OCR
RECOGNISING ACHIEVEMENT

SPECIMEN F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

BIOLOGY B

B732/01

Unit B732: Biology modules B4, B5, B6 (Foundation Tier)

MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 85

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 answers	Marks	Additional guidance
1	(a)		because there is no light underground / AW (1) so no need for chloroplasts for photosynthesis (1)	2	
	(b)		absorb water (1) absorb minerals (1)	2	
			Total	**4**	

Question			Expected answers	Marks	Additional guidance
2	(a)		because it is warmer and there is more sunlight (in Australia) (1) so more / faster photosynthesis (1) and the glucose / starch produced by photosynthesis can be used for growth (1)	3	**answers must link conditions to increased photosynthesis to increased growth for full credit** **allow** reference to warmer temperature increasing the rate of chemical reactions (1)
	(b)		insecticides / pesticides (1) BUT use insecticides / pesticides to kill insects (2) predators / biological control / suitable example (1) BUT predators / biological control / suitable example to eat the insects (2) **max two**	2	
			Total	**5**	

Question			Expected answers	Marks	Additional guidance
3	(a)		idea of two samples set up, one with bacteria killed and one sample untreated (1) samples left for specified time in a sealed container / in controlled conditions (1) method of identifying positive result for decay in the untreated samples (1)	3	**allow** example of method to kill the bacteria in control sample eg heating (1) **allow** example of conditions under which sample kept eg in a tube with a bung in the top (1) **allow** examples of positive result eg can see mould growing / loss in mass due to decay (1)
	(b)	(i)	oxygen / tick in 4th box (1)	1	
		(ii)	moisture / warmth (1)	1	**allow** water / heat / temperature **allow** pH **allow** (coarse stone) filter
	(c)	(i)	to release minerals in the sewage (used by plants for growth) / AW (1)	1	**allow** prevent contamination of fields (1) **allow** to remove parts of sewage which will not decompose (1)
		(ii)	trying to produce as much food as possible from the land / plants / animals available (1)	1	
			Total	**7**	

Question			Expected answers	Marks	Additional guidance
4	(a)		**Level 3** Answer applies knowledge of factors that affect transpiration to draw conclusions which correctly compare the effects of increased air movement **and** increased humidity on the rate of transpiration, supported by calculations of percentage loss. 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 applies knowledge of transpiration to correctly describe the effects of increased air movement **and** increased humidity on the rate of transpiration shown in the experimental data, supported by calculations. 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 applies knowledge of transpiration to correctly describe the effect of **either** increased air movement **or** increased humidity on the rate of transpiration, using some data from the table. 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:** • reference to what each experiment is testing ie A = natural air movement + natural humidity therefore control, B = high air movement, C = high humidity • in **A**: mass of water lost = 7.1g, % mass lost = 16.7% • in **B**: mass of water lost = 10.6g, % mass lost = 24.3% • in **C**: mass of water lost = 0.8g, % mass lost = 1.8% • increased air movement increases rate of transpiration • increased humidity decreases rate of transpiration • reference to comparing result from B-A against C-A to compare the effects • positive effect of increased air movement (24.3 – 16.7 = 7.6) is less than negative effect of increased air humidity (1.8 - 16.7 = -14.9)
	(b)		(control) to show loss in mass is due to plant alone / to show loss in mass is only due to transpiration (1)	1	

Question			Expected answers	Marks	Additional guidance
	(c)		same starting mass / controlled room temperature / controlled light intensity / same type of plant / same size plant (1)	1	**allow** same surface area of leaf
	(d)		xylem (1)	1	
			Total	**9**	

Question			Expected answers	Marks	Additional guidance
5	**(a)**		trachea (1)	1	
	(b)		bronchitis / (lung) cancer / pneumonia (1)	1	**allow** higher level answers: cystic fibrosis / asbestosis / tuberculosis / emphysema (1)
	(c)	**(i)**	4 (litres) (1)	1	
		(ii)	he breathes out more slowly (than the person without asthma) / AW (1)	1	
		(iii)	make sure breathing is normal at start / after test (1) have inhalers available (in case of asthma attack) (1)	2	**allow** let him stop the test if he is having problems / AW (1)
			Total	**6**	

