

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

Duration: 1 hour

Other Materials Required:

- Pencil
- Ruler (cm/mm)

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.
- 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.

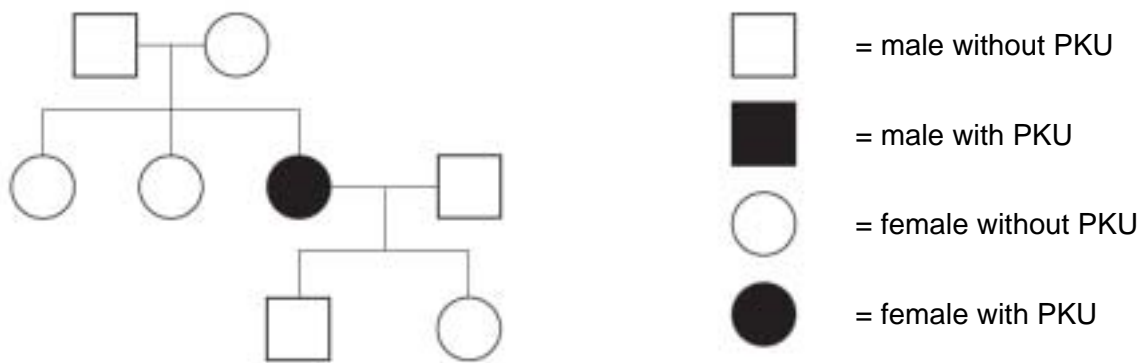
PKU is caused by a faulty gene.

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

PKU is inherited in a similar way to cystic fibrosis.

PKU is inherited in a similar way to Huntington's disease.

PKU is inherited in a different way from cystic fibrosis and Huntington's disease.

explanation

Parents can be carriers of PKU.

PKU is caused by a dominant allele.

Parents cannot be carriers of PKU.

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]

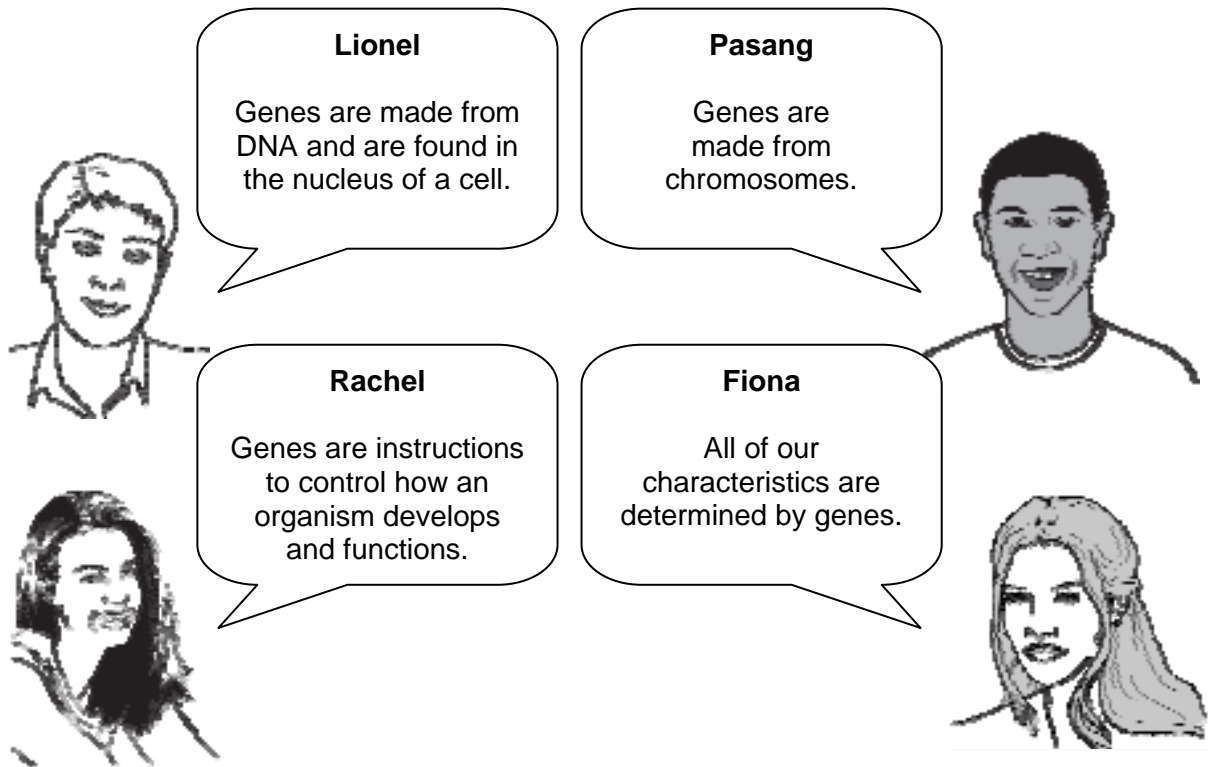
(iii) Doctors have said that it is right to test all babies for PKU even though it costs the NHS money.

