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)

MONDAY 21 JANUARY 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/T40781

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.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

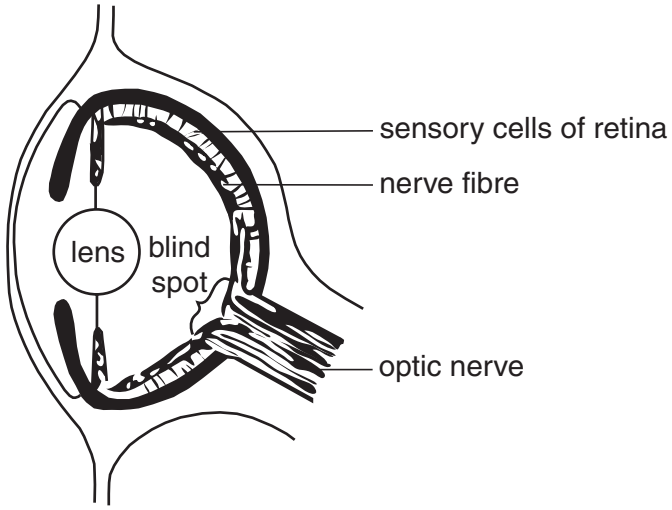
- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 42.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	6	
2	4	
3	4	
4	7	
5	7	
6	11	
7	3	
TOTAL	42	

This document consists of **16** printed pages.

Answer **all** the questions.

1 The diagram shows an octopus eye.



octopus eye

(a) Eyes help animals survive by detecting changes.

Complete the sentences. Choose words from this list.

effector
hormonal
nervous
receptor
responses
stimuli

Cells which detect changes are called ..... cells.

The changes detected by these cells are called ..... .

Eyes are part of the ..... system.

[3]

(b) Octopus eyes are very complex.
Some people say they have been designed.
Most scientists believe that eyes evolved by natural selection.

The sentences **A**, **B**, **C**, **D** and **E** describe possible steps in the natural selection of eyes. They are in the wrong order.

A Individuals which survived longer bred and passed on their genes.

B Individuals with better eyesight were more likely to survive.

C Over many generations, lenses improved.

D Individuals who could focus light on the retina could find food or escape predators better.

E Due to natural variation, some individuals in a population had lenses which focused light on the retina.

Fill in the boxes to show the right order. The first one has been done for you.

E				

[3]

[Total: 6]

2 Read the article about fish and fishing.

What's healthy and what's sustainable?

Sales of oily fish have increased following reports that omega-3 oils in the fish can make you live longer.
Scientists warn that current levels of fishing are not sustainable.
Scientists also say poisons have built up in fish because of pollution.
Fishing nets can damage plants which are the **basis for local ecosystems**.

