OCR
RECOGNISING ACHIEVEMENT

SPECIMEN F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

BIOLOGY B

B731/01

Unit B731: Biology Modules B1, B2, B3 (Foundation Tier)

MARK SCHEME

Duration: 1 hour 15 minutes

MAXIMUM MARK 75

This document consists of 16 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. 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.

Question			Expected answer	Marks	Additional guidance
1			Deb's EAR is 34.8 (1) Total protein intake is 32.4g which is less than EAR (1) **any one from** yes (no mark) because she / teenagers needs (a lot of) protein for growth (1) Deb's actual requirement for protein will be higher than calculated because she is a teenager (1) no (no mark) idea that she is only slightly below and could make this up another day / EAR is an average figure so she should take average protein intake over a number of days (1)	3	marking points must support conclusion to gain credit
			Total	**3**	

Question			Expected answer	Marks	Additional guidance
2	**(a)**		skin provides a barrier / AW (1) clotting blood prevents entry (at cuts) (1) trapped by mucus in airways (1) killed by (hydrochloric) acid in stomach (1)	4	
	(b)		ethical worries concerning animal rights (1) concerns about different effects on animals compared with humans (1)	2	
			Total	**6**	

Question			Expected answer	Marks	Additional guidance
3	(a)		pupil (1) optic nerve (1)	2	
	(b)	(i)	✓ ✓ **X**	1	all three correct to score the mark
		(ii)	because reflexes are protective (so if they are slower there is) more chance of injury / AW (1)	1	
			Total	**4**	

Question			Expected answer	Marks	Additional guidance
4	(a)		nicotine (1)	1	
	(b)	(i)	older / takes longer to become disabled (1) 20 years extra (before becoming disabled) (1)	2	
		(ii)	because smoking causes damage to cilia which means chemicals build up and cause cancer / emphysema (1) but giving up prevents further damage to cilia / less build-up of chemicals so reducing risk of cancer / emphysema (1)	2	**answers must link giving up smoking to limiting lung damage and subsequent risk of disease in order to gain full credit**
			Total	**5**	

Question			Expected answer	Marks	Additional guidance
5	(a)		to make roots grow (faster) (1)	1	
	(b)		**Level 3** Answer thoroughly evaluates both conclusion and method, in terms of not testing directional growth, and applies knowledge of how to conduct this experiment to discuss in detail the flaws in the experimental method outlined, including lack of unidirectional light and control of variables. 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** A limited evaluation of conclusion and method, and applies knowledge of how to conduct this experiment to discuss specific flaws in the method including timing and watering. 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** An incomplete answer, simple evaluation in terms of conclusion not right, applies knowledge to experimental method to identify method was not a 'fair test'. 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:** • Basil is not right to draw this conclusion based on his evidence evaluation of conclusion • idea that conclusion not valid / not based on evidence • because experiment did not test directional growth • experiment was testing whether plant grows in light or dark evaluation of method • not enough detail to allow method to be followed • reference to condition of unidirectional light required / idea that should have blocked out light from all but one direction • reference to not watering both batches equally • reference to not leaving them to grow for the same length of time • idea of not a 'fair test' • reference to not doing repeats / controlling variables • reference to variables that were not controlled eg size of plant at the start **allow** examples of how the experiment should have been done
			Total	**7**	

Question			Expected answer	Marks	Additional guidance
6	(a)		scorpion and spider (1) because they both have 8 legs (1)	2	both needed for mark **allow** body **not** divided into head, thorax and abdomen (1)
	(b)		has warning colouration to deter predators (1) mimicry of wasps which have stings (1) eyes on the side of its head giving a wide field of vision (1)	2	
			Total	**4**	

Question			Expected answer	Marks	Additional guidance
7	(a)		idea of competition (1) bananas stop light reaching the weeds / weeds cannot photosynthesise (1) bananas use water / stop water / overshadow reaching weeds so weeds do not grow (1) banana plants outcompete weeds for minerals etc. (1)	2	
	(b)		carbon dioxide (1)	1	**Not** gas
	(c)	(i)	4 (1)	1	
		(ii)	number of root borers and aphids increases because fewer ants are eating them (1) the increase in numbers of root borers and banana aphids causes more damage to the roots and leaves of the banana plants, reducing the banana crop (1)	2	**allow** higher level answers specifically referring to the increased action of banana aphids on leaves and root borer insects in roots and how this will limit water uptake/photosynthesis, decreasing growth of banana crop (2) **ignore** references to reduced number of banana plants

Question			Expected answer	Marks	Additional guidance
7	(c) ✎	(iii)	**Level 3** Applies understanding of energy transfers to describe in detail the processes of energy capture, transfer between trophic levels and loss at all stages for the banana plant food web and clearly sequences them in the correct order. 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 may describe some processes and may not make the correct order clear. 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** An incomplete answer, naming some processes without describing them and omitting other processes. 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:** • energy enters the food chain from sunlight • energy trapped by banana plants/chlorophyll in leaves of banana plants • by photosynthesis • energy trapped in food/sugar then • energy transferred from one organism to another (from producer to primary consumer) by feeding • energy in banana plants transferred to root borers, banana aphids and banana skippers by feeding • energy transferred from primary consumers to secondary consumers/ants and wasps • energy transferred from secondary consumers to tertiary consumers/birds then • energy is lost at each stage/trophic level as it is converted into less useful forms • examples of methods of energy loss from this food web includes excretion, heat from respiration and egestion
			Total	**12**	