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

.....
.....
.....
..... [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]

- 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 | <input type="checkbox"/> |
| get bigger | <input type="checkbox"/> |
| spread easily to other people | <input type="checkbox"/> |
| recognise antibodies | <input type="checkbox"/> |

[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?

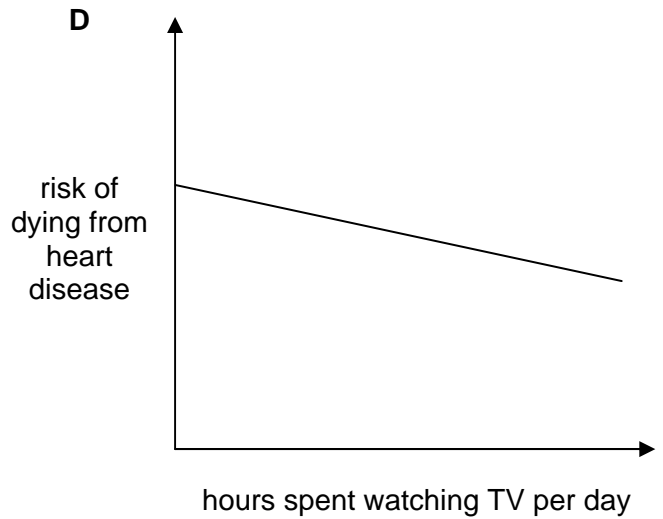
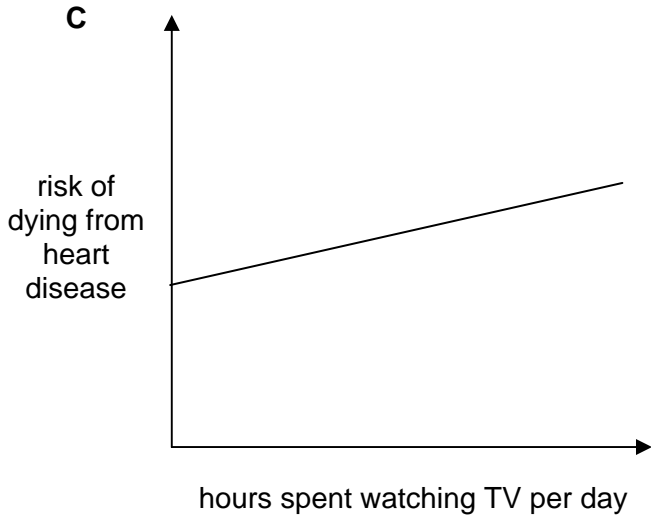
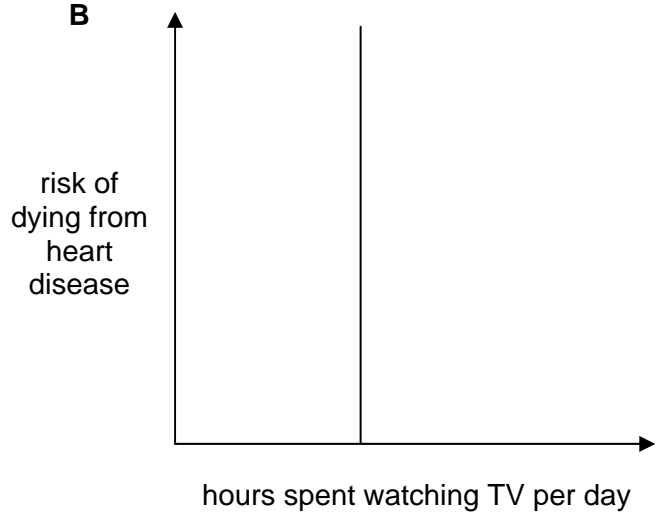
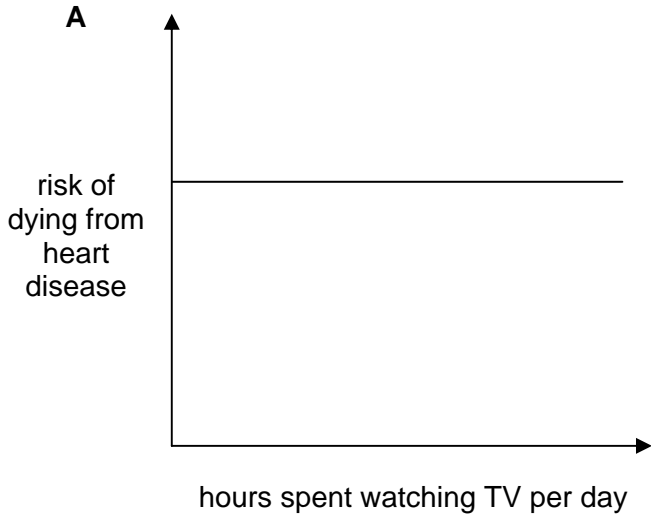
Explain your answer.

