

GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
BIOLOGY A

UNIT 1 – Modules B1 B2 B3 (Higher Tier)

SAMPLE ASSESSMENT MATERIAL

(from 2010 onwards)

Time: 40 minutes

Candidates answer on the question paper

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
 Ruler (cm/mm)

Candidate
Forename

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Candidate
Surname

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Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name 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 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

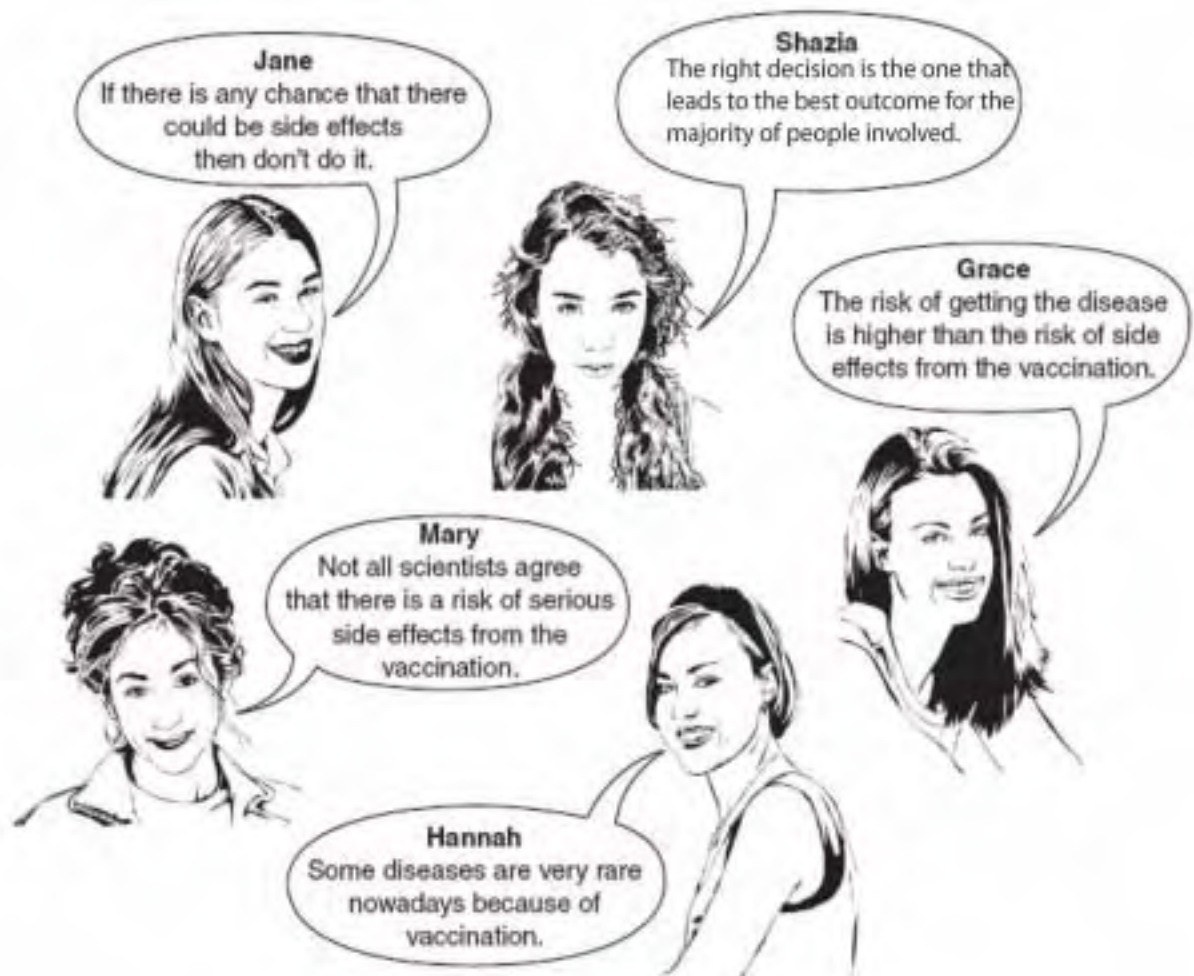
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **42**.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	11	
2	4	
3	9	
4	5	
5	8	
6	5	
TOTAL	42	

This document consists of **12** printed pages.

