Rewarding Learning

General Certificate of Secondary Education
2017

Biology

Unit 2

Higher Tier

[GBY22]

FRIDAY 16 JUNE, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of students in schools and colleges.

The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and the mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes, therefore, are regarded as part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all the markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

				AVAILABLE MARKS
1	**(a)**	Any **two** from: Larger nucleus; irregular shape; Thicker cell membrane; smaller than normal cells;	[2]	
	(b)	Fewer cancer cells/smaller tumour;	[1]	
		Tumour not spreading/entering the blood;	[1]	
	(c)	Radiotherapy;	[1]	
		Surgery;	[1]	6
2	**(a)**	A – Aorta;	[1]	
		B – Renal artery;	[1]	
		C – Pulmonary artery;	[1]	
	(b)	Hepatic portal vein drawn between digestive system and liver;	[1]	
		Arrow drawn up/↑ into liver;	[1]	5
3	**(a)**	**(i)** Discontinuous;	[1]	
		(ii) Tongue rolling;	[1]	
	(b)	**(i)** $\frac{34}{100} \times 1800000$ **or** 1800000 – (954000 + 180000 + 54000); [1] 612000; [1]	[2]	
		(ii) Fewest number of people to **donate;**	[1]	
	(c)	Blood given to a patient (from one person to another);	[1]	6

4 **(a)** Fleming; [1]

(b) **Indicative content:**

1 Bacteria grown on agar plates;
2 Plates contaminated/described;
3 Penicillium is a fungus;
4 Produces a chemical/substance/antibiotic;
5 Chemical **diffuses**;
6 Bacteria killed;
7 Reference to clear area;

Response	**Mark**
Candidates **must use appropriate, specialist terms** throughout **using at least FIVE of the points**. They use **good** spelling, punctuation and grammar and the form and style are of a **high standard**.	[5]–[6]
Candidates use **some appropriate, specialist terms** throughout **using at least THREE of the points**. They use **satisfactory** spelling, punctuation and grammar and the form and style are of a **satisfactory** standard.	[3]–[4]
Candidates make **little use of specialist terms** throughout **using at least ONE of the points**. The spelling, punctuation and grammar, form and style are of a **limited** standard.	[1]–[2]
Response not worthy of credit.	[0]

[6] 7

5 **(a)** Bacterium; [1]
Sexual intercourse; [1]
Droplet infection; [1]
Vaccination/MMR; [1]
Fungus; [1]

(b) **(i)** Bacterium; [1]

(ii) Any **two** from:
Cook food at high temperature/defrost food thoroughly;
Wash knives/cutting surfaces/wash hands after handling food;
Storage/handling of cooked and uncooked foods; [2] 8

6 **(a)** Any **two** from:
Type of exercise; duration of exercise; gender; weight; age; [2]

(b) Any **two** pairs from:
Lower resting heart rate; 56 [±2] vs 77 [±2];
Increases slower when exercising; 56 [±2] up to 106 [±2] vs 77 [±2] up to 105 [±2];
Lower maximum heart rate; 105 [±2] vs 135 [±2];
Faster recovery; 2 minutes vs 5 minutes after exercise; [4] 6

AVAILABLE MARKS

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7	**(a)**		A – Red blood cell;	[1]	
			B – Platelet;	[1]	
			C – White blood cell;	[1]	
	(b)		A – no nucleus, C has a nucleus;	[1]	
			A – smaller/biconcave shape, C not concave;	[1]	
	(c)		Any **two** from: CO_2/carbon dioxide Hormones; Urea; Water;	[2]	
	(d)	**(i)**	Fewer red blood cells/more platelets;	[1]	
		(ii)	anaemia; iron/red meat/blood transfusion/B12;	[2]	10
8	**(a)**	**(i)**	Cell wall labelled/line/arrow touching/between the two lines/ bounding the cell labelled as cell wall;	[1]	
		(ii)	Any **three** from: B is flaccid/plasmolysed, A is turgid; B – smaller vacuole; B – cytoplasm/cell membrane pulled away from cell wall; B – cell wall moved inwards;	[3]	
		(iii)	Cell loses water/water moves out of cell; Osmosis; Through **semi-/selectively/partially permeable** membrane; More water inside cell than in external solution/ concentration gradient described;	[4]	
	(b)	**(i)**	27–27.5%;	[1]	
		(ii)	sugar concentration which causes 0% change in mass is conc. of sugar in cells; potato is 21–22%; carrot has higher concentration (of sugar) than potato;	[3]	12
9	**(a)**		**Chargaff** – chemical analysis; equal number of A and T, C and G;	[2]	
			Franklin and Wilkins – used X-ray crystallography to find shape;	[1]	
	(b)		Peer review; experiments repeated/checked by other scientists;	[2]	5