source of information:

explanation:


..... [2]

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



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. | <input type="checkbox"/> |
| To test whether the drugs are safe for humans. | <input type="checkbox"/> |
| Drugs should not be tested on ill people unless we know they work. | <input type="checkbox"/> |
| It is easier to find healthy volunteers than people with the illness. | <input type="checkbox"/> |

[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. | <input type="checkbox"/> |
| The microorganisms are not killed by antimicrobials. | <input type="checkbox"/> |
| The microorganisms are not affected by vaccination. | <input type="checkbox"/> |
| The microorganisms damage white blood cells. | <input type="checkbox"/> |

[1]

- (ii) Antibiotics are a type of antimicrobial.

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

.....

.....

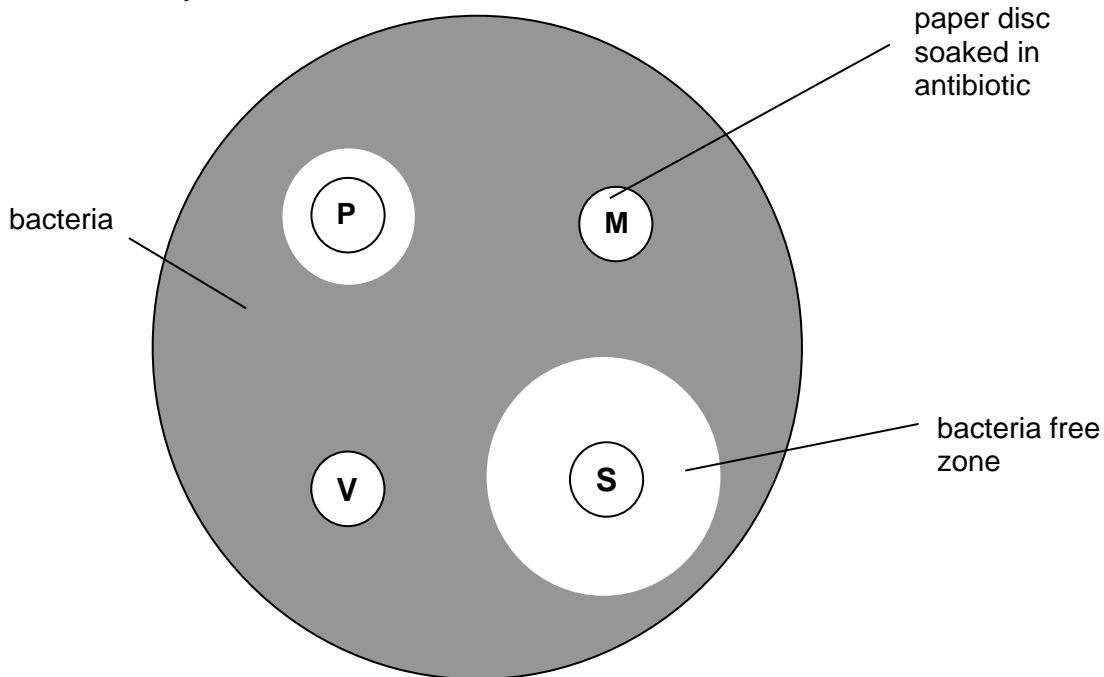
.....

