OCR
RECOGNISING ACHIEVEMENT

SPECIMEN F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE **A161/01**

BIOLOGY A

Unit A161: Modules B1, B2, B3 (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)

Duration: 1 hour

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks for each question is given in brackets **[ ]** at the end of the question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

For Examiner's Use		
	Max	**Mark**
1	**5**	
2	**8**	
3	**6**	
4	**3**	
5	**9**	
6	**7**	
7	**2**	
8	**2**	
9	**7**	
10	**3**	
11	**5**	
12	**3**	
TOTAL	**60**	

Answer **all** the questions.

1 In the future it may be possible to repair damaged body parts using stem cells.

(a) Use the words provided to complete the sentences.

active	**altered**	**clones**	**genes**	**illnesses**
inactive	**infections**	**living**	**specialised**	**unspecialised**

Embryonic stem cells can develop into any kind of cell because they are ..... .

During the development of multicellular organisms, cells usually become ..... .

Scientists hope that research into stem cells will lead to treatment for some ..... .

[2]

(b) Stem cells can also be used to produce clones.

Put a tick (✓) in the box next to the **correct** description of what clones are.

Clones…

…contain only specialised cells, for example skin cells. ☐

…can only be produced by sexual reproduction. ☐

…are genetically identical cells or organisms. ☐

…are cells that are the same size and perform the same function. ☐

[1]

(c) Using human embryos to produce stem cells has caused a lot of argument.

Suggest **two** arguments **against** the use of human embryonic stem cells.

.....

.....

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

[Total: 5]

2 Read the information about phenylketonuria (PKU).

PKU is an inherited disorder.

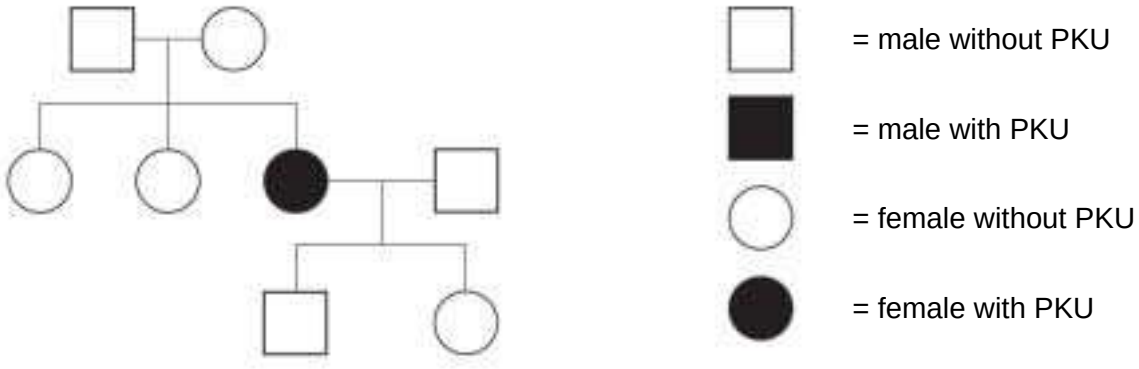
PKU is caused by a faulty gene.

A chemical called phenylalanine builds up in the bodies of people with PKU.

Too much phenylalanine causes serious health problems.

Serious health problems can be avoided with a controlled diet. The sooner this diet is started after birth, the less harm is caused.

(a) Look at the family tree.



Draw straight lines to link the correct **description** of the inheritance of PKU with the **two** correct **explanations.**

You should join **one** description with **two** explanations.

description	**explanation**
	Parents can be carriers of PKU.
PKU is inherited in a similar way to cystic fibrosis.	
	PKU is caused by a dominant allele.
PKU is inherited in a similar way to Huntington's disease.	
	Parents cannot be carriers of PKU.
PKU is inherited in a different way from cystic fibrosis and Huntington's disease.	
	PKU is caused by a recessive allele.

[2]

(b) About 1 in 10 000 babies born in the UK has PKU.

(i) Testing a baby for PKU costs the NHS £6.

Calculate the cost to the NHS of identifying one baby with PKU.

answer = £ ..... **[1]**

(ii) The Office for National Statistics reported that 710 000 babies were born in the UK in 2008.

How many babies born in the UK in 2008 would you expect to have been born with PKU?

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

(iii) Doctors have said that it is right to test all babies for PKU even though it costs the NHS money.

