

**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 17 June 2011
Afternoon**

Duration: 40 minutes



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.

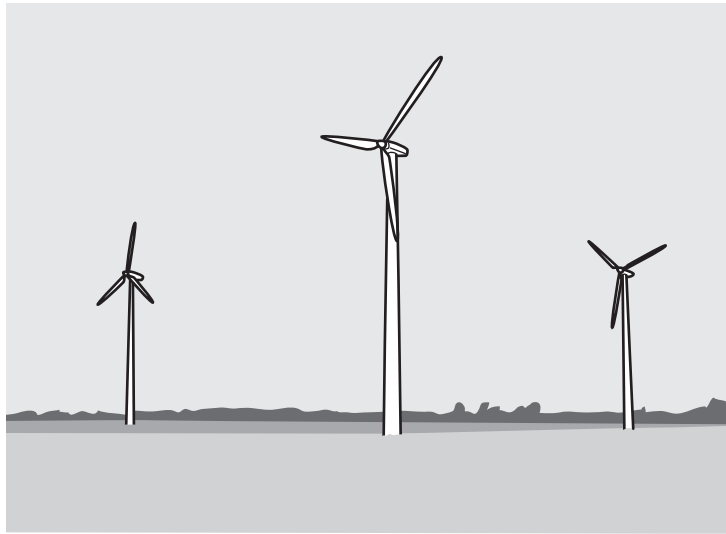
INFORMATION FOR CANDIDATES

- 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 **42**.
- This document consists of **16** pages. Any blank pages are indicated.

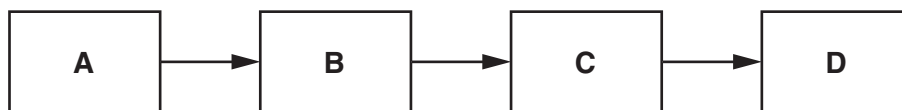
2

Answer **all** the questions.

- 1 Wind turbines can be used to generate electricity in wind farms.



- (a) The block diagram below shows the stages by which a wind turbine generates electricity.



The letters **A**, **B**, **C** and **D** stand for the statements below.

Put the correct letter next to each statement.

One has been done for you.

Electricity is generated.

☐

Electricity is passed on to the National Grid.

☐

This makes the generator spin.

☐

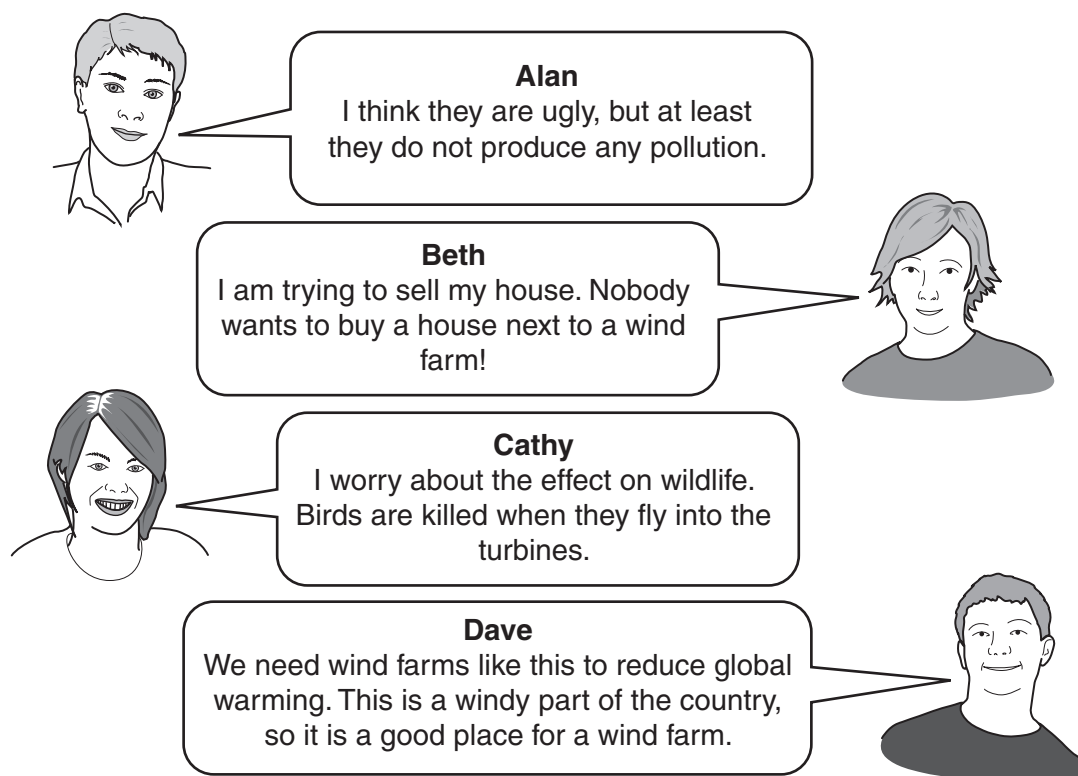
Wind makes the blades of the turbine rotate.