..... [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.

.....

..... [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.

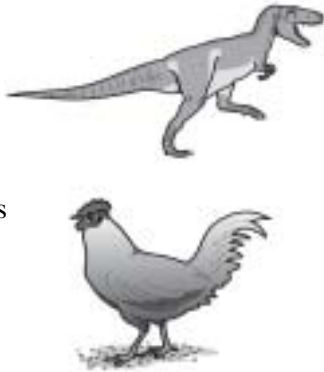
Are birds dinosaurs?

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.

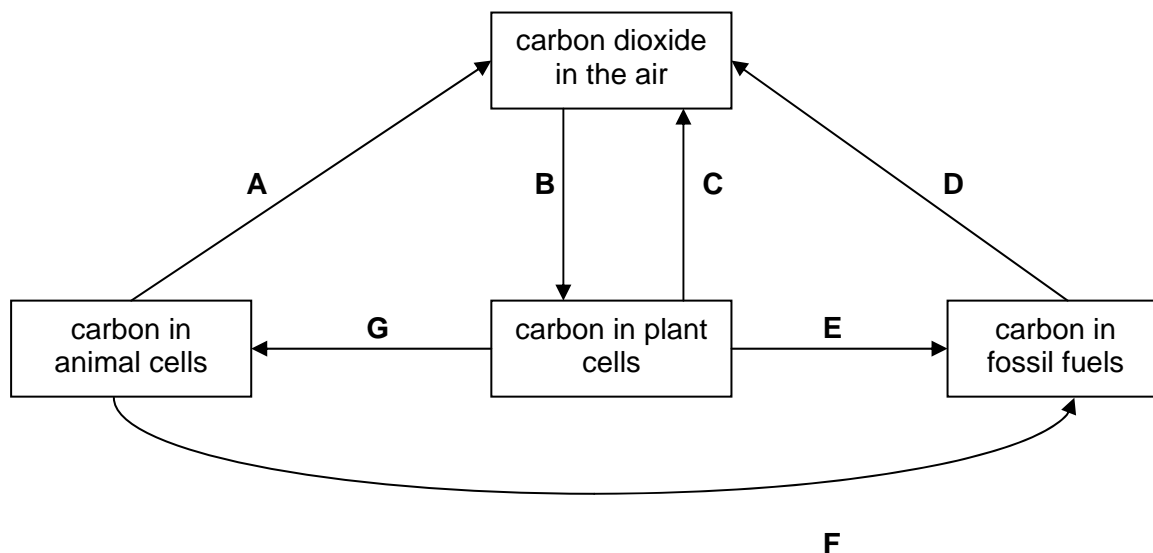
Which of the following changes would slow down the increase in carbon dioxide in the atmosphere?

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?

