OCR
RECOGNISING ACHIEVEMENT

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A213/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

SCIENCE A

Unit 3 Modules B3 C3 P3 (Foundation Tier)

WEDNESDAY 11 JUNE 2008

Afternoon
Time: 40 minutes

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

CUP/T56925

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **42**.

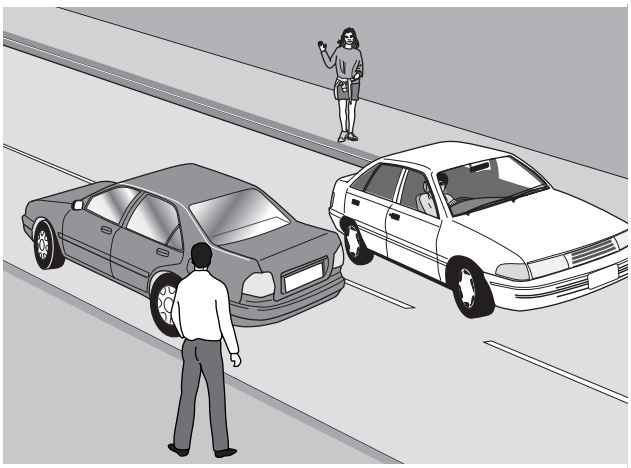
FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	5	
2	4	
3	5	
4	6	
5	8	
6	6	
7	2	
8	6	
TOTAL	42	

This document consists of **12** printed pages.

[Turn over

Answer **all** the questions.

1 Jill sees her friend Mark across the road. She waves to him.



(a) Complete the sentences by choosing the **best** words from this list.

a brain
an effector
a receptor
a response
a spinal cord

Jill's eye is .....

Jill waving is .....

Jill's actions are co-ordinated by .....

[3]

(b) Mark starts to cross the road without looking.
A car sounds its horn and he jumps back onto the kerb.
His face goes pale and he breathes quickly.

Some of these **events** involve rapid **nervous** responses.
Others involve longer lasting **hormonal** responses.
Put a tick (✔) in the correct box for each event.

event	nervous	hormonal
hearing the car horn		
his face goes pale		
jumping back on the kerb		

[2]

[Total: 5]

2 Sandy is a warden for a conservation group.
He notices that there are fewer sea birds nesting on the cliffs this year than in previous years.
He is worried that some species of birds may die out.

(a) Which word is used to describe a species which **has** died out?

Put a (ring) around the correct answer.

endangered **evolved** **extinct** **protected**

[1]

(b) Which of the following could be reasons for the reduced sea bird population?

Tick (✔) the **two** most likely reasons.

The weather is better this year. ☐

There is less food for the birds this year. ☐

Fewer of last years' chicks survived the winter. ☐

Fewer people in the area have cats as pets. ☐

Changes in the tides sent many birds off course. ☐

[2]

(c) Most sea birds eat fish.

How will the reduced sea bird population affect the population of fish?

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

The population of fish will decrease. ☐

The population of fish will increase. ☐

The population of fish will stay the same. ☐

[1]

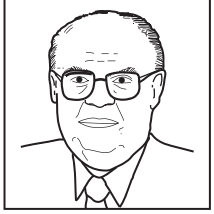
[Total: 4]

3 Evolution is a scientific theory.
It says that all living things evolved from a common ancestor by mutation and natural selection.

Two scientists are discussing evolution.
Here are some of their statements.

A. The fossil record shows a gradual change from simple organisms to more complex organisms.

Dr Peters



B. We know that mutations are happening in species today to produce differences. This could lead to new species being formed.

C. Selective breeding may produce very different looking animals but they are still the same species.

Professor Li

D. Most mutations are harmful to life and don't have any benefit to the animal.

E. Many fossils look identical to animals we see today.

(a) Which **two** of the statements **A**, **B**, **C**, **D** and **E** support the theory of evolution?

statements …… and …… [2]

(b) Selective breeding can be compared with natural selection.

Here are some statements.
Put a tick (✔) in each row of the table to show whether they are about **selective breeding**, **natural selection**, or **both**.

	selective breeding	**natural selection**	**both**
Individuals are chosen for useful features.			
There is variation between individuals.			
Some individuals are better adapted to survive.			
Useful features are passed on to offspring.			

