UNIT 4: (Double Award) BIOLOGY 2
HIGHER TIER

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (apart from the questions where a level of response mark scheme is applied).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statements.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
1	(a)			**Any 2 x (1) from:** *Symptom* – constant thirst (no mark) *Explanation* – ref to body having to lose a lot of water excreting glucose *Symptom* – excessive urination (no mark) *Explanation* – ref to body having excess glucose to excrete which cannot be done unless dissolved in water *Symptom* – loss of weight (no mark) *Explanation* – body can't use the glucose it gets from food as a source of energy therefore fat stores are used		2		2		
	(b)	(i)		Increases (1) Pancreas (1) recognizes increase in glucose in blood and secretes insulin (1)			3	3	1	
		(ii)		{No/ very low} insulin would be recorded			1	1		
				Question 1 total	**0**	**2**	**4**	**6**	**1**	**0**

<table>
<tr><th colspan="4" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>2</td><td>(a)</td><td></td><td></td><td>Carbohydrate (1)
excess of which is converted to glycogen (1)</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td></td><td>of the 149 horses tested 62.0% had PSSM1 gene</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>I</td><td>0.9</td><td></td><td>1</td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>II</td><td>1</td><td></td><td>1</td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td>(iii)</td><td></td><td>Clydesdale + Shire + Belgian</td><td></td><td>1</td><td></td><td>1</td><td></td><td></td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td></td><td><table><tr><td></td><td>B</td><td>b</td></tr><tr><td>b</td><td>Bb</td><td>bb</td></tr><tr><td>b</td><td>Bb</td><td>bb</td></tr></table>Gametes correct (1)
Cross correct (1)</td><td></td><td>2</td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td></td><td>1 : 1</td><td></td><td>1</td><td></td><td>1</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>Question 2 total</td><td>0</td><td>9</td><td>0</td><td>9</td><td>3</td><td>0</td></tr>
</table>

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
3	(a)			$\frac{47 \times 51}{36}$ (1) 67 (1) must be a whole number	1	1		2	2	
	(b)			**Any 3 x (1) from:** no death no immigration or emigration sampling methods are identical marking has not affected the survival rate of the adders	3			3		3
	(c)			decreased (no mark is awarded for completing the table)			1	1		
	(d)			minimum 2 or 3 days (1) so that adders can be counted but are not permanently marked which could affect their chance of successful reproduction or increase predation (1)		2		2		2
	(e)			April – July (1) all adders out of hibernation or population not increased by young animals (1)			2	2		2
				Question 3 total	**4**	**3**	**3**	**10**	**2**	**7**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
4				***Indicative content:*** • Disease causing bacteria can be weakened or killed in the laboratory • The weakened bacteria are made into a vaccine • When introduced into the body the immune system treats the weakened bacterium as a disease causing antigen • lymphocytes • secrete antibodies specific to the antigen • antibodies destroy antigens • memory cells remain in body • and produce antibodies very quickly • if the same antigen is encountered a second time **5 – 6 marks**: Detailed description of how bacteria are used to produce vaccines and the effect vaccination has on the body. *There is a sustained line of reasoning which is coherent, relevant, substantiated and logically structured. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.* **3 – 4 marks**: A description of the effect vaccination has on the body. *There is a line of reasoning which is partially coherent, largely relevant, supported by some evidence and with some structure. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar.* **1- 2 marks**: A basic description, including vaccines contain antigens to which the body makes antibodies. *There is a basic line of reasoning which is not coherent, largely irrelevant, supported by limited evidence and with very little structure*. *The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.* **0 marks***: No attempt made or no response worthy of credit.*	6			6		
				Question 4 total	**6**	**0**	**0**	**6**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
5	(a)			Undifferentiated/unspecialized cells (1) which can become any type of cell/any specialized cell (1)	2			2		
	(b)	(i)		Unlikely to be rejected/more likely to be accepted (1) Genetically identical (1)	2			2		
		(ii)		Embryos (1) Embryos are destroyed (1)	2			2		
	(c)	(i)		Stem cells are separated from fat cells		1		1		1
		(ii)		Divide/ reproduce (1) By mitosis (1)	1	1		2		
		(iii)		stem cells are attracted to the chemokine		1		1		
				Question 5 total	**7**	**3**	**0**	**10**	**0**	**1**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
6	(a)			1 mark for each correct row. Both columns in the row must be completed correctly *Asexual* / *Sexual* 1 parent/female only / 2 parents/male & female no sperm (involved) / sperm (involved) no fertilization / fertilization	3			3		
	(b)	(i)		extract DNA (1) genetic profile the DNA (1) if clone then all profiles will be the same/ if not clone then all profiles will be different (1)			3	3		
		(ii)		if female isolated then can produce offspring/ no males needed		1		1		
		(iii)		if conditions are unfavourable for young/ lack of food/drought/ unsuitable temp then fertilization can be delayed until conditions improve		1		1		
	(c)			if disease occurs then members of a clone either all survive or all die – high risk (1) variation in offspring produced by sexual reproduction mean some will survive disease (1)			2	2		
				Question 6 total	**3**	**2**	**5**	**10**	**0**	**0**

Question				Marking details	Marks Available					
					AO1	AO2	AO3	Total	Maths	Prac
7	(a)			A <u>bacterium</u> is no longer destroyed by an antibiotic which was once used to kill it (1) MRSA or any other correct e.g. *Clostridium difficile (c-diff)*(1)	2			2		
	(b)	(i)		Fewer colonies around both the mould and crocodile blood are being destroyed (1) by a chemical diffusing out (1)	1	1		2		2
		(ii)		Penicillin	1			1		
	c)			**Any 4 (x1) from:** extract active chemical purify active chemical extensive field trials rigorous testing look for side effects ethical issues including animal testing		4		4		
				Question 7 total	**4**	**5**	**0**	**9**	**0**	**2**

HIGHER TIER

SUMMARY OF MARKS ALLOCATED TO ASSESSMENT OBJECTIVES

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	0	2	4	6	1	0
2	0	9	0	9	3	0
3	4	3	3	10	2	7
4	6	0	0	6	0	0
5	7	3	0	10	0	1
6	3	2	5	10	0	0
7	4	5	0	9	0	2
TOTAL	24	24	12	60	6	10