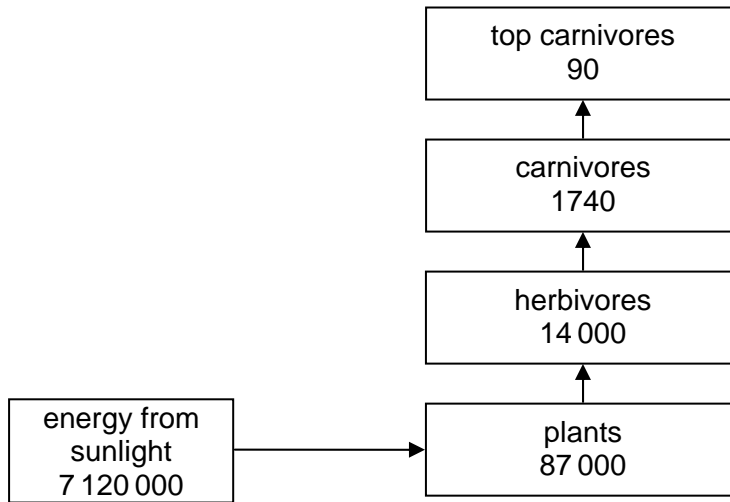
arrows and [1]

[Total: 3]

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

She calculated the energy in each level in $\text{kJ} / \text{m}^3 / \text{year}$.

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		the percentage of energy in the plants transferred to the carnivores.
	less than		
	the same as		

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.

.....

.....

.....

.....

..... [3]

[Total: 3]

[Paper Total: 60]

END OF QUESTION PAPER

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GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

A161/01

BIOLOGY A

Unit A161: Modules B1, B2, B3 (Foundation Tier)

MARK SCHEME

Duration: 1 hour

MAXIMUM MARK 60

Guidance for Examiners

Additional guidance within any mark scheme takes precedence over the following guidance.

1. Mark strictly to the mark scheme.
2. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise.
3. Accept any clear, unambiguous response which is correct, eg mis-spellings if phonetically correct (but check additional guidance).
4. Abbreviations, annotations and conventions used in the detailed mark scheme:

/	=	alternative and acceptable answers for the same marking point
(1)	=	separates marking points
not/reject	=	answers which are not worthy of credit
ignore	=	statements which are irrelevant - applies to neutral answers
allow/accept	=	answers that can be accepted
(words)	=	words which are not essential to gain credit
<u>words</u>	=	underlined words must be present in answer to score a mark
ecf	=	error carried forward
AW/owtte	=	alternative wording
ORA	=	or reverse argument

Eg mark scheme shows 'work done in lifting / (change in) gravitational potential energy' (1)

work done = 0 marks
 work done lifting = 1 mark
 change in potential energy = 0 marks
 gravitational potential energy = 1 mark

5. Annotations:
 The following annotations are available on SCORIS.

✓	=	correct response
✗	=	incorrect response
bod	=	benefit of the doubt
nbod	=	benefit of the doubt not given
ECF	=	error carried forward
^	=	information omitted
I	=	ignore
R	=	reject
6. If a candidate alters his/her response, examiners should accept the alteration.

7. Crossed out answers should be considered only if no other response has been made. When marking crossed out responses, accept correct answers which are clear and unambiguous.

eg

For a one mark question, where ticks in boxes 3 and 4 are required for the mark:

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth 0 marks.

Put ticks (✓) in the two correct boxes.

<input type="checkbox"/>
<input type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

Put ticks (✓) in the two correct boxes.

<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>
<input type="checkbox"/>

This would be worth one mark.

8. The list principle:
If a list of responses greater than the number requested is given, work through the list from the beginning. Award one mark for each correct response, ignore any neutral response, and deduct one mark for any incorrect response, eg one which has an error of science. If the number of incorrect responses is equal to or greater than the number of correct responses, no marks are awarded. A neutral response is correct but irrelevant to the question.

9. Marking method for tick boxes:

Always check the additional guidance.

If there is a set of boxes, some of which should be ticked and others left empty, then judge the entire set of boxes.