[3]

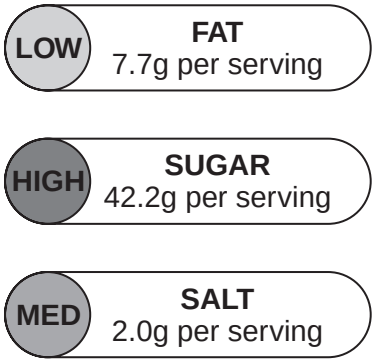
[Total: 5]

4 The Food Standards Agency is encouraging the use of 'traffic light' labelling on foods.

This shows if the food has high, medium or low amounts of some nutrients.
The colour code is:

Red	High
Amber	Medium
Green	Low

(a) Here is the traffic light label for a sponge cake:



(i) What colour is the traffic light for salt?

Put a (ring) around the correct answer.

red **amber** **green**

[1]

(ii) Which nutrient has a red traffic light?

Put a (ring) around the correct answer.

fat **sugar** **salt**

[1]

(b) Why is the Food Standards Agency encouraging traffic light labelling?

Put a tick (✔) in the box next to the **best** answer.

They like brightly coloured labels. ☐

The Government told them to. ☐

They want to make everyone eat the same food. ☐

They want people to choose a healthy diet. ☐

[1]

(c) Five people are talking about the risk of eating sugar in their diet.

(i) Which **two** people have taken steps to reduce their risk?

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

(ii) Who has decided that the benefits of eating sugar outweigh the risk?

.....[1]

[Total: 6]

5 Joe is a farmer.

(a) Complete the sentences about farming by choosing the **best** words from this list.

air
disease
fertile
nitrogen
soil
sterile

Fertilisers can be added to the soil.

Fertilisers usually contain .....

Farmers add this to make the soil more .....

Farmers also have to protect crops against .....

[3]

(b) **(i)** Here are four statements about farming methods.

Put ticks (✔) in the boxes next to the statements about **intensive** farming.

Pesticides are used to kill insects that damage the crop. ☐

Chemical weed killers are used to stop weeds competing with crops. ☐

Manure is put on the ground to add nutrients to the soil. ☐

No artificial fertiliser is used. ☐

[2]

(ii) Joe changes his farming methods to become an organic farmer.

What **must** he do before his crops can be labelled '**organic**'?

Put a tick (✔) in the box next to the **best** answer.

Tell all his customers that his food is organic. ☐

Put adverts in the local papers. ☐

Meet the UK national standards for organic farming. ☐

Tell his neighbouring farmers that his farm is organic. ☐

[1]

(c) Joe notices differences in his farm now he is organic.

Which **two** of the following will he notice?

Put a tick (✔) in each box next to the **two** correct answers.

His crop yield is lower. ☐

There is less wildlife in his fields. ☐

He spends less on pesticides. ☐

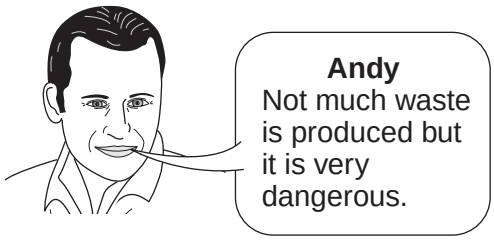
The weather is warmer. ☐

[2]

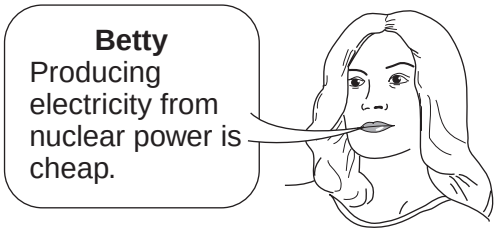
[Total: 8]

6 The British government is considering building some new nuclear power stations.

Here is what some people have said about nuclear power.

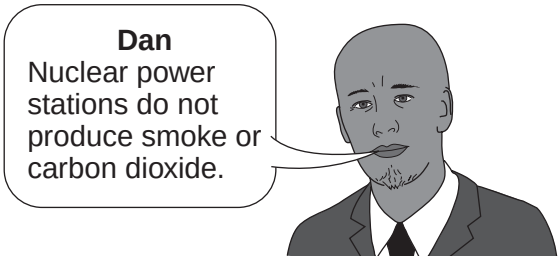


Andy
Not much waste is produced but it is very dangerous.



Betty
Producing electricity from nuclear power is cheap.

Chris
In the 1990s nuclear power was the fastest growing source of power in the world.



Dan
Nuclear power stations do not produce smoke or carbon dioxide.