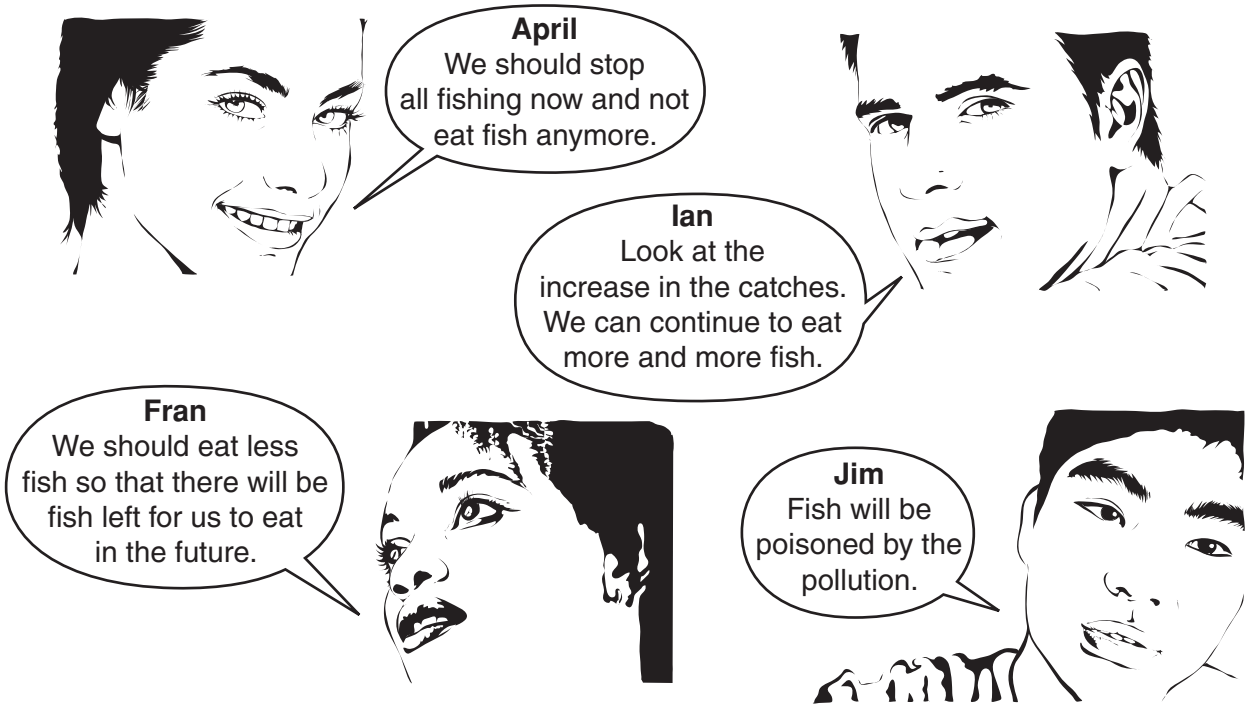
The table shows some information about five species of fish.

fish	contains omega-3 oil	sustainable	contaminated with poisons
cod	no	no	no
eel	no	no	yes
whiting	no	no	yes
herring	yes	yes	no
mackerel	yes	yes	yes

(a) Which fish would you recommend as being the safest **and** healthiest to eat?

answer .....[1]

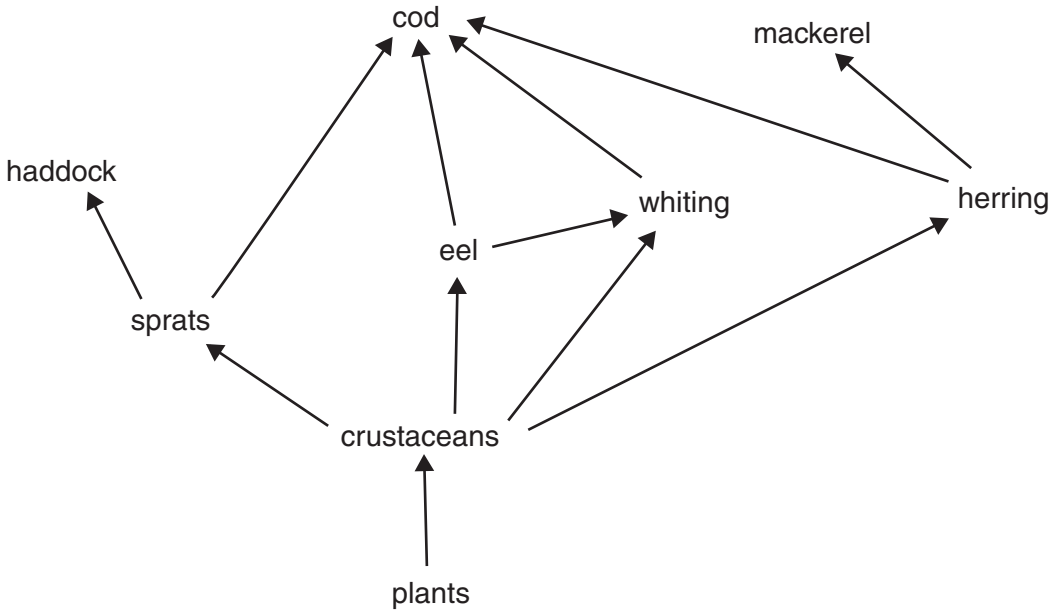
(b) Four friends are arguing about what sustainable fishing means.



Who has understood what **sustainable** means?

answer .....[1]

(c) Look at the food web of some organisms that live in the North Atlantic.



(i) In the article, plants are described as the 'basis for local ecosystems'.