Use the information about PKU and your answers to parts **(i)** and **(ii)** to suggest reasons why the doctors have come to this conclusion.

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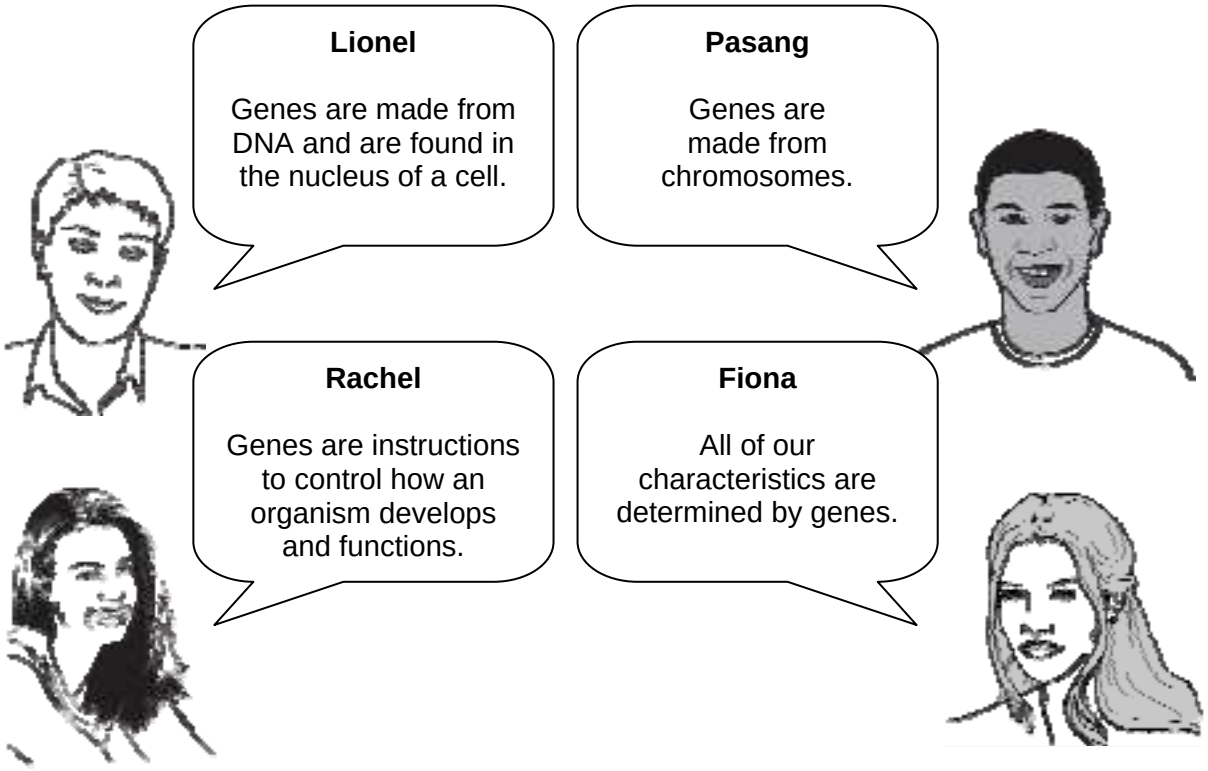
..... **[3]**

(c) PKU is a genetic disorder.

After a science lesson about genetics, some friends discuss what they think genes are.



Write down the names of the **two** people who make correct statements.

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

[Total: 8]

3 Jadzia has similarities to her mother and similarities to her father, but is **not** identical to either of them.

Use your knowledge of genes, sexual reproduction and the environment to explain why.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 6]

4 (a) Some microorganisms cause diseases that make us ill.

What do these microorganisms do that makes us ill?

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

produce toxins	☐
get bigger	☐
spread easily to other people	☐
recognise antibodies	☐

[1]

(b) Norman is infected with 1000 bacteria.

Each bacterium can reproduce every 20 minutes inside the human body.

When each bacterium reproduces it divides into two to produce two bacteria.

(i) How many bacteria would you expect to be present in Norman's body after 1 hour?

Put a ring around the correct answer.

2000 **4000** **6000** **8000**

[1]

(ii) The number of bacteria present in Norman's body after 1 hour was actually 7000.

How does this number compare with your answer to part **(b)(i)**?

Suggest a reason for the difference.

.....

