Rewarding Learning

General Certificate of Secondary Education
2018

Biology

Unit 2

Higher Tier

[GBY22]

MONDAY 18 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)**	**(i)**	Valve;	[1]	
		(ii)	Stops backflow; [1] Under low pressure; [1]	[2]	
	(b)		→	[1]	
	(c)		Capillary – Thinner/only one cell thick;	[1]	5
2	**(a)**		50th (percentile);	[1]	
	(b)		C; [1] Average **mass** =1525 (±25); [1]	[2]	
	(c)		Length; [1] Cell number; [1]	[2]	5
3	**(a)**		Combines with red blood cells (haemoglobin)/reduces oxygen being carried; [1] Nicotine; [1]	[2]	
	(b)	**(i)**	Emphysema;	[1]	
		(ii)	Alveoli breakdown/described; [1] less surface area; [1] or **Bronchiole** narrow; [1] Less oxygen gets **into alveoli**; [1]	[2]	5

4 **Indicative Content**

1. 28 days long;
2. Menstruation occurs in correct sequence;
3. (Menstruation) **uterus lining** builds up/breaks down;
4. Day 14 ovulation/egg released from ovary;
5. Fertilisation fusion of egg and sperm **nuclei**/**in oviduct**/zygote;
6 Implantation/**forms** placenta;

Band	Response	Mark
A	Candidates **must use appropriate, specialist terms** throughout to describe and explain their conclusions **using <u>at least 5</u> of the points**. They use **good** spelling, punctuation and grammar and the form and style are of a **high standard**.	[5]–[6]
B	Candidates use **some appropriate, specialist terms** throughout to describe and explain their conclusions **using <u>at least 3</u> of the points**. They use **satisfactory** spelling, punctuation and grammar and the form and style are of a **satisfactory standard**.	[3]–[4]
C	Candidates make **little use of specialist terms** throughout to describe and explain their conclusions **using <u>at least 1</u> of the points**. The spelling, punctuation and grammar, form and style are of a **limited standard**.	[1]–[2]
D	Response not worthy of credit.	[0]

[6] 6

				AVAILABLE MARKS
5	(a)	Cholesterol/fat;	[1]	
	(b)	Less blood flow; [1] Less oxygen/glucose; [1] No respiration; [1]	[3]	
	(c)	Any **two** from: Stress; Lack of exercise; High fatty diet/salt/obesity/diabetes; Genetics; High blood pressure;	[2]	6
6	(a) (i)	(Short) length of DNA;	[1]	
	(ii)	(Random) change; [1] in number of chromosomes/structure of a gene/DNA/base sequence/chromosome; [1]	[2]	
	(iii)	UV light;	[1]	
	(b)	3 bases/TTT missing from gene; [1] **Phenylalanine** not present in protein; [1]	[2]	
	(c)	Any **two** from: Risk associated with genetic screening; Decision to terminate/have children; Freedom of choice/information.	[2]	8
7	(a) (i)	Uncontrolled/abnormal **cell division**;	[1]	
	(ii)	Malignant – No capsule; [1] Able to spread; [1]	[2]	
	(b) (i)	Human Papilloma (Virus)/HPV;	[1]	
	(ii)	Virus is transferred by **sexual intercourse**; [1] Girls become immune to the virus; [1] Before they become sexually active; [1]	[3]	
	(iii)	[1] – appropriate y-axis scale; [2] – correct plots (× 2); [1] – line drawn;	[4]	
	(iv)	Number of cases rise; [1] Increase of population; [1] or Number of cases fall; [1] Vaccine/medical intervention/condoms; [1] or Numbers of cases level off/oscillates; [1] Increase of population balances medical intervention; [1]	[2]	13

					AVAILABLE MARKS
8	(a)	(i)	Prevent air/bubbles (in the stem);	[1]	
		(ii)	Fan at different sett**ings**/different distan**ces**; [1] Distance moved by bubble over a period of time; [1]	[2]	
		(iii)	Any **two** from; Syringe pushes bubble back to zero/up capillary tube; [1] Repeats; [1] Average; [1]	[2]	
	(b)		Any **four** from: Decreases water uptake; [1] Less evaporation/diffusion/transpiration; [1] From mesophyll cells through stomata; [1] