GCE

Biology B

H022/02: Biology in depth

Advanced Subsidiary GCE

Mark Scheme for June 2019

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

Annotations

Annotation	Meaning
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	Tick
	Cross
	Confused (replaces the question mark)
	Benefit of doubt
	AO1 – Knowledge and understanding
	AO2 – Apply knowledge and understanding
	AO3 - Analyse
	AO4 - Evaluation
	Omission
	Not answered question
	Noted but no credit given
	Too vague

OFR	Own figure rule
REP	Repetition

Subject-specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.

You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet **Instructions for Examiners**. If you are examining for the first time, please read carefully **Appendix 5 Introduction to Script Marking: Notes for New Examiners**.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

Question			Answer	Marks	Guidance
1	(a)	(i)	both have the formula $C_6H_{12}O_6$ / same formula ✓	1	**ACCEPT** both have 6 carbon (atom) s **ACCEPT** both have a ring structure **IGNORE** ref to CH_2OH **IGNORE** ref to six-carbon ring
		(ii)	*ORA for glucose* fructose has two CH_2OH groups ✓ fructose has a 5, membered / sided, ring structure ✓	Max 1	**ACCEPT** glucose only has one CH_2OH **ACCEPT** glucose has a 6 membered/sided ring structure **DO NOT CREDIT** six-carbon ring
	(b)	(i)	Y ✓	1	**IGNORE** phloem
		(ii)	differential stain ✓ allow structures to become visible ✓ **OR** *idea of* allow, tissues / cells, to be distinguished ✓	Max 2	**IGNORE** named stains **IGNORE** refs to colourless **IGNORE** organelles/structures
	(c)	(i)	brown / yellow / orange **AND** less / no starch remaining ✓	1	
		(ii)	neutralisation ✓	1	**CREDIT** *idea of* the acid would interact with iodine
		(iii)	ref. to repeating with the same conditions ✓ without acid ✓	2	
		(iv)	use a colorimeter ✓	1	
			Total	10	

Question			Answer	Marks	Guidance
2	(a)	(i)	decrease in males **and** increase in females ✓ males 173 - 177 to 113 - 117 **and** females 38 - 42 to 53 - 57 ✓	2	**ACCEPT** males decrease by 56 - 64 and females increase by 11 - 19
		(ii)	same trend would continue ✓ *idea of* lung cancer takes a long time to develop ✓	2	**ACCEPT** it takes longer than 5 years to develop lung cancer
		(iii)	48 000 000 ✓✓	2	**Correct answer = 2 marks** If answer not given to two sig figs, then **ALLOW 1** mark for 48 235 294 **OR** (41 000 ÷ 85) x 100 000 **ALLOW 1** mark for 480 **OR** 41 000 ÷ 85

	(b)*		*Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.* **Level 3 (5–6 marks)** A detailed description of how lung cancer develops **plus** at least **one** example of both long term **and** short term effects of pollution on the respiratory system. **Level 2 (3–4 marks)** A partial description of how lung cancer develops **plus** at least **one** example of either the long term **or** short term effects of pollution on the respiratory system. **Level 1 (1–2 marks)** A description of either how lung cancer develops **or** examples of either long term **or** short term effects of pollution on the respiratory system **0 marks** No response or no response worthy of credit.	**6**	Short-term effects include • irritation nose and throat • upper respiratory infections such as bronchitis and pneumonia • allergic reactions • aggravate the medical conditions e.g. asthma or emphysema. Long-term health effects include • chronic respiratory disease e.g. chronic bronchitis or emphysema, lung cancer. • ref. to causes / symptoms of COPD Developing lung cancer include • contains carcinogens/mutagens • carcinogens cause proto-oncogenes to form oncogenes • uncontrolled mitosis • tumour forms • references metastasis • description of malignant or benign.
			Total	**12**	

Question			Answer	Marks	Guidance
3	(a)	(i)	0.1-0.5 (s) ✓ pressure in the ventricles is greater than the atrium ✓	2	 **ORA**
		(ii)	0.2-0.3 (s) ✓ pressure in the ventricle is greater than the aorta ✓	2	 **ORA**
		(iii)	86 (bpm) ✓	1	**ACCEPT** 85.7 / 85
	(b)		mixing of oxygenated and deoxygenated blood ✓	1	**ACCEPT** legs receive less oxygenated blood **IGNORE** refs to whole body
	(c)	(i)	two suitable variables ✓ ✓	2	Including but not limited to: gender, age, ethnicity, exercise, duration of hypertension **IGNORE** ref to diet/time of day
		(ii)	arterial pressure decreases **and** venous pressure increases ✓ *idea that* decrease in the volume of blood in the artery **OR** increase in volume of blood in vein ✓	2	
		(iii)	17 (%) ✓✓ 2 (%) ✓✓	4	**Correct answer = 4 marks** If answer not given to the nearest whole number, then **ALLOW** 2 marks for correctly showing 16.7% and 2.2% **IGNORE** signs
			Total	14	