Answer **all** the questions.

- 1 Saleema has a three-month-old daughter called Nadia.
Nadia is due for a vaccination to protect her from a certain disease.
Saleema is worried that there may be side effects.
She asks some of her friends what they think.



(a) (i) Which friend can see a benefit to **Nadia** in having the vaccination?

answer [1]

(ii) Explain what Shazia meant.

Write about vaccination to help you answer the question.

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..... [3]

(b) Mary says that not all scientists agree that there is a risk.

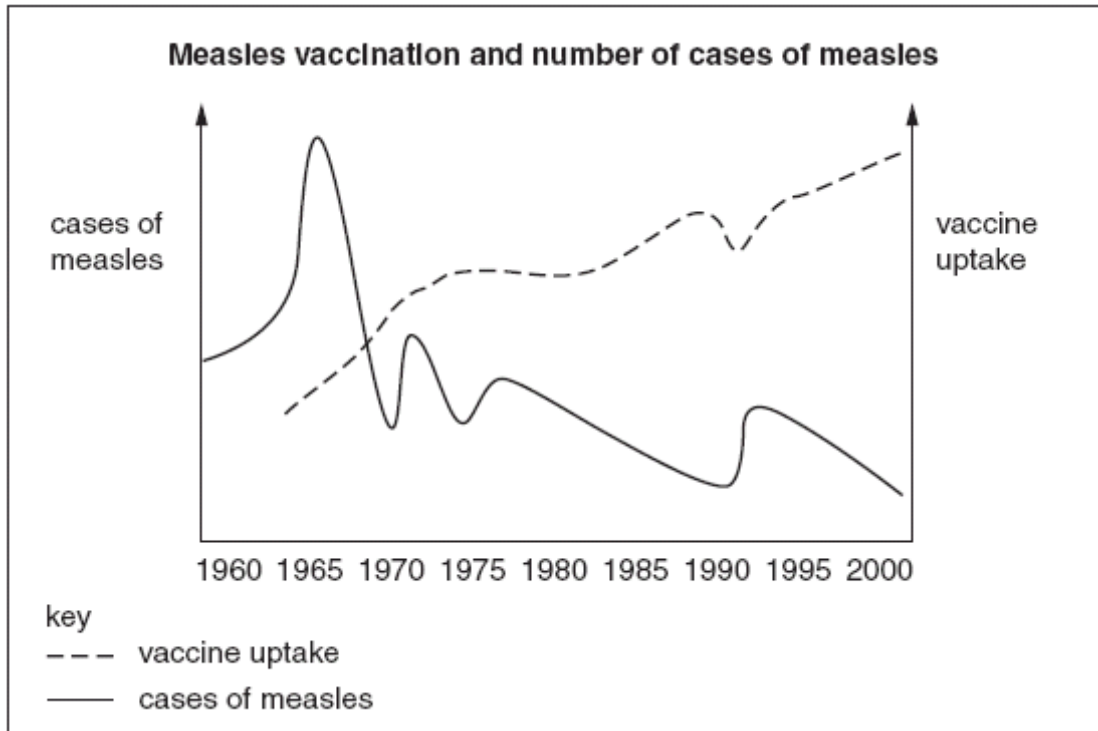
What reasons might these scientists have for coming to different conclusions?

Explain your answer.

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..... [2]

(c) Saleema tells her doctor she is worried.

He shows her this information.



Use this information to answer these questions.

(i) What general trends are shown?

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

There is a positive correlation between vaccine uptake and the number of cases of measles.

As vaccine uptake increases, the number of cases of measles falls.

There is a negative correlation between vaccine uptake and the number of cases of measles.

There is no correlation between vaccine uptake and the number of cases of measles.

As vaccine uptake falls, the number of cases of measles falls.

[2]

(ii) In 1994, there was an increase in the number of cases of measles.

Use the graph to suggest a reason why.

Put a tick (✓) in the correct box.

More children became susceptible to measles.

The measles virus became more infectious.

Fewer children were vaccinated.

[1]

(d) Look at these statements. Some support vaccination, and some do not.