☐ **A**

[2]

3

(b) These people have different ideas about the wind farm next to their village.



Alan
I think they are ugly, but at least they do not produce any pollution.

Beth
I am trying to sell my house. Nobody wants to buy a house next to a wind farm!

Cathy
I worry about the effect on wildlife. Birds are killed when they fly into the turbines.

Dave
We need wind farms like this to reduce global warming. This is a windy part of the country, so it is a good place for a wind farm.

(i) Who mentions an advantage of having the wind farm?

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

Alan	☐
Beth	☐
Cathy	☐
Dave	☐

[1]

(ii) Who mentions both an advantage and a disadvantage of having the wind farm?

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

Alan	☐
Beth	☐
Cathy	☐
Dave	☐

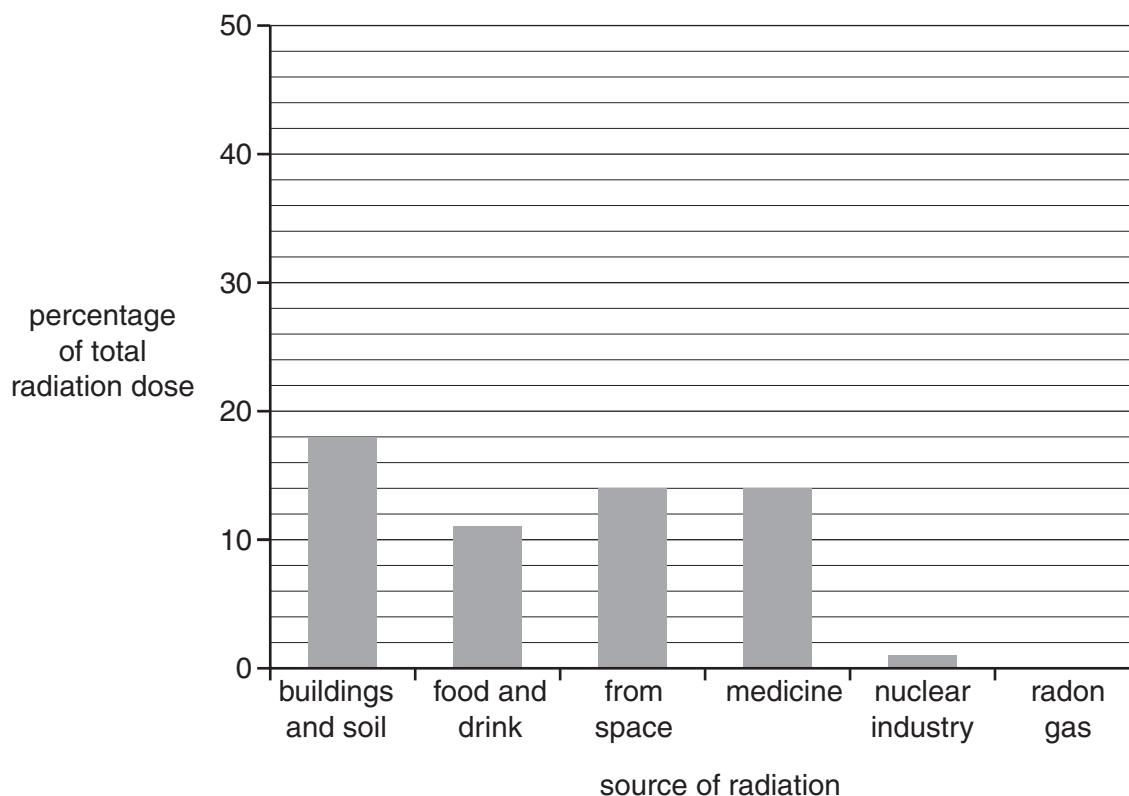
[1]

[Total: 4]

4

- 2 The average radiation dose of people living in Europe can be measured.
The radiation comes from different sources.
The bar chart shows the percentage of the total dose that is received from different sources.