If there is at least one tick, ignore crosses. If there are no ticks, accept clear, unambiguous indications, eg shading or crosses.

Credit should be given for each box correctly ticked. If more boxes are ticked than there are correct answers, then deduct one mark for each additional tick. Candidates cannot score less than zero marks.

Eg If a question requires candidates to identify a city in England, then in the boxes

Edinburgh	
Manchester	
Paris	
Southampton	

the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).


Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	x	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	x		✓		✓	✓		✓	
Score:	2	2	1	1	1	1	0	0	0	NR

10. Three questions in this paper are marked using a Level of Response (LoR) mark scheme with embedded assessment of the Quality of Written Communication (QWC). When marking with a Level of Response mark scheme:
- Read the question in the question paper, and then the list of relevant points in the 'Additional guidance' column of the mark scheme, to familiarise yourself with the expected science. The relevant points are not to be taken as marking points, but as a summary of the relevant science from the specification.
 - Read the level descriptors in the 'Expected answers' column of the mark scheme, starting with Level 3 and working down, to familiarise yourself with the expected levels of response.
 - *For a general correlation between quality of science and QWC:* determine the level based upon which level descriptor best describes the answer; you may award either the higher or lower mark within the level depending on the quality of the science and/or the QWC.
 - *For high-level science but very poor QWC:* the candidate will be limited to Level 2 by the bad QWC no matter how good the science is; if the QWC is so bad that it prevents communication of the science the candidate cannot score above Level 1.
 - *For very poor or totally irrelevant science but perfect QWC:* credit cannot be awarded for QWC alone, no matter how perfect it is; if the science is very poor the candidate will be limited to Level 1; if there is insufficient or no relevant science the answer will be Level 0.

Question		Expected answers	Marks	Additional guidance
1	(a)	unspecialised specialised illness	[2]	all three correct = 2 marks one or two correct = 1 mark
	(b)	<p style="text-align: right;"> <input type="checkbox"/> <input type="checkbox"/> genetically identical cells or organisms <input checked="" type="checkbox"/> <input type="checkbox"/> </p>	[1]	tick in any other box = 0 marks
	(c)	any two from: it is 'playing God' / religious objection embryos killed / lives wasted some actions are wrong whatever the consequences may lead to reproductive cloning benefit does not outweigh cost / named arguments against	[2]	
Total			[5]	


Question	Expected answers	Marks	Additional guidance
<p>2 (a)</p>	<p>description</p> <p>PKU is inherited in a similar way to cystic fibrosis.</p> <p>explanation</p> <p>Parents can be carriers of PKU.</p> <p>PKU is caused by a recessive allele.</p>	<p>[2]</p>	<p>choice of only top left box = 1 mark any line from the top left box indicates the candidates choice</p> <p>then look at the right hand boxes to award second mark both top and bottom "explanation" boxes selected = 1 mark no extra boxes allowed</p>

Question			Expected answers	Marks	Additional guidance
2	(b)	(i)	£60 000	[1]	
		(ii)	71	[1]	
		(iii)	idea that benefits outweigh costs one life worth more than £60 000 / 71 lives improved/owtte each year can start treatment very early to limit damage / this saves (NHS) money in the long run (because it is expensive to treat people who get ill due to PKU) / idea that parents have the right to know or can start preparing for child with PKU	[3]	accept some actions are right whatever the cost allow ecf from part (i) and (ii)
	(c)		Lionel <u>and</u> Rachel	[1]	both needed either order
			Total	[8]	