- A There is a 1:500 risk of death from measles. There is a 1:5000 risk of serious side effects from the vaccination.
- B There is a 1:20 risk of deafness from measles. There is a 1:20 risk of temporary soreness at the injection site.
- C Epidemics can start if a high percentage of the population is vaccinated.
- D It is impossible to eliminate all side effects from vaccination.
- E There is a 1:100 risk of increased temperature from vaccination. There is a 1:20 risk of a swelling appearing at the injection site.

Which **two** statements support vaccination?

statements and [2]

[Total: 11]

2 Alex works for a pharmaceutical company trying to make new antibiotics.

Antibiotics are used to treat infections caused by some microorganisms.

(a) Why do scientists need to find new types of antibiotics?

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

Antibiotics can be killed.

Not all microorganisms can be controlled with antibiotics.

Microorganisms can become resistant to antibiotics.

[1]

(b) The statements **A**, **B**, **C**, **D** and **E** explain how bacteria become resistant to an antibiotic.

They are in the wrong order.

A The bacteria without the mutation are killed by the antibiotic.

B Most of the bacteria are now resistant to the antibiotic.

C Next time the same antibiotic is used, the bacteria are not affected.

D The resistant bacteria have reduced competition for resources and multiply rapidly.

E A mutation in a gene makes some bacteria more resistant to the antibiotic.

Put the statements in the correct order by writing **A**, **B**, **C**, **D** or **E** in each box.

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[3]

[Total: 4]

3 Theresa and Matthew have identical twin boys.

Identical twins are clones.

(a) Put ticks (✓) in the boxes next to the statements that **best** describe clones.

Clones cannot be produced by natural means.

Clones cannot be produced by asexual reproduction.

Differences between clones are due to genetic factors.

Differences between clones are due to environmental factors.

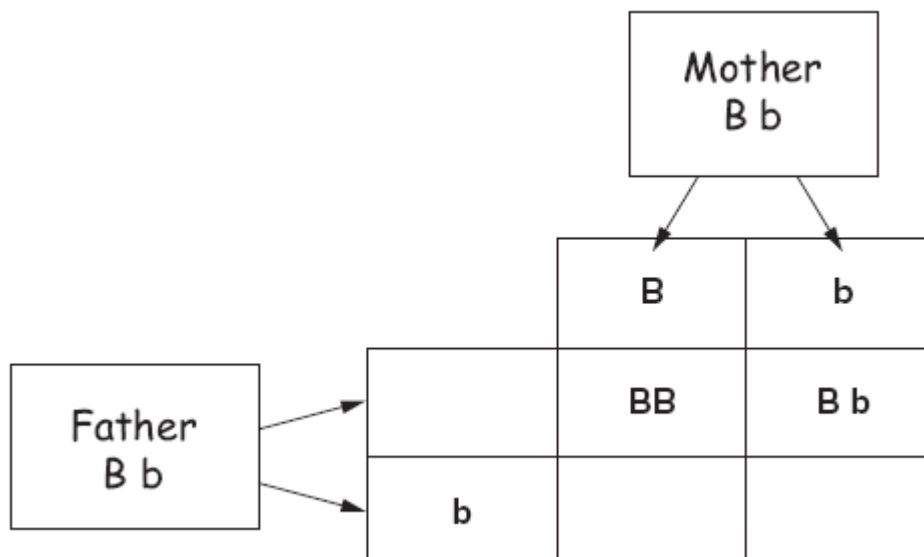
Clones can be produced by transferring a nucleus from a cell into an empty egg cell.

[2]

(b) The twins have an older brother called Steven. There are differences between him and the twins.

Steven has blue eyes. The twins and both of their parents have brown eyes.

Complete the genetic diagram below to show how Steven inherited blue eyes. **B** is the allele for brown eyes, and **b** is the allele for blue eyes.



[2]

(c) Theresa is pregnant.

(i) Theresa and Matthew want another child.

There is a 50% chance that this child will be a boy.

Explain why.

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..... [2]

(ii) Matthew and Theresa decide to have the fetus genetically tested.

Explain why Matthew and Theresa decide to have the test and what decisions they will have to make if the test comes back as positive.

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..... [3]

[Total: 9]

- 4 Andrew's employer asks him to attend a health screening session.

The nurse doing the screening asks him if there are any inherited disorders in his family history and offers him a genetic test.

- (a) Andrew may **not** wish his employer to be given the results of this test.

Put ticks (✓) in the boxes next to the **two** most likely reasons why.

The test may give a false positive result for a disorder.