Put a tick (✓) in the box next to the **best** explanation for this description.

All the animals eat plants. ☐

Crustaceans eat all the plants. ☐

Food chains always start with plants. ☐

Only animals can make their own food. ☐

[1]

(ii) Scientists think that there will be a **fall** in the number of herring.
How will this affect the number of mackerel?

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

There will be fewer mackerel because there will be less food. ☐

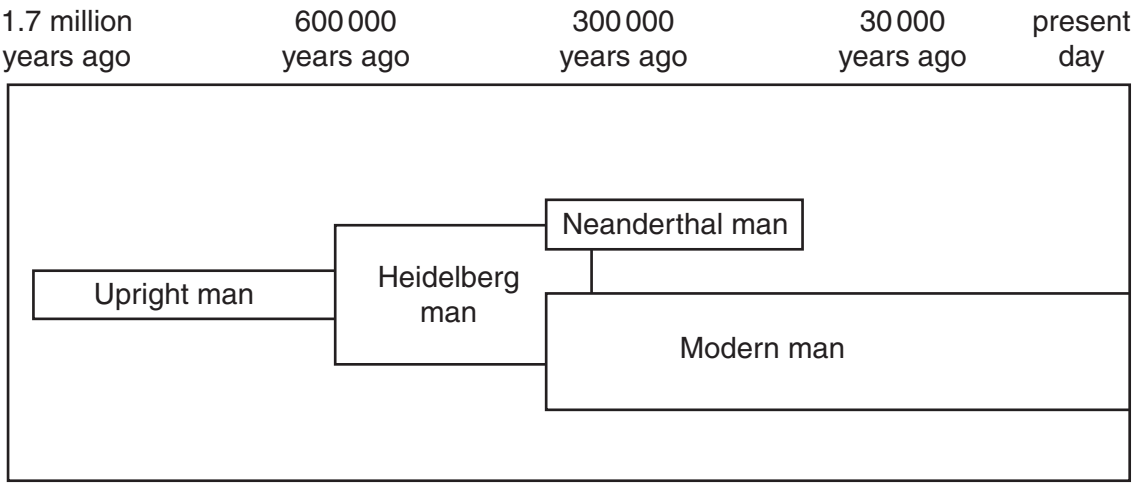
There will be the same number of mackerel because mackerel don't eat herring. ☐

There will be more mackerel because they will not be eaten by herring. ☐

[1]

[Total: 4]

3 The diagram below shows one possible pattern for human evolution. This is a simplified diagram which only shows four of the many hominid species which scientists think have existed over the last 1.7 million years.



(a) Some hominid species are extinct.

Put **one** tick (✓) in the table to show a species which is **extinct**.
Put **one** tick (✓) in the table to show a species which is **not extinct**.

hominid species	extinct	not extinct
Upright man		
Heidelberg man		
Neanderthal man		
Modern man		

[1]

(b) Which species is likely to have had the smallest brain?

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

Upright man ☐

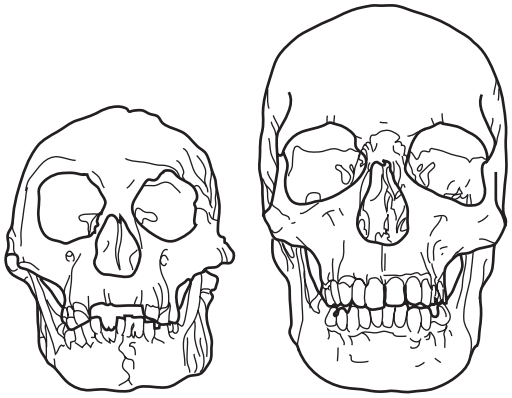
Heidelberg man ☐

Neanderthal man ☐

Modern man ☐

[1]

(c) In 2004 on the Indonesian island of Flores, scientists found the skull and some bones from an adult female. Read the statements about this find.

Flores man  Modern man

A The female was only one metre tall.

B Next to the bones, scientists also found stone tools and signs of cooking.

C The bones were 13 000 years old.

D Scientists said the bones belonged to a species new to science. They called this species Flores man.