					AVAILABLE MARKS
10	**(a)**	**(i)**	Plasmid;	[1]	
		(ii)	Restriction (enzyme);	[1]	
		(iii)	Sticky ends;	[1]	
	(b)	**(i)**	prevent contamination;	[1]	
		(ii)	high temperature kills bacteria/cold temperature slows growth of bacteria/maximise growth/output of insulin;	[1]	
		(iii)	sensor detects/monitors temperature; water jacket warms/cools water;	[2]	
		(iv)	extraction; purification; packaging; (Any 2 for **[1]**)	[1]	8

11 (a) (i) Coronary; [1]

(ii) Fatty deposit/cholesterol/atheroma; [1]

(iii) Any **two** from:
Smoking;
Lack of exercise;
Obesity/fatty diet; [2]

(b) Indicative content

1 Balloon inflated/air blown in and wire cage expands against artery wall/blockage;
2 Balloon/fine tube taken out and wire cage remains/holds artery/wall open;
3 **<u>increased/more blood flow</u>** to heart cells;
4 More sugar/O_2;
5 Cells able to respire normally;
6 Prevents cells dying;

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[6]

AVAILABLE MARKS

10

					AVAILABLE MARKS
12	**(a)**	**(i)**	Mutation;	[1]	
		(ii)	Some of original bacteria population are resistant;	[1]	
			Antibiotic kills most/non-resistant bacteria;	[1]	
			Resistant bacteria survive;	[1]	
			Reproduce;	[1]	
			Pass on resistance gene/allele to all offspring;	[1]	
		(iii)	Treatment with other antibiotics; Resistant to more than one antibiotic;	[2]	
	(b)	**(i)**	Droplet infection/described;	[1]	
			(BCG) vaccination;	[1]	
		(ii)	Any **two** from: Overall increase; Number of cases increases slowly (from 2007 to 2010); Number of cases increases quickly (from 2011–2013);	[2]	
	(c)		Any **four** from: 1990–2012 number of antibiotics reduces/described; (Reduced antibiotics 1990–2012) allowed number of antibiotic resistance cases increases; Since 2012 number of antibiotics increases; 7 new/60% of 12 new antibiotics; New antibiotics may reduce number of resistance cases;	[4]	16
13	**(a)**		Any **two** pairs from: [description + appropriate explanation] Skin; A barrier; Mucous membranes; Trap viruses; Blood clotting; A barrier; Hair follicles; produces oil; Stomach acid; kills bacteria; tears; lysozyme;	[4]	
	(b)		Weakened/killed; Virus does not cause disease; Antigens still present; Recognised by lymphocytes; Produce antibodies/memory cells.	[5]	
	(c)		Any **three** from: Antibodies produced (if not given in **(a)**); Antibodies combine/join with antigens; Clumps formed; immobilize/stops viral reproduction; Clumps destroyed by phagocytes; Takes time/2 week delay.	[3]	
	(d)		Any **four** from: Requires a year to produce a vaccine; Virus can **mutate** to produce unknown strains; Vaccine may not give immunity against unknown strains/may not include unknown strains; Populations have no immunity/memory cells to unknown strains; Unknown strains reproduce rapidly causing large numbers to become ill/disease to spread quickly;	[4]	16
				Total	**115**