



Rewarding Learning

**General Certificate of Secondary Education
2015**

Biology

Unit 2

Higher Tier

[GBY22]

MONDAY 15 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) continuous;	[1]
	(b) (i) Tally completed correctly; Numbers: 1, 2, 5 , 1, 1;	[2]
	(ii) Histogram;	[1]
	(iii) $3/10 \times 100; = 30;$	[2]
	(iv) Small sample size;	[1]
	(c) (i) Diet/calcium/proteins/vitamin D;	[1]
	(ii) Genetic;	[1]
2	(a) Amniocentesis;	[1]
	(b) Nucleus;	[1]
	(c) Down syndrome;	[1]
	(d) Mutation;	[1]
	(e) Different genders/A male, B female/different sex chromosomes/ A–XY, B–XX/different numbers of chromosomes (described);	[1]
	(f) Abortion (for medical reasons); Risk of miscarriage (caused by screening);	[2]
		9
		7

3 Indicative content

- 1 Water has **moved out** of cells;
- 2 Down concentration gradient/described;
- 3 Through selectively/partially permeable membranes;
- 4 Cytoplasm shrank;
- 5 Cell membrane pulls away from cell wall;
- 6 Cells (in concentrated solution) become plasmolysed;
- 7 Cell wall permeable to sugar solution/sugar can pass through cell wall;
- 8 Sugar solution enters inside cell wall;
- 9 Sugar does not enter cell membranes/membranes impermeable to sugar;

Response	Marks
Candidates must use appropriate, specialist terms throughout to describe the process of osmosis using at least five of the above 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 to describe the process of osmosis using at least three of the above 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 to describe the process of osmosis using some or all of the above points . The spelling, punctuation and grammar, form and style are of a limited standard.	[1]–[2]
Response not worthy of credit	[0]

[6]

6

- 4 (a) Distance moved by bubble;
Time;

[2]

- (b) Any **four** from:

Results/trend shows increasing humidity reduces transpiration (rate);
80% humidity/in bathroom causes 0.3 mm (± 0.05) per minute;
20%/living room causes 1.7 (± 0.05) mm per minute;
Less diffusion gradient (in bathroom);

[4]

6

- 5 (a) Artery thicker muscle/wall than vein;
Artery smaller lumen;

[2]

- (b) Prevent backflow;

[1]

- (c) Allow artery to stretch (under high pressure)/withstand high pressure;
Return to normal (after pulse);

[2]

- (d) carotid artery;

[1]

- (e) jugular vein;

[1]

- (f) Allow **time** for/**enough** diffusion of gases to occur;

[1]

8

			AVAILABLE MARKS			
6	(a) (i)	chromosome;	[1]	10		
	(ii)	nuclear membrane disappears;	[1]			
	(iii)	DNA replicates/each chromosome copies/doubles/duplicates;	[1]			
	(iv)	genetically identical;	[1]			
	(v)	asexual;	[1]			
	(b) (i)	1 long black chromosome and 1 short white chromosome in one cell; 1 long white chromosome and 1 short black chromosome in the other cell;	[2]			
	(ii)	2 daughter cells in mitosis, 4 in meiosis; daughter cells have same number of chromosomes as parent cell in mitosis, daughter cells have half the number in meiosis/ diploid v haploid; daughter cells identical in mitosis, variation in meiosis; one v two divisions Any two , comparison needed	[2]			
	(iii)	sperm/ovum/gamete;	[1]			
	7	(a)	L drawn in chambers ①/③;		[1]	12
		(b)	①, ③, ②, ④;		[1]	
(c)		Any two from: X produces more pressure/force; Pumps blood greater distance/all around the body; Y pumps blood to lungs;	[2]			
(d)		coronary arteries ;	[1]			
(e)		Any three from: Heart muscle/cells receive less blood; less O ₂ /glucose; Stop respiring/producing energy; Die/stop contracting;	[3]			
(f)		Stops pumping blood around the body /circulation stops/no oxygen to cells;	[1]			
(g)		Any three from: 1. (The more exercise) the lower the heart rate; 2. (Heart rate decreases) from 80 to 60 beats per min; 3. The more exercise the more blood pumped per beat ; 4. (Volume of blood pumped per beat increases) from 60 cm ³ to 90 cm ³ ; 5. Strengthens (heart muscles);	[3]			