(i) Statement **B** is an example of data. Which other **two** statements, **A**, **C** or **D**, are also data?

answer ..... and .....[1]

(ii) The scientists said that although the species had a smaller brain than modern man, it may have been quite intelligent.

Which statement, **A**, **B**, **C** or **D**, provides evidence supporting this hypothesis?

answer .....[1]

[Total: 4]

4 Eve is trying to eat healthily. She knows that it is important to cut down on some food chemicals such as sugar, fat and salt.

Eve has a fridge magnet that shows guidelines for healthy amounts of sugar, fat and salt in foods.

CHECK THE

LABELS!

	What's a little? (per 100 g)	What's a lot? (per 100 g)
Sugar	2 g	10 g
Fat	3 g	20 g
Salt	0.3 g	1.5 g

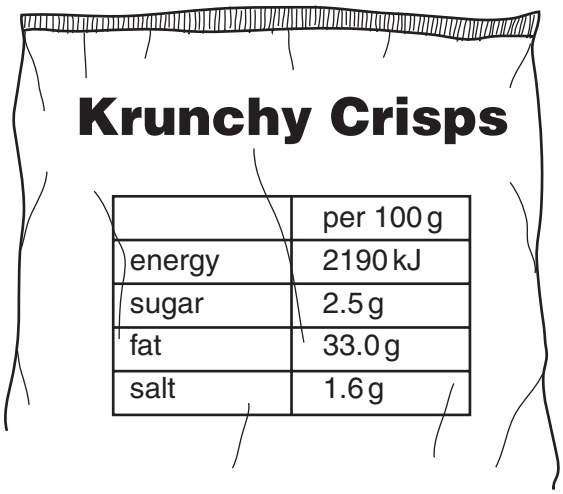
(a) Which food chemical, from the table, should be eaten in the smallest amount?

Put a (ring) around the correct answer.

sugar **fat** **salt**

[1]

(b) Eve looks at the label on a packet of Krunchy Crisps.



(i) Use information from the fridge magnet and the Krunchy Crisp packet to decide whether the crisps are **high** or **low** in sugar, fat and salt.

Put a tick (✓) in each correct box.

	high	**low**
sugar		
fat		
salt		

[2]

(ii) Eve knows that she cannot assess the risk of eating Krunchy Crisps using only this information.

Which statements show why she cannot assess the risk?

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

She might be eating other foods that are more harmful than crisps. ☐

She does not know the outcomes of eating too much sugar, salt and fat. ☐

She needs to take into account the amount of crisps that she eats. ☐

Other brands of crisps may have different amounts of sugar, salt and fat. ☐

[2]

(c) Eve reads an article that says that eating too much fat can increase the risk of getting heart disease.

Eve knows that her grandmother eats lots of fatty foods and has a very healthy heart.

Which of the following statements best explains why this can happen?

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

Eve's grandmother has other health problems. ☐

There is only a correlation between eating too much fat and having heart disease. ☐

Eve's grandmother was born before there were guidelines for healthy eating. ☐

Measuring risk only works for large numbers of people, not individuals. ☐

[2]

[Total: 7]

5 Joe is a farmer.
He wants to increase the yield of cereal crops from one of his fields.

(a) What effect does each of the following have on the crop yield?

Put a tick (✓) in each correct box.

	increases crop yield	**decreases crop yield**
adding nitrogen compounds to the soil		
fungal disease on the crops		
adding manure to the soil		

[1]

(b) Joe sees that there are a lot of greenfly on the crops in the field.
He is deciding whether or not to spray the greenfly with pesticide.

Which of the following statements are arguments **for** and which are arguments **against** spraying a crop with pesticide?

Put a tick (✓) in each correct box.

	argument **for** spraying	argument **against** spraying
Greenfly damage the plant stems.		
Pesticides may leave residues in the plants and soil.		
Greenfly are eaten as food by ladybirds.		
Joe wants to market the crops he grows as ‘organic’.		

[2]

(c) Joe sells his cereals to a food company.

The following list shows some chemicals that can be found in cereals.
Some chemicals found in cereals are harmful and can cause allergies in some people.

Put a (ring) around each of the **two** harmful chemicals.

aflatoxin from mould

cellulose

fibre

herbicide

starch

[2]

(d) Cereals are important foods because they contain carbohydrates and proteins.