Question	Expected answers	Marks	Additional guidance
3	<p> [Level 3] Answer clearly explains why children have similarities to both parents and why they are not identical to either of them. Answer considers genetic and environmental factors. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p>[Level 2] Answer gives limited genetic explanations for the similarities and differences OR explains just one side (similarities or differences), but in detail. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p>[Level 1] Answer discusses only similarities or differences, not both, and lacks detail OR answer considers only environmental factors without explaining genetic basis of inheritance. Not much detail is provided in the explanation and little consideration is given to the role of genes in sexual reproduction. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	[6]	<p>relevant points include:</p> <p>she has similarities to her parents because:</p> <ul style="list-style-type: none"> • children, inherit / get, their genes from their mother and father • half of her, genes / alleles, are from her mother and half are from her father • genes, control / code for / are instructions for, characteristics • accept examples of characteristics, e.g. hair colour, eye colour • behavioural, traits / characteristics, are learned from parents • accept references to ‘inheritance’ of behavioural characteristics (nurture) <p>she is not identical to them because:</p> <ul style="list-style-type: none"> • idea that, egg / sperm / gametes, only contain half of the genetic material of each parent • combination / mixture, of, genes / alleles / chromosomes, from both parents gives different, characteristics / phenotype • child may inherit (recessive) alleles that were not expressed in the parents • she inherited X from father (and X from mother) so is female, unlike father • different environmental factors • accept examples of environmental factors that would certainly differ between parents and child, e.g. diet, amount of exercise etc. • ignore references that make assumptions about superficial differences, e.g. she wears different clothes, wears spectacles, has a different hair cut, dyes her hair, had plastic surgery, etc.
	Total	[6]	

Question		Expected answers	Marks	Additional guidance
4	(a)	produce toxins <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks
	(b) (i)	8000	[1]	
	(ii)	<i>it is smaller because:</i> population size is limited by competition / lack of resources / conditions not optimal / immune attack	[1]	no mark for saying it is smaller
Total			[3]	

Question		Expected answers	Marks	Additional guidance
5	(a)	peer-reviewed journals (no mark) because work has been verified/repeated/checked by other scientists/experts (working in the same area)	[2]	accept "proved" instead of "verified/repeated/checked"
	(b)	C	[1]	


Question	Expected answers	Marks	Additional guidance
5 (c) 	<p>[Level 3] Answer clearly explains the links between the ideas of correlation, factors and cause, and considers genetic and lifestyle factors. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p>[Level 2] Answer shows limited understanding of correlation, factors and cause, and gives examples of relevant factors. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p>[Level 1] Answer only gives examples of factors without considering ideas of correlation and cause OR only states that TV does not necessarily cause heart disease without considering other factors. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	[6]	<p>relevant points include:</p> <ul style="list-style-type: none"> • idea that an observed correlation does not necessarily mean that watching TV (the factor) causes heart disease (the outcome) • idea that the factor might increase the probability of the outcome, but does not necessarily lead to it (does not make it certain to happen) • idea that other factor(s) may be just as important, or more important • Toby might , be able to / need to , change other factors (to lower his risk of developing heart disease) <p>ignore refs. to the article not being trustworthy ignore refs. to the study needing to be repeated, etc.</p> <p>examples of other factors:</p> <ul style="list-style-type: none"> • genetic factors / family history of disease • lifestyle factors, e.g. lack of exercise, poor/fatty diet, stress, smoking / excessive nicotine, drinking / excessive alcohol <p>accept economic factors if linked to poor diet etc.</p>
	Total	[9]	

Question		Expected answers	Marks	Additional guidance
6	(a)	To test that the drugs are safe... <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0
	(b) (i)	... are not killed by antimicrobials. <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks
	(ii)	always finish a course of antibiotics only take antibiotics when necessary	[2]	accept regularly change the antibiotic being used (in the population) accept use combination of antibiotics
	(c) (i)	P = 3.14 S = 12.56/12.6	[1]	both required for 1 mark
	(ii)	S (no mark) because it has larger area of bacteria-free zone so more bacteria have been killed/growth inhibited	[2]	ecf for answer based upon the numbers the candidate wrote in the table in part (i)
Total			[7]	

Question	Expected answers	Marks	Additional guidance
7	<u>gain</u> any one from: in food from respiration <u>loss</u> any one from: sweat faeces breathing	[2]	one mark for gain one mark for loss
	Total	[2]	

Question		Expected answers	Marks	Additional guidance
8	(a)	<p>Chickens evolved from dinosaurs.</p> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks
	(b)	<p>Three proteins from <i>T. rex</i> ...</p> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	[1]	tick in any other box = 0 marks
Total			[2]	