The percentage for one source of radiation has **not** yet been plotted on the chart.



- (a) (i) 42% of the total radiation dose is from radon gas.
Complete the bar chart with this value. [1]

- (ii) Which of the sources in the chart gives the smallest percentage of the total radiation dose?

answer [1]

- (b) The radioactive materials used in medicine and in the nuclear industry are artificial ones, not natural ones.

- (i) What is the percentage of the total radiation dose given by these two artificial sources of radiation?

answer = % [1]

- (ii) Which of the natural sources of radiation gives the smallest percentage of the total radiation dose?

answer [1]

5

- (c) People who work with radioactive materials are at risk, and their employers need to make sure that the risk is small.

Name one job where workers will be regularly exposed to radioactive materials.

In your answer you should include

- what the risk is
- how the risk to the workers is kept as small as possible.

.....

.....

.....

..... [3]

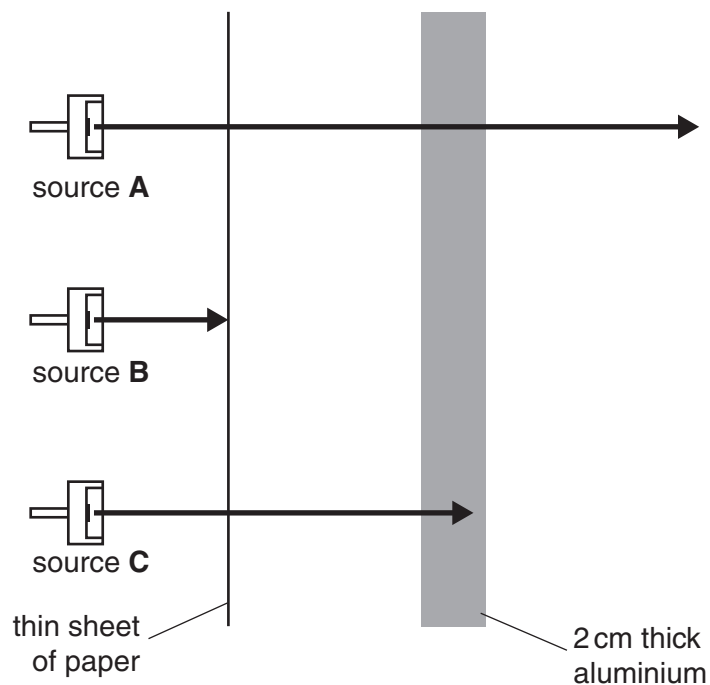
[Total: 7]

6

- 3 The diagram shows three different types of radiation being given out by radioactive sources **A**, **B** and **C**.

Sheets of thin paper and thick aluminium are put in front of the sources.

The arrows show how far each type of radiation can travel through these materials.



Put a tick (✓) in the correct box after each question.

	source A	source B	source C
Which source gives out the most penetrating radiation?	☐	☐	☐
Which source gives out beta radiation?	☐	☐	☐
Which source gives out gamma radiation?	☐	☐	☐

[3]

[Total: 3]

- 4 This is a question about extinctions.

Read the information about passenger pigeons.

- 1 When European settlers arrived in North America in the 1600s, there were millions of passenger pigeons.
- 2 The female passenger pigeons only laid one egg a year.
- 3 The passenger pigeons had few natural predators.
- 4 The birds fed mainly on acorns, chestnuts and beech nuts in the extensive woodlands of North America.
- 5 Settlers cut down woods for fuel and to build houses.
- 6 The settlers hunted the birds for food and feathers.
- 7 In 1914 the last passenger pigeon died in captivity.

Write the sentence number that provides evidence for each statement.

- (a) Humans may have **directly** caused the extinction of the passenger pigeon.

sentence number [1]

- (b) Humans may have **indirectly** caused the extinction of the passenger pigeon.