Draw a straight line from each **foodstuff** to the correct **elements** it contains.

foodstuff	elements
	carbon, hydrogen, oxygen and nitrogen
carbohydrates	
	carbon and hydrogen only
proteins	
	carbon, hydrogen and oxygen

[2]

[Total: 7]

6 Radon gas is given off by the rocks in some parts of Britain.
Radon is a radioactive gas. It gives off alpha radiation.

(a) (i) Which of these is true for **alpha** radiation?

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

It is absorbed by a sheet of paper.	☐
It penetrates a sheet of paper but is absorbed by a thin metal sheet.	☐
It penetrates a thin metal sheet but is absorbed by several centimetres of lead.	☐

[1]

(ii) Alpha radiation is an ionising radiation.

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

It is used in TV remote controls.	☐
It can break up molecules.	☐
It is given out by mobile phones.	☐

[1]

(iii) Ionising radiation can have an effect on living cells.

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

A cancer may develop.	☐
Skin cells may turn into bone cells.	☐
The cells may die.	☐
The cells may turn green.	☐

[2]

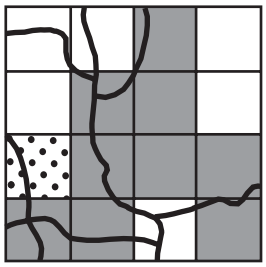
(b) This question is about houses in regions where there is too much radon gas.

If the level of radon is too high, there is a health risk, so action must be taken.

The maps show the percentage of houses with a health risk due to radon gas in three different regions of England.

Cambridgeshire

Norfolk



Yorkshire

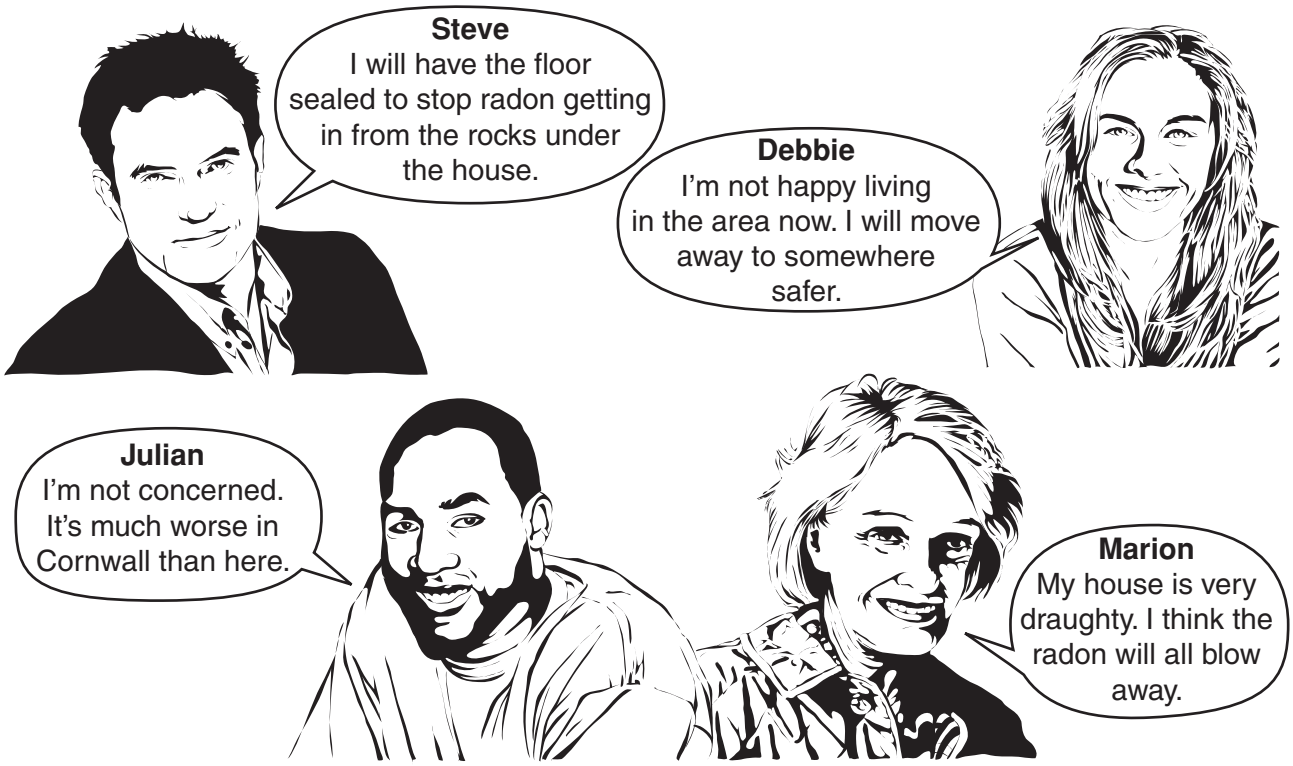
percentage of houses where action must be taken	
	less than 1%
	between 1% and 3%
	between 3% and 5%
	between 5% and 10%
	more than 10%