(a) Each statement could be used in an argument about building new nuclear power stations.

For each statement decide if it could be used **for**, **against**, **neither** or **both** sides of the argument.

Put a tick (✔) in the correct box for each person.

Put only one tick in each row.

person	for	against	neither	both
Andy				
Betty				
Chris				
Dan				

[4]

(b) Dan says that no carbon dioxide is produced by nuclear power stations.

Which two other energy sources will not produce carbon dioxide?

Put (rings) around the **two** correct energy sources.

coal **gas** **oil** **tides** **wind**

[2]

[Total: 6]

7 The radiological protection agency says, 'Even though it is very difficult to measure the health effects of very low radiation doses we should assume the higher the radiation dose the higher the risk.'

Here are some examples of low radiation doses.

typical background radiation dose in Australia	2.0 mSv/year
typical background radiation dose in North America	3.0 mSv/year
typical background radiation dose in United Kingdom	2.3 mSv/year
average extra dose to North American nuclear industry workers	2.9 mSv/year

(a) Which country has the highest risk from background radiation?

Put a (ring) around the correct country.

Australia **North America** **United Kingdom**

[1]

(b) What is the **total** dose (in mSv/year) for a typical worker in the North American nuclear industry?

Put a (ring) around the correct answer.

2.9 **3.0** **4.9** **5.2** **5.9**

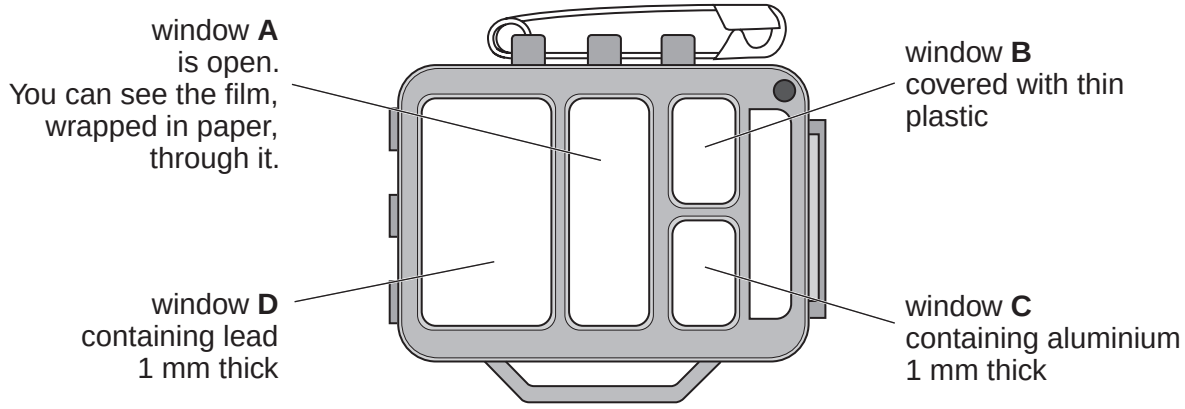
[1]

[Total: 2]

8 Workers exposed to radiation can use badges to detect the radiation dose they are exposed to.

Radiation is detected by a photographic film wrapped in paper.

The badge has four windows. One window is open and the other windows are covered by thin plastic, aluminium or lead. Lead is much denser than aluminium.



(a) **(i)** Which window, **A**, **B**, **C** or **D**, will block all beta radiation?

Window .....[1]

(ii) Which window, **A**, **B**, **C** or **D**, will give the **best** measure of background radiation?

Window .....[1]

(b) A salesman for the badge says 'The badge will not detect alpha radiation. This is not very important when the risk is from irradiation from a source outside your body.'

Which of the following best explain these two statements?

Put a tick (✔) in the box next to each of the **two** best explanations.

Alpha radiation is a helium nucleus. ☐

Alpha radiation cannot penetrate paper. ☐

Alpha radiation contains neutrons. ☐

Alpha radiation is stopped by dead skin cells. ☐

Alpha radiation has a very long half-life. ☐

[2]

(c) The unit of radiation dose is the sievert.

It is a measure of the possible harm to your body.

Which of the following is the sievert based on?

Put a tick (✔) in the box next to each of the correct answers.

amount of radiation	☐
half-life of the radiation source	☐
weight of a person	☐
type of radiation	☐
number of neutrons in a radioactive atom	☐

[2]

[Total: 6]

END OF QUESTION PAPER