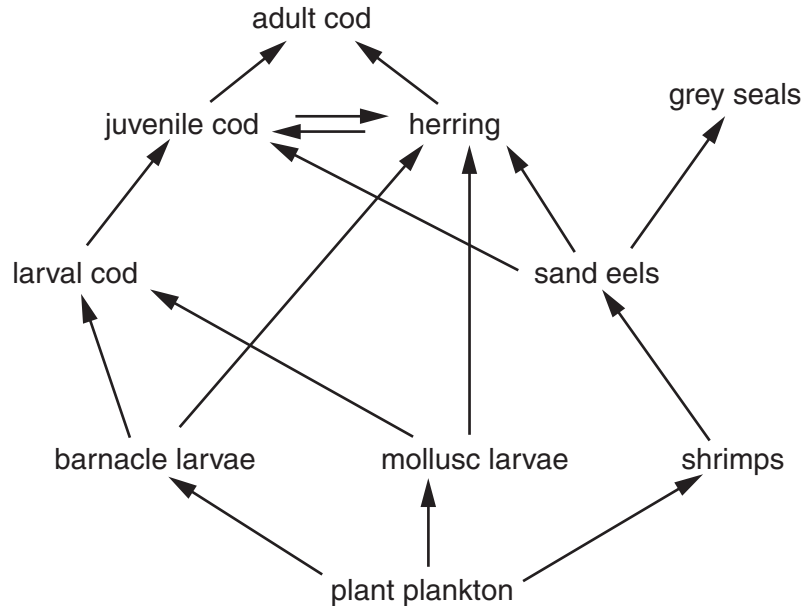
sentence number [1]

[Total: 2]

- 5 The diagram shows part of a food web for the North Sea.

Larvae are the young stages of some animals.

Use information from the food web to answer the questions.



- (a) Sand eels are eaten by puffins.

Complete the food web to show this information.

[1]

- (b) (i) Complete the sentence.

Barnacle larvae are eaten by larval cod and

[1]

- (ii) Use information from the food web to complete the sentence.

The species with the most varied diet is

[1]

9

(c) Barnacle larvae, mollusc larvae and shrimps all feed on plant plankton.

All three are using the same food source.

What do scientists call this?

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

fighting

☐

competition

☐

natural selection

☐

evolution

☐

[1]

[Total: 4]

6 Read the article.



Artist's reconstruction of
A. ramidus

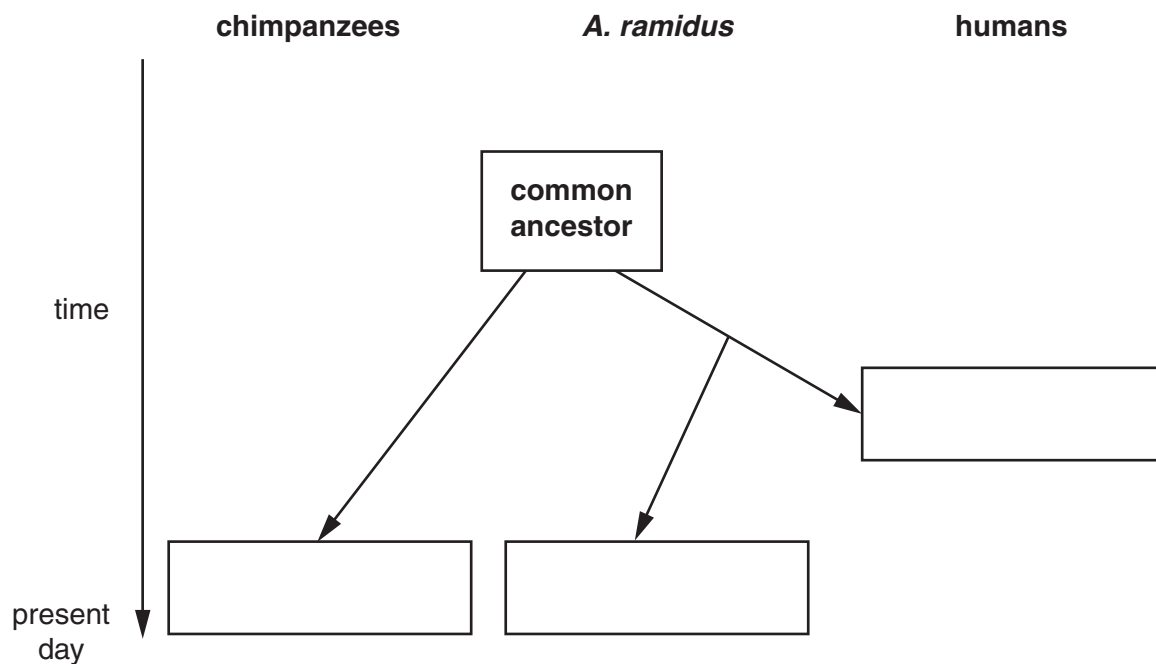
Missing link – the scientific breakthrough of 2009

Parts of an ancient skeleton of an ape-type animal, *Ardipithecus ramidus*, were discovered in 1994.

Scientists spent years piecing together fragments of the badly crushed pelvis bones. In 2009 they decided that *A. ramidus* could walk upright.