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

[Total: 3]

5 Toby sees this article in a newspaper.

> Heart disease is one of the most common causes of death in the UK.
>
> Some scientists suggest that there is a correlation between the amount of time spent watching TV each day and the risk of dying from heart disease.
>
> They concluded that watching TV increases the risk of dying from heart disease.

(a) Toby wonders if he can believe the suggestion in the article.

He tries to find the same suggestion by looking in other sources of information.

He finds similar reports in:

- health magazines
- newspapers
- peer-reviewed journals
- television programmes.

Which source of information can Toby have most confidence in?

Explain your answer.

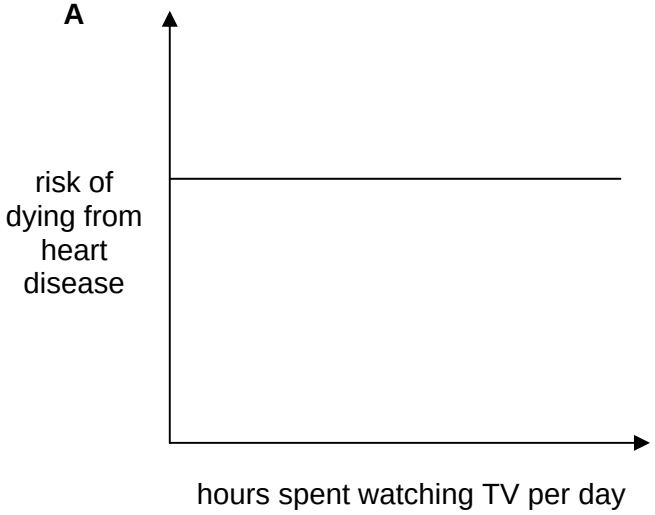
source of information: .....

explanation: .....

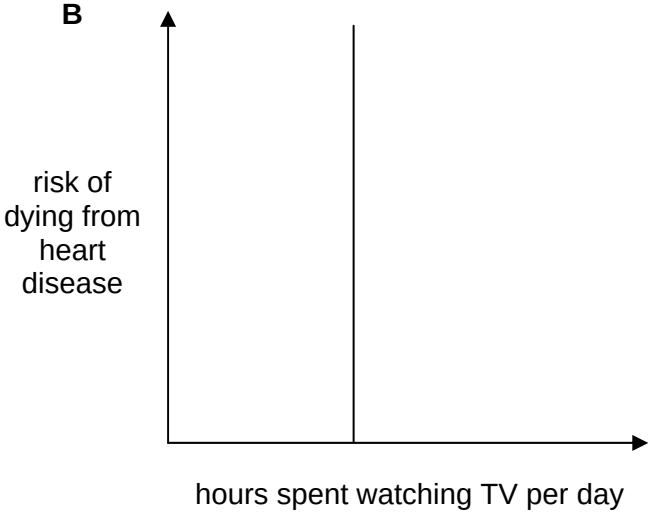
..... **[2]**

(b) Which graph, **A**, **B**, **C**, or **D**, illustrates the correlation described in the article?