Question		Expected answers	Marks	Additional guidance
9	(a)	<p>the arrival of a new disease</p> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	[1]	tick in any other box = 0 marks

Question	Expected answers	Marks	Additional guidance
9 (b) 	<p>[Level 3] Answer correctly uses technical terms such as natural selection, variation, mutation, competition and inheritance to explain the increase in numbers of black squirrels. All information in answer is relevant, clear, organised and presented in a structured and coherent format. Specialist terms are used appropriately. Few, if any, errors in grammar, punctuation and spelling. (5 – 6 marks)</p> <p>[Level 2] Answer mostly explains the increase in black squirrel numbers, but omits some elements or technical terms. For the most part the information is relevant and presented in a structured and coherent format. Specialist terms are used for the most part appropriately. There are occasional errors in grammar, punctuation and spelling. (3 – 4 marks)</p> <p>[Level 1] Answer only partially explains the increase in black squirrel numbers and omits technical terms. Answer may be simplistic. There may be limited use of specialist terms. Errors of grammar, punctuation and spelling prevent communication of the science. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	[6]	<p>relevant points include:</p> <ul style="list-style-type: none"> • process is called natural selection • there is variation in the (genes coding for) colour • mutation (in genes) leads to, variation / different colours • ref. to any selective advantage of black fur (accept any reasonable suggestion that would convey an advantage, e.g. preferential selection by females / camouflage / warmer / thicker) • (grey) females, select / choose, black males • (allele/gene for) black colour is, passed on / inherited • offspring are black, so number of black squirrels increases • grey squirrels, not born / die out
	Total	[7]	




Question		Expected answers	Marks	Additional guidance
10	(a)	Stop burning forests ... <input checked="" type="checkbox"/> <input type="checkbox"/> Cut back on the use of fossil fuels... <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	[2]	one mark for each correct tick three ticks deduct one mark four or five ticks = 0 marks
	(b)	A <u>and</u> C	[1]	either order both required for one mark
Total			[3]	

Question		Expected answers	Marks	Additional guidance
11	(a)	energy from sunlight plants	[1]	both required for one mark
	(b) (i)	$1740 \times 100/87000$ 2	[2]	correct answer on its own = 2 marks
	(ii)	more than energy is lost by the herbivores when they move around	[2]	
Total			[5]	

Question	Expected answers	Marks	Additional guidance
12	<p><i>No because:</i> any three from: biodiversity has decreased / numbers of plants/animals has decreased idea that extinction is permanent / some of the lost species may be unique to the island increase in jobs/income is not enough to justify loss of species idea that Roshan may be biased because he is unemployed (and so wants to get a job in the plantation or wants the increased income to the island)</p> <p>OR</p> <p><i>Yes because:</i> any three from: plantation has increased the number of jobs plantation has increased the income to the island loss of species is relatively small (still lots left) idea that humans are more important than animals/plants</p>	[3]	no mark for yes or no
	Total	[3]	

Assessment Objectives (AO) Grid

(includes quality of written communication )

Question	AO1	AO2	AO3	Total
1(a)	2			2
1(b)	1			1
1(c)		2		2
2(a)	1	1		2
2(b)(i)		1		1
2(b)(ii)		1		1
2(b)(iii)		2	1	3
2(c)	1			1
3 	5	1		6
4(a)	1			1
4(b)(i)		1		1
4(b)(ii)			1	1
5(a)		2		2
5(b)		1		1
5(c) 	2	3	1	6
6(a)	1			1
6(b)(i)	1			1
6(b)(ii)	2			2
6(c)(i)		1		1
6(c)(ii)			2	2
7	2			2
8(a)		1		1
8(b)			1	1
9(a)	1			1
9(b) 	2	4		6
10(a)		2		2
10(b)	1			1
11(a)		1		1
11(b)(i)		2		2
11(b)(ii)	1	1		2
12		1	2	3
Totals	24	28	8	60

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