherapy emits beta radiation.

A small amount of radioactive material is put inside a patient's body, near the cancerous cells.

It is taken out 10 days later.

(a) Which of the following statements is the reason for using this type of radiotherapy?

Put a tick (✓) in the box next to the **one** correct reason.

It kills cancer cells.

It kills healthy cells.

It makes healthy cells cancerous.

It makes cancerous cells healthy.

[1]

(b) Beta radiation is better than gamma radiation for this type of radiotherapy.

Which statement explains why?

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

Gamma radiation is more ionising than beta radiation.

Gamma radiation is not given out by radioactive materials.

Cancer cells absorb beta radiation more effectively than gamma radiation.

Cancer cells absorb beta radiation less effectively than gamma radiation.

[1]

(c) The patient had a large dose of radiation from the treatment.

Which of the following changes to the treatment would give a **bigger** dose?

Put ticks (✓) in the boxes next to the **two** correct changes.

leaving the radioactive material in the patient for 5 days instead of 10 days

leaving the radioactive material in the patient for 15 days instead of 10 days

putting the radioactive material in the body for 10 days but farther away from the cancerous cells

putting less radioactive material into the patient

putting more radioactive material into the patient

[2]

(d) Some hospital staff are at risk from the radioactive materials used in radiotherapy.

Write down the job of one person in the hospital who may be at risk from handling radioactive materials.

job

Suggest **two** ways in which the hospital could reduce the risk to this person.

.....
.....
.....
.....
.....

[3]

[Total: 7]

2 This question is about generating electricity.

(a) (i) Electricity is a useful source of energy.

Which of the following statements explain why it is useful?

Put ticks (✓) in the boxes next to the **two** correct statements.

Electricity can be used in many ways.

Only electricity can be used for lighting.

Electricity is easy to transmit over large distances.

High voltage electricity can be dangerous.

Most power stations produce carbon dioxide.

[2]

(ii) Which one of the following statements about electricity is true?

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

Electricity is a fossil fuel.

Electricity is a primary energy source.

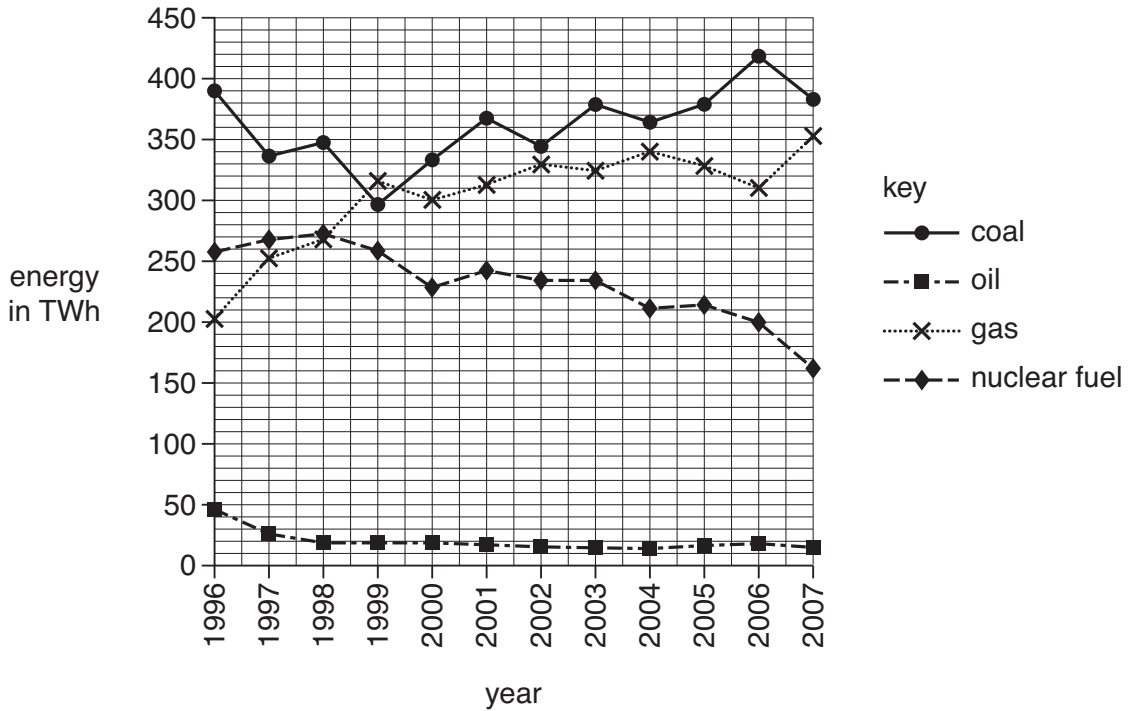
Electricity is a renewable energy source.