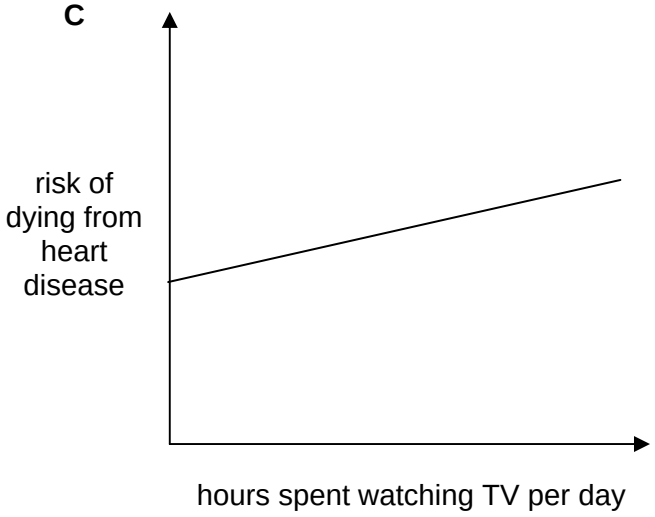
A



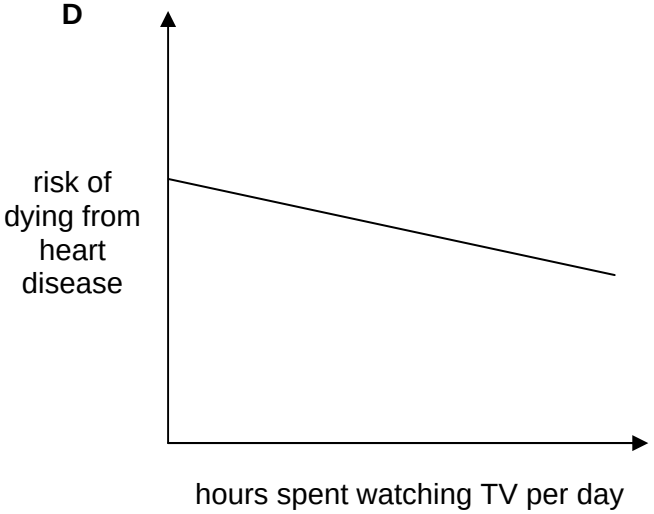
B



C



D



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

(c) Toby watches TV every night after work. He is worried about the correlation reported in the article. He decides to stop watching TV because he believes it will cause heart disease.

What advice would you give Toby about this?

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 9]

6 **(a)** New drugs for humans have to be tested. Some of these drugs are antimicrobials.

They are tested on **healthy** volunteers before being tested on people with the illness.

Why is this done?

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

It is cheaper than testing the drugs on ill people.	☐
To test whether the drugs are safe for humans.	☐
Drugs should not be tested on ill people unless we know they work.	☐
It is easier to find healthy volunteers than people with the illness.	☐

[1]

(b) Many antimicrobials are becoming less effective.

This is because an increasing number of disease-causing microorganisms are becoming resistant to antimicrobials.

(i) Put a tick (✓) in the box next to the correct description of what 'resistant' means.

The microorganisms are reproducing more rapidly.	☐
The microorganisms are not killed by antimicrobials.	☐
The microorganisms are not affected by vaccination.	☐
The microorganisms damage white blood cells.	☐

[1]

(ii) Antibiotics are a type of antimicrobial.

Describe **two** ways in which we can reduce the spread of antibiotic resistance.

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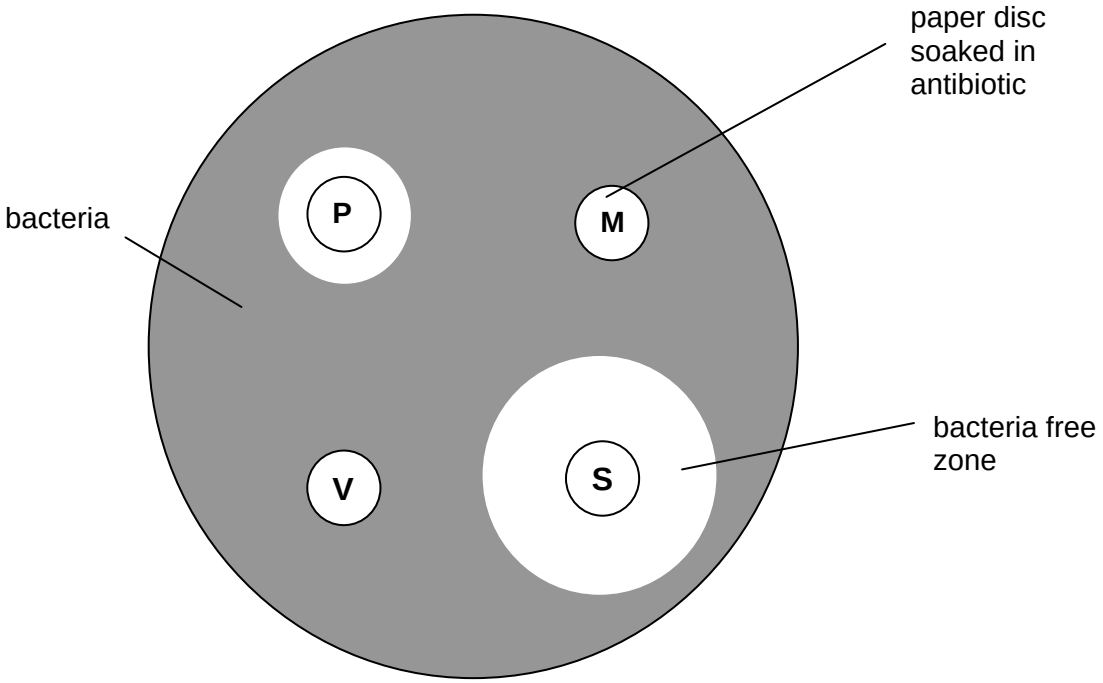
..... **[2]**

(c) Polly wants to test how well different antibiotics work against a type of bacteria.