Question			Expected answers	Marks	Additional guidance
6	(a)		(yes – no mark) Y is the sperm duct / carries sperm (1) so if Y is narrower then it carries fewer sperm (1) OR (no – no mark) Y is the sperm duct / carries sperm (1) Y is still open so sperm can still pass through (1)	2	**answers must support conclusion drawn to gain credit** **allow** Y is narrower so could get more easily blocked (1)
	(b)		**any two from** idea of increasing **chances** of pregnancy by using treatments (1) although pregnancy still not guaranteed (1) can cost money to go through treatments / may not be able to afford treatment (1) increased chance of multiple births (with some treatments) (1) have to consider ethical issues (1)	2	**allow** example of ethical issue (1)
			Total	**4**	

Question			Expected answers	Marks	Additional guidance
7	(a)		adolescence / puberty (1)	1	**ignore** teenager / youth
	(b)	(i)	answer in range 0 – 6 months / 0.5 years (1)	1	
		(ii)	answer in range 19 – 20 years (1)	1	

Question	Expected answers	Marks	Additional guidance
(c)	**Level 3** Well-reasoned conclusion about Lucy's parents concern. Applies knowledge of factors that affect growth to show how a broad range of interacting factors could have led to Lucy growing less than average. 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** Simple conclusion about Lucy's parents. Applies knowledge of factors that affect growth to show how at least two factors could have led to Lucy growing less than average. 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** Recalls some factors that affect growth. 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:** • yes because she is below the line and therefore underweight • no because she is only being compared to an average, there is time for her to grow and catch up, it is not necessarily bad to be below average factors include: • genes inherited from parents / quality of diet / amount of exercise / levels of hormones / health / disease applications include: • genes: Lucy's parents are shorter / lighter than average so Lucy will inherit genes which make her shorter / lighter • diet: in Lucy's diet a possible lack of proteins needed for growth / calcium needed for teeth and bones / not having balanced diet could limit growth / eating too little / AW • exercise: lack of regular exercise by Lucy could mean she does not develop strong bones / strong muscles • hormones: lack of hormones during infancy / puberty to stimulate growth • health / disease: Lucy could suffer from poor health / (specific) diseases which can limit growth • idea that could be a combination of factors that influence growth
	Total	**9**	

Question			Expected answers	Marks	Additional guidance
8	(a)		because blood is always needed / otherwise blood will run out (1) blood is needed for transfusions / used in operations / used for injured people (1)	2	**allow** people with blood loss / people who need blood eg haemophilia (1)
	(b)		blood group O (1) rhesus negative (1)	2	
	(c)		stop (blood) clotting (1) so blood keeps flowing / leech can keep feeding (1)	2	
			Total	**6**	

Question			Expected answers	Marks	Additional guidance
9	(a)	(i)	A (1)	1	**allow** ringed / underlined answer
		(ii)	(90/30000) = 0.003mm(1) therefore size of coliform > 0.0003mm (1)	2	
	(b)	(i)	both bars correctly drawn (1) (July = 500, August =300)	1	**allow** bars of any width drawn to correct height (+/- half square)
		(ii)	July and August (1)	1	**allow** answers either way round
		(iii)	boat yard (1) because most coliforms / bacteria are found in A / nearby (1)	2	**answers must link high number of coliforms to proximity to boatyard to gain full credit**
		(iv)	take more samples / collect samples over longer period of time / take samples from sewage pipes of buildings to compare with samples from sewage (1)	1	**allow** collect more evidence (1) if no other mark awarded **ignore** repeat the <u>same</u>/<u>identical</u> experiment again
			Total	**8**	

Question			Expected answers	Marks	Additional guidance
10	✎		**Level 3** Describes process of fermentation in detail in terms of anaerobic respiration and the need for keeping air and other micro-organisms out. 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** Describes reactants and products of fermentation and need for yeast and absence of oxygen. 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** Names fermentation and identifies that alcohol is made and yeast is used. 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 fermentation • yeast is used • alcohol is made • extracting sugar from source material • sugar / glucose is broken down • in the absence of oxygen • by anaerobic respiration • production of carbon dioxide • entry of air and other micro-organisms must be prevented **allow** higher level answers: • keeping fermentation warm • clarifying/clearing/drawing off the wine **ignore** any references to distillation or drinks produced by distillation unless linked to toxic effects of alcohol on yeast at high concentrations
			Total	**6**	