Electricity is a secondary energy source.

[1]

(b) The graph shows the amount of electrical energy generated in Great Britain from 1996 to 2007. The amount of energy is measured in terawatt-hours (TWh).

The electricity was generated from four different sources: coal, oil, gas and nuclear fuel.



(i) Electrical energy generated from which source, **coal**, **oil**, **gas** or **nuclear fuel**, decreased by the greatest amount from 1996 to 2007?

answer [1]

(ii) In which one year did gas generate more electrical energy than any other fuel?

answer [1]

(iii) Which fuels generated more than 250TWh in any year since 2000?

Write the name of **each** correct fuel in this space.

..... [1]

(iv) Which fuels generated less than 200TWh in any year on the graph?

Write the name of **each** correct fuel in this space.

..... [1]

[Total: 7]

3 Read the newspaper article.

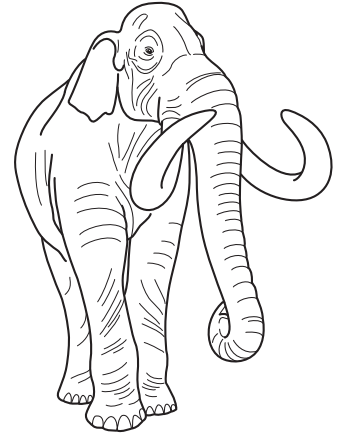
Mammoth skull found

A fossil of a mammoth skull has been found in France.

The skull is the most complete steppe mammoth skull ever found.

Steppe mammoths are thought to be a stage in evolution between the southern mammoth and the woolly mammoth.

All species of mammoth are now extinct.

**(a)** Fossils are one source of evidence for evolution.

Which other source of evidence for evolution is used by scientists?

Put a tick (✓) in the box next to the **one** correct source.

the internet

photographs

DNA analysis

TV programmes

[1]

(b) Scientists do not agree on how different mammoth species evolved.

Some scientists do not agree that steppe mammoths are a stage of evolution between southern mammoths and woolly mammoths.

What is the best **scientific** reason for this?

Put a tick (✓) in the box next to the **best** reason.

They may not believe in evolution.

Some scientists do not like new ideas.

Very few complete skulls have been found.

Scientists need to do breeding experiments with mammoths.

[1]

[Total: 2]

- 4 (a) Two communication systems have evolved in multicellular animals.

Put a **ring** around **each** of these **two** communication systems.

blood **digestive** **hormonal** **nervous** **respiratory**

[2]

- (b) The sentences below describe how the communication systems work.

Complete the sentences by using the **best** words from the list.

blood

effector

impulse

receptor

response

spinal

A stimulus or change is detected by cells.

A change caused by a stimulus is called a

The change is produced by cells.

[2]

[Total: 4]

5 Read the newspaper article on Neanderthal man.

Latest research on Neanderthal man

early Modern man



Neanderthal man

Neanderthal man probably became extinct about 24 000 years ago, during the last Ice Age.

Early Modern man and Neanderthal man lived at the same time and in the same places.

Scientists have recently excavated a cave near Gibraltar. The cave had been used by Neanderthal man. They found evidence of fires and flint stone tools.

Chemical analysis of bones shows that early Modern man ate a much greater variety of foods than Neanderthal man.

(a) One explanation for the extinction of Neanderthal man is:

- early Modern man was in competition with Neanderthal man, and
- early Modern man was more successful than Neanderthal man.

Which of the observations below are evidence for this explanation?

Put ticks (✓) in the boxes next to the **two** correct answers.

Neanderthal man lived in caves.

Neanderthal man used fire and flint stone tools.

Early Modern man ate a greater variety of foods.

Neanderthal man became extinct about 24 000 years ago.

Early Modern man and Neanderthal man lived at the same time and in the same places.

[2]

(b) Apart from competition, suggest **two other** possible reasons why Neanderthal man became extinct.

.....

.....

.....

..... [2]

[Total: 4]

6 Most scientists agree that evolution can be explained by natural selection.

Natural selection was first described by Darwin and Wallace in the 1850s.

(a) Which observations support their explanation?

Put ticks (✓) in the boxes next to the **two** correct observations.

Some species are found in many countries.

Characteristics can be inherited.

Variation exists between individuals.

Sexual reproduction occurs in plants and animals.

Asexual reproduction occurs in plants and animals.

[2]

(b) In 1858, when Darwin and Wallace published their ideas, many people disagreed with the idea of natural selection.

Suggest **two** reasons why many people at this time rejected natural selection.

.....

.....

.....