She grows the bacteria on a petri dish. She then places four paper discs, **P**, **M**, **V** and **S**, in the dish. Each disc is soaked in a different antibiotic.

This is what Polly sees after she has left the dish for 6 hours.



(i) Polly wants to calculate the area of the bacteria-free zone around disc **P** and the zone around disc **S**. This will allow her to compare how well the antibiotics worked.

Polly uses this formula

$$\text{area} = 3.14 \times r^2$$

where r is the distance in cm from the centre of the disc to the edge of the bacteria-free zone.

Complete the table of Polly's results.

disc	r in cm	size of area in cm^2
P	1	
S	2	

[1]

(ii) Which antibiotic, **P**, **M**, **V** or **S** is the most effective against this type of bacteria? Explain your answer.

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

[Total: 7]

7 Maintaining a constant amount of water in the body is important for cell activity.

We gain water by drinking and we lose some water by excreting urine.

State **one** other way we **gain** water and **one** other way we **lose** water from our bodies.

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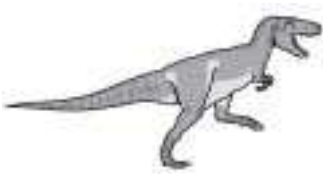
..... **[2]**

[Total: 2]

8 Read the newspaper article.

Are birds dinosaurs?

Tyrannosaurus rex (*T. rex*) is the most famous of all dinosaurs.



A 68-million-year-old fossil of a *T. rex* bone was found that still contained seven proteins.

Three of the proteins were very similar to proteins found in birds such as chickens.

Some scientists have suggested that this agrees with the idea that birds evolved from dinosaurs.

(a) Put a tick (✓) in the box next to the **explanation** reported in the article.

T. rex was the same as a chicken. ☐

Chickens evolved from dinosaurs. ☐

Dinosaurs evolved from chickens. ☐

T. rex is not related to chickens. ☐

Chickens evolved from *T. rex*. ☐

[1]

(b) Put a tick (✓) in the box next to the one piece of data that supports this explanation.

Seven proteins were found in a *T. rex* fossil. ☐

A 68-million-year-old *T. rex* fossil was found. ☐

Three proteins from *T. rex* were very similar to proteins found in chickens. ☐

[1]

[Total: 2]

9 (a) Which of these factors could cause a species to die out?

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

an increase in food supply	☐
decreased competition	☐
the arrival of a new disease	☐
the extinction of its predator	☐

[1]

(b) In the south east of England there is one main species of squirrel. Most of these squirrels have grey fur, but a small number of this species have black fur.

The number of squirrels with black fur in the population is increasing. The appearance of squirrels with black fur and their increase is an example of evolutionary change.

Suggest how this evolutionary change has happened.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

[Total: 7]

10 (a) The amount of carbon dioxide in the atmosphere has increased during the past 200 years.

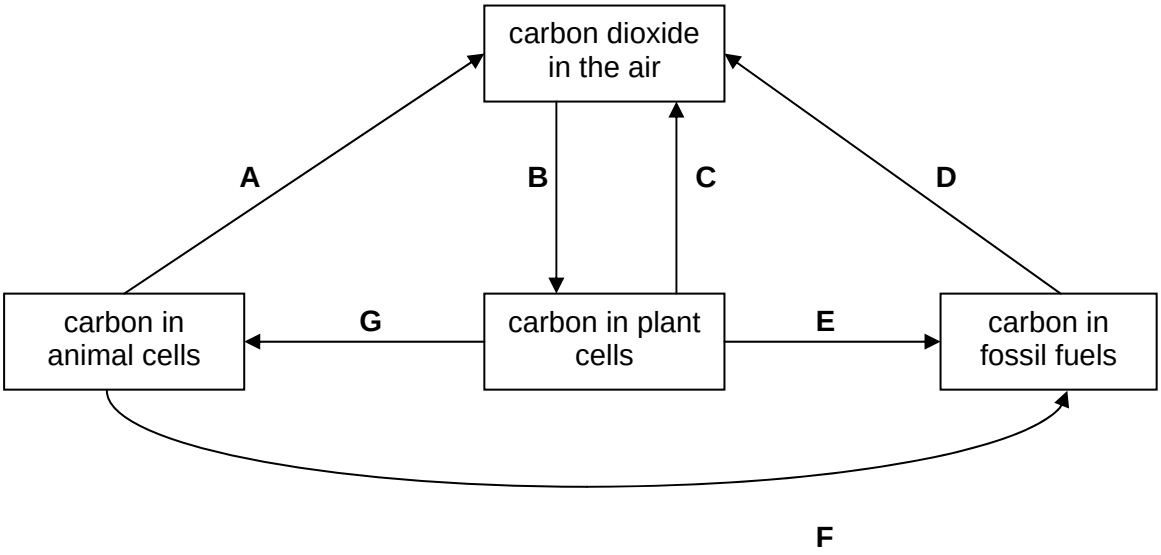
Which of the following changes would slow down the increase in carbon dioxide in the atmosphere?