His employer could provide him with counselling.

His employer may not promote him.

His job at work will be protected by the disability discrimination act.

He does not want his doctor to be given the results of the test.

[2]

- (b) Andrew's father's grandfather died of a form of cancer that can be inherited. This cancer is caused by a faulty gene. Andrew has not been tested for the faulty gene but does attend the hospital for regular check ups.

Andrew is trying to decide if he should have genetic screening for the faulty gene.

Put a (ring) around each of the letters **A**, **B**, **C**, **D** or **E** which **support** Andrew being screened for the faulty gene.

- A** If he does not have the gene then he will not need regular check ups.
- B** If he does have the gene then he may not be able to get life insurance.
- C** If he does not have the gene then he will know that he cannot pass it on to his children.
- D** If he does have the gene then he may become depressed.
- E** If he does have the gene then regular check ups could detect cancer at an early stage.

[3]

[Total: 5]

5 Read this passage about a discovery made by a conservation group.

New rodent is ‘living fossil’

- 1. A squirrel-like rodent was discovered in Laos in 2005. It is the only survivor of a group that scientists thought had died out 11 million years ago.
- 2. It is a herbivore, mainly eating leaves, grass and seeds.
- 3. Scientists have been unable to classify it in any of the families of living rodents known already.
- 4. Scientists believe it is a ‘living fossil’. They have concluded that it is related to a group of prehistoric rodents that once lived in South East Asia.
- 5. Detailed measurements of the rodent’s skeleton have been made. The teeth are pointed but in other ways are very similar to rodent fossils only found in 11-million-year-old rock.
- 6. The chief scientist said efforts to conserve this animal should be given the highest priority.

(a) Which three statements, 1, 2, 3, 4, 5 or 6, contain data?

statements, and [2]

(b) Species of animals evolve over time.

Explain how this happens.

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..... [3]

(c) Conservationists are now studying the rodent and its habitat.

They want to make sure it does not become extinct.

Which changes could cause the rodent to become extinct?

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

More trees grow giving new shelter.

The rodent faces increased competition for its food.

The environmental conditions begin to change.

The rodent is susceptible to a new disease.

The number of humans living in the area decreases.

An asteroid passes close to Earth.

[3]

[Total: 8]

6 Our bodies need communication systems to respond to changes in our surroundings.

Some of these responses are controlled by nerves.

Some are controlled by hormones.

(a) Here are two examples of responses:

- knee jerk reaction when the knee cap is tapped
- controlling the glucose level in the blood after a meal.

Describe **two** other responses that are controlled by nerves and **two** other responses that are controlled by hormones.

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..... [4]

(b) The internal environment of our bodies must be maintained.

What is the name of this process?

answer [1]

[Total: 5]

END OF QUESTION PAPER

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GCSE Unit

MARK SCHEME

SAMPLE ASSESSMENT MATERIAL
(from 2010 onwards)

Biology A (J633)
Modules B1, B2 and B3
Higher Tier

A221/02

Maximum Mark: 42

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, e.g. 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

E.g. 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. If a candidate alters his/her response, examiners should accept the alteration.
6. 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.
7. 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, e.g. 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.

8. 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, e.g. 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.

E.g. 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

Question			Expected Answers	Marks	Rationale
1	a	i	Grace (1)	1	if more than one answer given then score = 0 marks
		ii	<p>[3 marks] Candidate demonstrates a high level of understanding of balancing the risk of side effects from vaccination for an individual, against the risk to the population of a disease spreading without vaccination. Consideration is given to the seriousness of both the disease and the possible side effects, to determine the outcome which benefits the majority of people. The answer is expressed clearly and logically.</p> <p>[2 marks] Candidate demonstrates an understanding of balancing the risk of side effects against the risk of the disease spreading, to determine the outcome which benefits the majority of people. The answer is expressed clearly and logically.</p> <p>[1 mark] Candidate recognises that the choice which benefits most people is correct and identifies one side of the risk (side effects or spread of disease).</p>	3	<p>accept either way round</p> <p>If more than two answers given then deduct 1 mark for each additional answer.</p> <p>candidate cannot score less than 0 marks</p>
	b		<p>idea of not enough evidence (1)</p> <p>idea that different scientists may get different results (1)</p>	2	