Question			Answer	Marks	Guidance
4	(a)*		*Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.* **Level 3 (5–6 marks)** A detailed description **and** explanation of the dietary changes recommended **and** the antenatal tests and why they are carried out. **Level 2 (3–4 marks)** A basic description and explanation of the dietary changes recommended **and** the antenatal tests available and why they are carried out. **Level 1 (1–2 marks)** A basic description and explanation of the dietary changes recommended **or** the antenatal tests available and why they are carried out. **0 marks** No response or no response worthy of credit.	6	**Indicative scientific points may include** dietary changes include • Protein –growth, enzymes, antibodies and haemoglobin • Calcium – for bone, teeth and muscle development • Folic acid – prevent neural tube/spinal/ brain defects and DNA replication/protein synthesis • Iron- for increased red blood cell count routine tests • ABO blood test-in case of transfusion • Rhesus test-details of possible immune response • Infectious disease blood test (HIV, syphilis, Hep. B) -baby can be treated before birth • Blood glucose test – can indicate diabetes • Ultrasound – check for development abnormalities • Urine test – pre-eclampsia • Other relevant tests e.g. amniocentesis • Blood pressure, weight

Question			Answer	Marks	Guidance
	(b)		*idea that* alcohol damages cell surface membrane ✓ cells lose water ✓ cell lyses ✓ contents of cell leaks out ✓	Max 2	
	(c)	(i)	week 6 ✓	1	
		(ii)	week 12 ✓	1	
	(d)		apoptosis / programmed cell death ✓ enzymes break down cell contents ✓ the cytoplasm shrinks ✓ chromatin condenses ✓ blebs form ✓ (blebs) are taken up by phagocytosis ✓	Max 2	**ACCEPT** organelles become tightly packed **ACCEPT** DNA breaks into fragments
			Total	12	

Question			Answer	Marks	Guidance
5	(a)		niches taken by new ladybirds ✓ *idea of* reduces number of native ladybirds due to, competition / predation / lack of food ✓ leads to fewer species ✓ genetic variation would decrease ✓ reduced biodiversity ✓	Max 3	**ACCEPT** *idea that* the introduction alters the food web **ACCEPT** *idea that* the gene pool would be smaller
	(b)	(i)	*idea of* (collect in) different / wider, area ✓ (collect at) different, times of day ✓ use of key for identifying ✓ example of collection technique ✓ method of ensuring that individuals not counted again ✓ repeat on different days ✓	Max 3	**ACCEPT** *idea of* well-prepared samplers Including but not limited to: students allocated random areas, take photographs
		(ii)	(n/N) 0.2450 **AND** (Sum) 0.18637 ✓ (D) 0.81363 ✓	2	**ALLOW** ecf
		(iii)	little / no impact ✓ has high species richness / evenness ✓ *idea that* the value calculated is close to 0.8 ✓	Max 2	**ALLOW** ecf from b(ii)
			Total	10	

Question			Answer	Marks	Guidance
6	(a)		*idea of* occurs most in winter ✓ (in winter) more people stay indoors ✓ (in winter) people are in closer proximity to each other ✓ (in winter) more chance of having another illness ✓	Max 2	**ORA** **ORA** **ORA** **ORA**
	(b)		3.14×10^9 ✓✓	2	**ALLOW 1** mark for 3141600000 **OR** (volume of droplet calculated / 5.0×10^{-4}) x 3000
	(c)	(i)	provides herd immunity / described **OR** as many people as possible are vaccinated ✓ people living with or working near someone who is infected are vaccinated ✓	2	**ACCEPT** ring vaccination
		(ii)	viruses can change their surface antigens ✓ antigenic shift / explained ✓ antigenic drift / explained ✓ high mutation rate ✓	Max 2	**ACCEPT** proteins major changes in the antigens of the same strain small changes in the shape and structure of antigens
	(d)		viral antigens pass through mucous membranes ✓ antigens, bind / AW, to specific B-cell (receptor) ✓ mitosis / AW, of B-cell ✓ B-cells differentiate into plasma cells ✓ plasma cells produce antibodies ✓	Max 4	**IGNORE** refs to T cells throughout **ACCEPT** enter blood **ACCEPT** clonal selection **ACCEPT** clonal expansion
			Total	12	

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