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

Stop burning forests to clear the land.	☐
Plant more grassland for cattle and sheep.	☐
Cut back on the use of fossil fuels as a source of energy.	☐
Use wind power instead of nuclear power to generate electricity.	☐
Find new sources of oil and gas to replace the ones that are running out.	☐

[2]

(b) The diagram shows part of the carbon cycle.



Which **two** arrows from **A**, **B**, **C**, **D**, **E**, **F** and **G** show respiration?

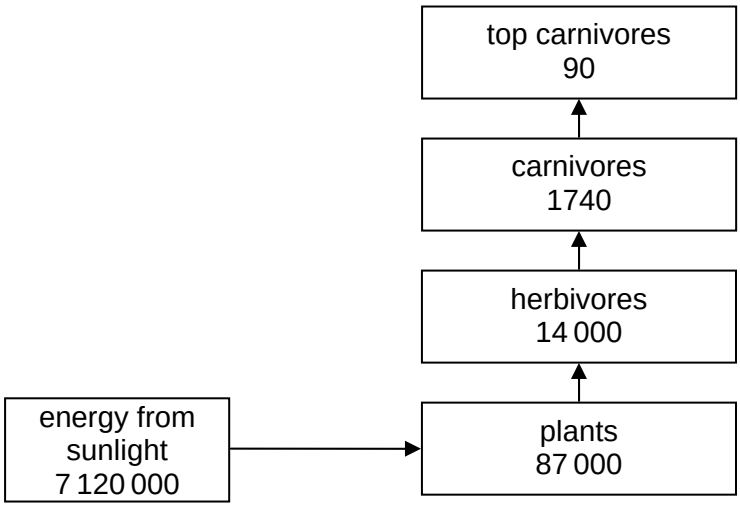
arrows ..... and ..... **[1]**

[Total: 3]

11 A scientist studied food chains in a river system in Florida, USA.

She calculated the energy in each level in kJ / m^3 / year.

The values she calculated are shown in the diagram.



(a) At which stage does most energy pass out of the ecosystem?

from ..... to ..... **[1]**

(b) The scientist calculated the percentage of energy in the plants that was transferred to the herbivores.

$$\frac{14\,000 \times 100}{87\,000} = 16\ \%$$

(i) What percentage of the energy in the plants was transferred to the carnivores?

Show your working.

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

(ii) Put a tick (✓) in the box next to the correct choice to complete each sentence.

The percentage of energy in the plants transferred to the herbivores is

more than	
less than	
the same as	

the percentage of energy in the plants transferred to the carnivores.

One reason for this is because

carnivores do not get any energy from sunlight.	
herbivores cannot digest plants.	
energy is lost by the herbivores when they move around.	
plants get their energy from sunlight.	

[2]

[Total: 5]

12 Scientists are studying an island in the Pacific Ocean. Some species living on the island are found nowhere else on Earth.

Several years ago, an area of forest on the island was chopped down. A palm oil plantation was created in place of the forest.

The palm oil plantation is an example of a monoculture.

The table gives information about the island before and after the palm oil plantation was created.

	before plantation was created	**after plantation was created**
number of animal species	12 142	10 673
number of plant species	9562	8134
unemployment (% of total population)	14	9
income to the island (millions of dollars per year)	132	156

Roshan lives on the island. He has two children and is currently unemployed. He wants the Government to create more palm oil plantations on the island.

Do you agree with Roshan?

Explain your answer.

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

[Total: 3]

[Paper Total: 60]

END OF QUESTION PAPER

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