..... [2]

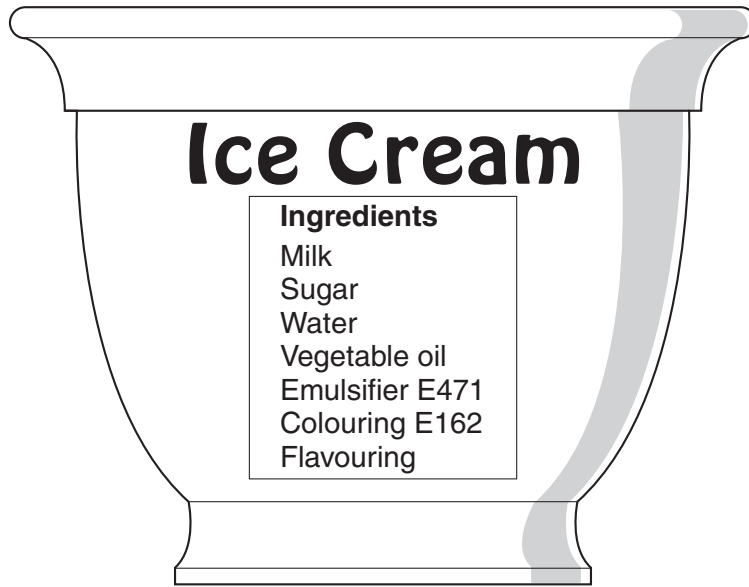
[Total: 4]

11
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Question 7 starts on page 12.

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7 The label on a tub of ice cream shows the ingredients in the ice cream.



(a) Emulsifiers are added to food.

They help some ingredients to mix together.

Which two ingredients in ice cream need an emulsifier so they can mix together?

Put ticks (✓) in the boxes next to the **two** correct answers.

- sugar
- water
- vegetable oil
- colouring
- flavouring

[2]

(b) (i) Emulsifiers are called additives because they are added to foods.

Name **one** other food additive and explain why it is added to food.

.....

.....

.....

.....

[2]

(ii) Most additives are given E numbers.

Here are four statements about additives with E numbers.

They are not all true.

Put a tick (✓) in the correct box after each statement to show whether it is **true** or **false**.

	true	false
They all supply energy to the body.	<input type="checkbox"/>	<input type="checkbox"/>
They have passed a safety test.	<input type="checkbox"/>	<input type="checkbox"/>
They are approved for use in the UK.	<input type="checkbox"/>	<input type="checkbox"/>
They are never harmful.	<input type="checkbox"/>	<input type="checkbox"/>

[2]

(c) Ice cream contains carbohydrates and proteins.

Draw a straight line from each **food type** to the elements it **consists of**.

You should draw only **two** straight lines.

food type	consists of
<input type="text" value="carbohydrate"/>	<input type="text" value="only carbon and hydrogen"/>
<input type="text" value="protein"/>	<input type="text" value="only carbon and oxygen"/>
	<input type="text" value="only carbon, oxygen and hydrogen"/>
	<input type="text" value="carbon, oxygen, nitrogen and hydrogen"/>

[2]

[Total: 8]

8 The most common cause of food poisoning in the UK is bacteria in food.

Some bacteria produce toxins when they grow in food.

Bacteria grow quickly at room temperatures but are killed at high temperatures.

Suggest **two** ways to reduce the risk of food poisoning from bacteria in food.

.....

.....

.....

..... [2]

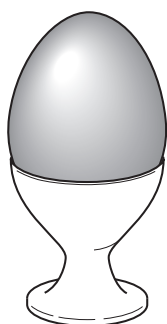
[Total: 2]

15
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Question 9 starts on page 16.

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9 Read this report.



An egg a day – the risk

Recent research suggests that an egg a day increases the risk of type 2 diabetes. Scientists reached this conclusion after tracking 57 000 men and women over a period of 20 years.

They found that eating an egg every day increased the overall risk of type 2 diabetes by about 60 per cent. Eating just one egg a week carried no increased risk.

Other scientists disagree with this research. They say that other lifestyle factors were not considered in the study, and that there is no possible mechanism to explain the link.

Some students are talking about the report.

Anwar
I am sure we should eat eggs. They are rich in protein and we need protein to grow.

Harry
I really enjoy eating bacon and eggs for breakfast. The report does not worry me.

Rachel
If our risk of getting diabetes is very low, it will still be low if we eat an egg every day.

Tessa
I shall make sure I do not eat more than one egg a week.

Dominic
It seems that everything we do is risky these days.

(a) Which **one** person is suggesting a way of reducing any risk from eating eggs?

answer [1]

(b) Which **two** people think the benefits of eating eggs outweigh the risks?

answer and [2]

- (c) Some scientists think that other lifestyle factors are more important in increasing the risk of type 2 diabetes.

Suggest one lifestyle factor, **apart from diet**, that increases the risk of type 2 diabetes.

.....

..... [1]

[Total: 4]

END OF QUESTION PAPER

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