Put a tick (✓) in the box for **each** correct region for each statement.

	Cambridgeshire	Norfolk	Yorkshire
One part of this region has very high radon levels.			
Over half of these regions have very low radon levels.			
No area in this region has more than 3% of houses where action must be taken.			

[4]

(c) Four people who live on one street have been told that their houses are above the level where action must be taken.



(i) Who thinks there is **no** real risk from radon gas in their house?

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

Steve ☐

Debbie ☐

Julian ☐

Marion ☐

[2]

(ii) Who is planning to make a change to their house to reduce the risk from radon gas?

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

Steve ☐

Debbie ☐

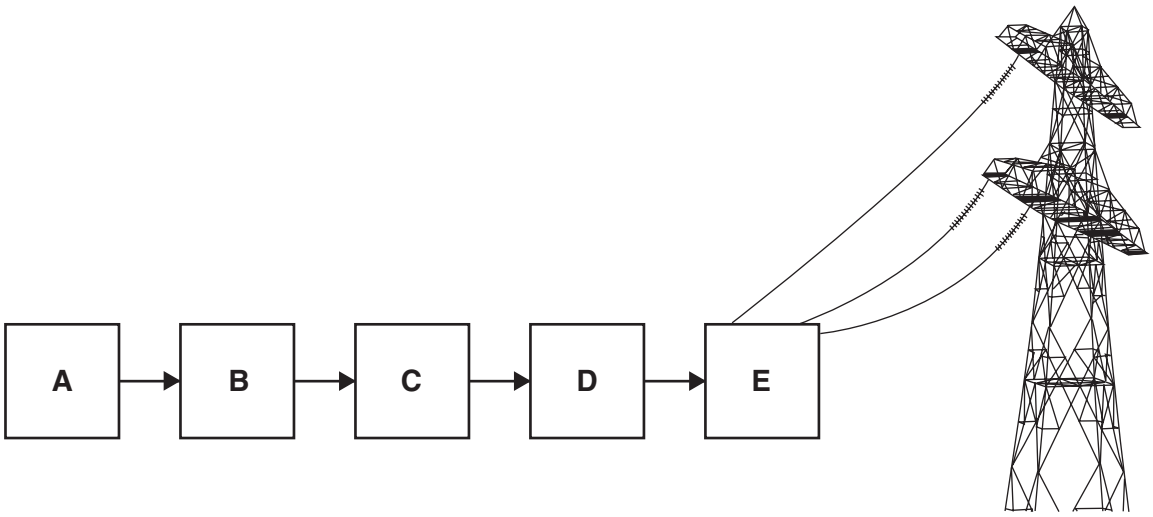
Julian ☐

Marion ☐

[1]

[Total: 11]

7 The following block diagram shows how electricity is made in a nuclear power station.



The statements in the table describe what happens at each stage.
They are in the wrong order.

Write the **correct** letter, **B**, **C**, **D** or **E**, next to each stage.
The first stage, **A**, has been put in for you.

Steam turns a turbine.	
Water is heated and changes to steam.	
The turbine turns a generator to make electricity.	
Nuclear changes release heat energy.	A
A transformer sends electricity to the National Grid.	

[3]

[Total: 3]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE