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)

MARK SCHEME

Duration: 1 hour

MAXIMUM MARK 60

This document consists of 20 pages

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
words	=	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.	Put ticks (✓) in the two correct boxes.	Put ticks (✓) in the two correct boxes.
☐	☐	✓
☐	☐	✓
✓	✓	☐
✓	✓	☐
☐	☐	☐
This would be worth 0 marks.	This would be worth one mark.	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	

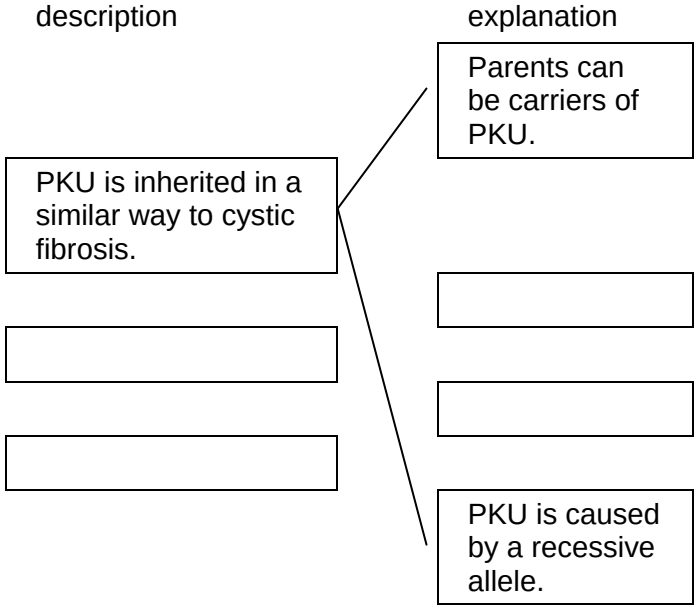
   the second and fourth boxes should have ticks (or other clear indication of choice) and the first and third should be blank (or have indication of choice crossed out).

Edinburgh			✓			✓	✓	✓	✓	
Manchester	✓	×	✓	✓	✓				✓	
Paris				✓	✓		✓	✓	✓	
Southampton	✓	×		✓		✓	✓		✓	
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)		genetically identical cells or organisms ☐ genetically identical cells or organisms ☐ genetically identical cells or organisms ✓ genetically identical cells or organisms ☐	[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
2	(a)			[2]	choice of only top left box = 1 mark any line from the top left box indicates the candidates choice then look at the right hand boxes to award second mark **both** top and bottom "explanation" boxes selected = 1 mark no extra boxes allowed

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		✎	**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** she has similarities to her parents because: • 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) she is not identical to them because: • 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 ✓	[1]	tick in any other box = 0 marks
	(b)	(i)	8000	[1]	
		(ii)	*it is smaller because:* 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)	✎	**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** • 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) **ignore** refs. to the article not being trustworthy **ignore** refs. to the study needing to be repeated, etc. examples of other factors: • genetic factors / family history of disease • lifestyle factors, e.g. lack of exercise, poor/fatty diet, stress, smoking / excessive nicotine, drinking / excessive alcohol **accept** economic factors if linked to poor diet etc.
			Total	**[9]**	

Question			Expected answers	Marks	Additional guidance
6	(a)		☐ To test that the drugs are safe... ✓ ☐ ☐	[1]	tick in any other box = 0
	(b)	(i)	☐ … are not killed by antimicrobials. ✓ ☐ ☐	[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)		Chickens evolved from dinosaurs. ☐ Chickens evolved from dinosaurs. ✓ Chickens evolved from dinosaurs. ☐ Chickens evolved from dinosaurs. ☐ Chickens evolved from dinosaurs. ☐	[1]	tick in any other box = 0 marks
	(b)		Three proteins from *T. rex* … ☐ Three proteins from *T. rex* … ☐ Three proteins from *T. rex* … ✓	[1]	tick in any other box = 0 marks
			Total	**[2]**	

Question			Expected answers	Marks	Additional guidance
9	(a)		the arrival of a new disease ☐ the arrival of a new disease ☐ the arrival of a new disease ✓ the arrival of a new disease ☐	[1]	tick in any other box = 0 marks

Question			Expected answers	Marks	Additional guidance
9	(b)	✎	**[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) **[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) **[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) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	**[6]**	**relevant points include:** • 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 … ☐ ☐ Cut back on the use of fossil fuels… ☑ ☐ ☐	[2]	one mark for each correct tick three ticks deduct one mark four or five ticks = 0 marks
	(b)		**A** and **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 x 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			*No because:* **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) **OR** *Yes because:* **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	**[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**