They said this means *A. ramidus* was, like humans, a hominid. It was not an ancestor of modern chimpanzees.

(a) Use words from the list to complete the diagram showing evolution of these species.



[2]

- (b) Some scientists agree that *A. ramidus* could walk upright.

Other scientists are **not** convinced.

Using information from the article, suggest why some scientists are not convinced that *A. ramidus* could walk upright.

.....

.....

..... [2]

[Total: 4]

7 This question is about evolution.

(a) Darwin suggested that evolution happened due to natural selection.

Read the information about peacocks.



Males have very large colourful tails with eyespots.

Females do not have large colourful tails.

Research shows that females prefer to mate with males with the most eyespots on their tails.

Explain why male peacocks have evolved such large tails.

In your answer, write about

- variation of peacocks
- competition between peacocks
- reproduction.

.....

.....

.....

..... [3]

(b) There is evidence for evolution.

Complete these sentences about this evidence.

The remains of dead plants and animals preserved in rocks are
called

The chromosomes of animals and plants show differences in a chemical
called

[1]

[Total: 4]

8 (a) Read this newspaper article.

Supermarkets have been told to remove packets of dried fruit from their shelves.

They contain the preservative sulfur dioxide, but this is not mentioned on the food label.

This means the dried fruit is a risk for people who have an allergy to sulfur dioxide.

(i) Many foods contain preservatives.

Explain what preservatives do and why they are added to food.

.....

.....

..... [2]

(ii) Jack has an allergy to sulfur dioxide.

How can he reduce the risk from this allergy when he eats?

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

only eat food he enjoys

☐

only eat food with lots of protein in it

☐

eat more food containing dried fruit

☐

read the labels on food to check for sulfur dioxide

☐

[1]

(b) Food may contain chemicals that are harmful to us.

(i) Give an example of a food that contains **natural** chemicals that may be a risk to us.

..... [1]

(ii) Describe one way that **human activity** can introduce harmful chemicals into food.

.....

..... [2]

[Total: 6]

9 Martha reads a healthy eating leaflet written by the Food Standards Agency.

(a) What are the jobs of the Food Standards Agency?

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

to find out the safe levels of chemicals in food

☐

to tell you if food is organic

☐

to stop people having diabetes because they are overweight

☐

to advise people on what they should eat

☐

to pass laws about healthy eating

☐

[2]

(b) The leaflet has a table that tells Martha the levels of fat, sugar and salt in a food.

The levels are classified as **high** and **low**.

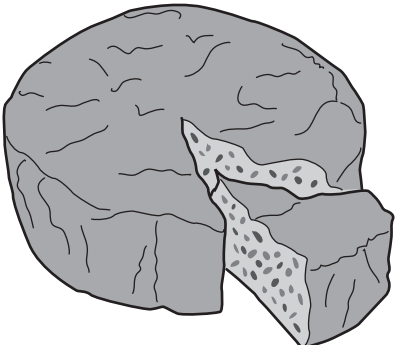
Each amount is given as grams in every 100 g of food.

	levels of fat, sugar and salt in food in g/100 g of food		
	fat	sugar	salt
food that is high has more than	20	15	1.5
food that is low has less than	3	5	0.3

Martha buys a cake at the supermarket.

She looks at the label.

The label shows her whether the food is **high** or **low** in fat, sugar and salt.

 FRUIT CAKE	Per 100g	
	Energy Carbohydrate Protein	1460 kJ 49.0 g 2.8 g
	FAT HIGH SUGAR HIGH SALT LOW	

15

Here are some statements about the cake.

Some are true and some are false.

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

	true	false
A 100g slice of cake has more than 20g fat in it.	☐	☐
A 100g slice of cake may only have 10g sugar in it.	☐	☐
A 100g slice of cake has more than 0.3g salt in it.	☐	☐

[2]

(c) The cake label also shows the amounts of carbohydrate and protein in the cake.

(i) What are the **four** main elements in proteins?

- 1
- 2
- 3
- 4

[2]

(ii) Our bodies need proteins for growth and repair.

The sentences below describe what happens when we eat proteins.

Draw a straight line from the **beginning** of each sentence to its correct **ending**.

beginning	ending
Digestion breaks down proteins into amino acids so they can be transported by the ...	... kidneys.
Amino acids that are not used for growth and repair are changed to urea in the ...	... blood.
Urea is excreted as urine by the ...	... liver.

[2]

[Total: 8]

END OF QUESTION PAPER

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