			AVAILABLE MARKS	
8	(a)	Less haemoglobin/fewer red blood cells; (Less) oxygen transported (to body/cells); (Less) respiration/energy produced;	[3]	8
	(b)	Heart rate increases/rapid; More blood has to be pumped to the cells;	[2]	
	(c)	Pale skin;	[1]	
	(d)	Blood/parts of blood (from a different person) added to the bloodstream/ body;	[1]	
	(e)	iron (tablets);	[1]	
9	(a)	1 – ovulation; 3 – mitosis/cell division;	[2]	8
	(b)	2 – fertilisation; sperm and ovum nuclei fuse ; 4 – implantation; foetus “sinks” into uterus lining ;	[2] [2]	
	(c)	Large surface area; increase (rate of) diffusion (of glucose/oxygen); or thin membranes; short diffusion distance; or good blood supply; maintains high concentration/diffusion gradient;	[2]	
10	(a) (i)	Range (several types) of a trait/characteristic in a population/species ; (Coat) colour (in the mouse);	[2]	8
	(ii)	In dark areas dark fur provides camouflage/better adapted ; This provides a (selective) advantage against predation ; Individuals with advantage are more likely to survive/reproduce ; pass genes on (to next generation); Individuals with the advantage (/described) increase in numbers ; or without the advantage (/described) decrease in number/become extinct; Any four	[4]	
	(b)	(Natural selection causes gradual) changes in a genotype of a population/ species; over a (long) period of time/many generations;	[2]	8

			AVAILABLE MARKS	
11 (a) (i)	artificial;	[1]	12	
(ii)	Any four from: Vaccine contains dead/weakened disease-causing organism; Which doesn't cause the disease; but contains antigens; stimulates white blood cells/lymphocytes; To produce antibodies; Memory cells;	[4]		
(iii)	Passive – body receives ready-made antibodies/doesn't make own antibodies	[1]		
(b) (i)	Have received passive immunity/antibodies from their mother remain in their blood;	[1]		
(ii)	550 – 70; = 480; thousand;	[3]		
(iii)	vaccination introduced (1968/9);	[1]		
(iv)	85 < 94%	[1]		
12	Any two pairs: Technique: flaming loop/sterilising loop (in alcohol)/flaming neck of (culture) bottle; Explanation: (Heat/alcohol) kills bacteria; Technique: open lid of Petri dish/culture bottle 45 °; Explanation: Prevents entry/contamination of bacteria; Technique: work near a (lit) Bunsen; Explanation: heat carries microorganisms upwards; Technique: seal Petri dishes; Explanation: prevents microorganism/pathogens escaping ;	[4]		4
13 (a)	bacteria not killed by an antibiotic; Not ref to immune	[1]		
(b)	fungus;	[1]		
(c)	oxacillin;	[1]		
(d)	CA – Gentamicin; HA – Tetracycline; Correct percentage of bacteria killed from graph – 94% gentamicin/ 93% tetracycline;	[1] [1] [1] [3]		
(e) (i)	mutant bacteria survive/reproduce; therefore pass on resistance gene/chromosome/mutation;	[2]		
(ii)	Any two from: patients may have open wounds; weakened immune systems; be in close proximity to other infected person; hospitals are an antibiotic environment;	[2]		
(iii)	bacteria will not yet have developed resistance to new antibiotic/ resistant bacteria will be killed by new antibiotic;	[1]	11	

14 Indicative content:

- 1 Tissue fluid formed by (high) pressure in blood;
- 2 Pushes/forces plasma (/water and dissolved substances);
- 3 Through thin/leaky capillary walls;
- 4 Into spaces between the cells;
- 5 Some/re-enters the blood/capillary;
- 6 By diffusion/osmosis;
- 7 Remaining fluid drains into the lymph vessel;
- 8 Returned to blood system;
- 9 The same volume reabsorbed as formed;

Accept: bullet points which start with capital letter.

Reject: through the capillary.

Response	Mark
Candidates must use appropriate, specialist terms throughout to describe and explain the formation of lymph using at least 6 of the above 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 to describe and explain the formation of lymph using at least 4 of the above 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 to describe and explain the formation of lymph using at least 2 of the above points . The spelling, punctuation and grammar, form and style are of a limited standard.	[1]–[2]
Response not worthy of credit.	[0]

[6]

Total

**AVAILABLE
MARKS**

6

115