Question			Expected Answers	Marks	Rationale
1	c	i	vaccine uptake increases, cases fall negative correlation <input type="checkbox"/> <input checked="" type="checkbox"/> (1) <input checked="" type="checkbox"/> (1) <input type="checkbox"/> <input type="checkbox"/>	2	if more than 2 boxes ticked then deduct 1 mark for each additional answer candidate cannot score less than 0 marks accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc
		ii	f fewer children vaccinated <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1)	1	if more than 2 boxes ticked then deduct 1 mark for each additional answer candidate cannot score less than 0 marks accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc
	d		A (1) B (1)	2	accept either order If more than two answers given then deduct 1 mark for each additional answer candidate cannot score less than 0 marks
Total				11	

Question			Expected Answers	Marks	Rationale
2	a		can become resistant <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> (1)	1	if more than 1 box ticked then deduct 1 mark for each additional answer candidate cannot score less than 0 marks accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc
	b		E before A A before D D before B B before C	3	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark
Total				4	

Question		Expected Answers	Marks	Rationale									
3	a	<p>environmental factors</p> <p>transferring a nucleus</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><input type="checkbox"/></td></tr> <tr><td><input type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> <tr><td><input checked="" type="checkbox"/></td></tr> </table> <p>(1) (1)</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2	<p>if more than 2 boxes ticked then deduct 1 mark for each additional answer</p> <p>candidate cannot score less than 0 marks</p> <p>accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc</p>					
<input type="checkbox"/>													
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	b	<p>father's alleles correct (1)</p> <p>correct combinations in offspring (1)</p>	2	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>B</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Bb (or bB)</td> <td>bb</td> </tr> </table>				B				Bb (or bB)	bb
B													
	Bb (or bB)	bb											
	c	<p>i [2 marks] Candidate demonstrates a high level of understanding by providing a full, clear explanation requiring no further detail. Answer is expressed clearly and logically.</p> <p>[1 mark] Candidate demonstrates incomplete understanding by partly explaining the answer although further detail is required.</p>	2	accept written explanations or diagrams, e.g. Punnett square									
		<p>ii to check that the baby is OK / does not have a genetic disease (1)</p> <p>whether or not to have (more) children (1)</p> <p>whether or not to terminate a pregnancy (1)</p>	3										
Total			9										

Question		Expected Answers	Marks	Rationale
4	a	may give false positive	<input checked="" type="checkbox"/> (1)	2 if more than 2 boxes ticked then deduct 1 mark for each additional answer candidate cannot score less than 0 marks accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc
		employer may not promote him	<input checked="" type="checkbox"/> (1)	
	b	A (1) C (1) E (1)	3	if more than 3 circled then deduct 1 mark for each additional answer all circled = 0 marks candidate cannot score less than 0 marks
		Total	5	

Question		Expected Answers	Marks	Rationale
5	a	sentences 1, 2 and 5	2	accept in any order. 3 correct = 2 marks 2 correct = 1 mark 1 correct = 0 marks if more than 3 answers then deduct 1 mark for each additional answer candidate cannot score less than 0.
	b	<p>[3 marks] Candidate demonstrates a high level of understanding using ideas of environmental change, genetic variation and natural selection to fully explain the answer. Answer is expressed clearly and logically.</p> <p>[2 marks] Candidate demonstrates a partial understanding using some of the above ideas to partly explain the answer. Answer is expressed clearly and logically.</p> <p>[1 mark] Candidate demonstrates a limited understanding by making a correct, relevant statement about evolution.</p>	3	
	c	<p>competition for prey <input type="checkbox"/></p> <p>environmental conditions <input checked="" type="checkbox"/> (1)</p> <p>susceptible to disease <input checked="" type="checkbox"/> (1)</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	3	if more than 3 boxes ticked then deduct 1 mark for each additional answer candidate cannot score less than 0 marks accept any clear, unambiguous method of indicating correct boxes e.g. crosses, shading etc
Total			8	

Question			Expected Answers	Marks	Rationale
6	a	i	any two examples of responses that are controlled by nerves (except knee jerk response). (2) any two examples of responses that are controlled by hormones (except blood glucose level). (2)	4	accept in any order
	b		homeostasis (1)	1	Accept 'homostasis' and 'homoeostasis' do not accept any other spelling.
			Total	5	
			Section total	42	