Question			Expected answers	Marks	Additional guidance
11	(a)		because earthquakes damage water supplies / sewage systems / AW (1) this means water supplies mix with sewage allowing transmission of cholera (1)	2	**answers must link damaged sewage/water systems to transmission of cholera to gain full credit** **ignore** other methods of transmission
	(b)		removing a gene from one organism (1) and inserting it into the potato plant so the gene works in the potato plant (1)	2	
			Total	**4**	

Question			Expected answers	Marks	Additional guidance
12	(a)		test their urine / blood (by dipping strip in) (1) **any one from:** for sugar / glucose against chart / by colour change (1) so that they know how much insulin to inject (1)	2	
	(b)		(low sucrose) will be sweeter (1)	1	
	(c)		pineapple juice contains enzyme / protease (1) so the (enzyme / protease) breaks down / digests gelatine (1) this (breakdown / digestion) only occurs at low temperatures (37^oC) / does not occur at high temperatures (70^oC) / AW (1) **because the enzyme** denatures / changes shape at high temperature (70^oC) / ORA (1)	4	**answers must be linked and in order to gain full credit** **allow** enzymes cannot react with substrate / protein at high temperatures (1)
			Total	**7**	

Question			Expected answers	Marks	Additional guidance
13	(a)	(i)	((120 – 95)÷10 =) 2.9 so fitness level is 'fair'	1	
		(ii)	Yes or no or possibly (no mark) because recovery rate is above that of Amy / Amy's recovery rate is 2.9 but Neil's rate is 3.1 / fitness level for Amy is only 'fair' but fitness level of Neil is 'good' (1) because recovery rates are close to each other so within limits of uncertainty (1) no repeats taken so not average figures (1) there are different way of measuring fitness and this is only one way (1)	2	**reasoning must be linked to answer to gain full credit**
	(b)		the first method is quicker / ora (1) the first method less chance of miscounting / less accurate / ora (1) the first method is less precise / will only get final values that are multiples of 4 / ora (1)	2	
	(c)		Neil (no mark) Neil returned to resting value after 2 / 3 min (1) but Amy still had not returned to resting after 5 min / AW (1) Neil's pulse rate returned to resting level quicker than Amy's (1)	2	**answers must support conclusion to gain full credit** **ignore** simply 'Neil increased by less'

Question			Expected answers	Marks	Additional guidance
	(d)		first method only two values / limited amount of data used to assess fitness (1) second method idea of more evidence / data (1) number of press-ups not counted so perhaps not a fair test (1) although two methods are used, they both indicate that Neil is fitter than Amy (1) do not take into account age or mass etc. (1)	3	**allow** idea of one being heavier / doing more work **allow** different exercises could be done for each method therefore results may not be conclusive (1) **allow** there is evidence from two different methods to support a conclusion / AW (1)
			Total	**10**	

Assessment Objectives (AO) Grid

(includes quality of written communication ✎)

Question	AO1	AO2	AO3	Total
1(a)		2		**2**
1(b)	2			**2**
2(a)		3		**3**
2(b)	2			**2**
3(a)	3			**3**
3(b)(i)	1			**1**
3(b)(ii)	1			**1**
3(c)(i)		1		**1**
3(c)(ii)	1			**1**
4(a) ✎		4	2	**6**
4(b)		1		**1**
4(c)		1		**1**
4(d)	1			**1**
5(a)	1			**1**
5(b)	1			**1**
5(c)(i)		1		**1**
5(c)(ii)		1		**1**
5(c)(iii)		2		**2**
6(a)	2			**2**
6(b)		2		**2**
7(a)	1			**1**
7(b)(i)		1		**1**
7(b)(ii)		1		**1**
7(c) ✎	2	2	2	**6**
8(a)	2			**2**
8(b)	2			**2**
8(c)	1	1		**2**
9(a)(i)	1			**1**
9(a)(ii)		2		**2**
9(b)(i)		1		**1**
9(b)(ii)		1		**1**
9(b)(iii)			2	**2**
9(b)(iv)		1		**1**
10 ✎	6			**6**
11(a)	1	1		**2**
11(b)	2			**2**
12(a)	2			**2**

Question	AO1	AO2	AO3	Total
12(b)		1		**1**
12(c)		4		**4**
13(a)(i)			1	**1**
13(a)(ii)			2	**2**
13(b)			2	**2**
13(c)			2	**2**
13(d)			3	**3**
Totals	**35**	**34**	**16**	**85**