Question			Expected answer	Marks	Additional guidance
8	(a)	(i)	2:3 (1)	1	
		(ii)	become extinct in region 2(no mark) only 1 male in region 2 so more likely to become extinct / male:female ratios more favourable in regions 1 and 3 (1) if male in region 2 dies none of the females will reproduce (1) small area of territory per bird so, not a large enough habitat / may not have enough territory to breed / be competing with each other (1)	3	**must use data they have selected to give a valid explanation and justify choice** **allow** higher level answers above target grade in terms of offspring of Great Bustards in region 2 will have less genetic diversity (1) **allow** specific examples of competition, eg in the small area they are all competing for a small amount of food (1)
	(b)		protect habitat / create new habitats (1) legal protection (1) education programmes (1) captive breeding (1) cull predators (1)	2	
			Total	**6**	

Question			Expected answer	Marks	Additional guidance
9			direct measurement of pollutant levels, where higher values show more pollution (1) measurement of presence/absence of indicator species (1) where less lichen (in village) shows higher pollution (1)	3	**allow** examples of direct measurement of pollutants eg sulfur dioxide, nitrogen oxides max (1)
			Total	**3**	

Question			Expected answer	Marks	Additional guidance
10	(a)		right side pumps blood to lungs (1)	1	
	(b)		**any two from:** white blood cell kills microbes / engulfs microbes / makes antibodies (1) platelets causes blood to clot / prevents excessive bleeding (1) plasma transports food molecules, water, antibodies and waste products around the body (1)	2	**allow** specific names of cells eg lymphocyte **ignore** fights disease **allow** thrombocyte **ignore** forms a scab answer must reference transporting multiple substances to gain credit
	(c)		idea that haemoglobin carries oxygen (1) lack of oxygen for respiration / not enough oxygen to muscles / can't exercise (1)	2	
			Total	**5**	

Question			Expected answer	Marks	Additional guidance
11	(a)		respiration (1)	1	
	(b)	(i)	nucleus and mitochondria (1)	1	
		(ii)	because chromosomes are made of DNA (1) and chromosomes are too small to be seen with the microscope (1)	2	
			Total	**4**	

Question			Expected answer	Marks	Additional guidance
12	(a)		bluecrop and toro / spartan and toro (1)	1	
	(b)		choose genetic engineering / ora (1) because cloned blueberries would be (genetically) identical to one of existing varieties / would not get new combination of characteristics / AW (1) but genetic engineering allows the wild taste gene to be inserted into the Spartan blueberry (1)	3	**answers must support method chosen to gain full credit** if cloning chosen **allow** 1 mark for reason why genetic engineering not chosen eg unexpected harmful effects
	(c)		maybe unexpected (harmful) effects / may escape into the wild / breed with wild plant (1)	1	**allow** expensive / technically difficult **ignore** time consuming **allow** unknown consequences **allow** ethical argument **allow** could be harmful / may be harmful **ignore** mutations
			Total	**5**	

Question	Expected answer	Marks	Additional guidance
13 ✎	**Level 3** Answer describes correctly the structural and genetic differences between sperm cells and body cells. The purpose of these adaptations is thoroughly explained. 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 describes most of the structural differences between sperm cells and body cells with a limited explanation of their importance. The haploid nature may be stated but not fully explained. 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 describes correctly one or two differences and gives a correct explanation for one of them. 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** differences: • many mitochondria in sperm compared to body cell • acrosome in sperm, not present in body cells • haploid nucleus in sperm, diploid nucleus in body cell **allow** small in size **allow** streamlined / aerodynamic (shape) explanation: • (mitochondria) for energy to swim • (acrosome) to produce enzymes / for digestion (of cell membrane) • (haploid nucleus) allows full or diploid number of chromosomes to be formed after fertilisation **allow** (enzymes) for digestion (of cell membrane)
	Total	**6**	

Question			Expected answer	Marks	Additional guidance
14	(a)		feels his pulse on wrist / neck (1) counts number of pulses in a certain time (1)	2	
	(b)	(i)	it increases (in a steady pattern) (1)	1	
		(ii)	correct answer from graph approx (50 km per hour) (1) line extrapolated on graph (1)	2	
			Total	**5**	

Assessment Objectives (AO) Grid

(includes quality of written communication ✎)

Question	AO1	AO2	AO3	Total
1	1	2		**3**
2(a)	4			**4**
2(b)	2			**2**
3(a)	2			**2**
3(b)(i)		1		**1**
3(b)(ii)		1		**1**
4(a)	1			**1**
4(b)(i)		2		**2**
4(b)(ii)	1	1		**2**
5(a)	1			**1**
5(b)✎		4	2	**6**
6(a)		2		**2**
6(b)		2		**2**
7(a)		2		**2**
7(b)	1			**1**
7(c)(i)		1		**1**
7(c)(ii)		2		**2**
7(c)(iii)✎	4	2		**6**
8(a)(i)		1		**1**
8(a)(ii)		1	2	**3**
8(b)	2			**2**
9	3			**3**
10(a)	1			**1**
10(b)	2			**2**
10(c)		2		**2**
11(a)	1			**1**
11(b)(i)		1		**1**
11(b)(ii)		1	1	**2**
12(a)		1		**1**
12(b)		2	1	**3**
12(c)	1			**1**
13✎	6			**6**
14(a)	2			**2**
14(b)(i)		1		**1**
14(b)(ii)		2		**2**
Totals	**35**	**34**	**6**	**75**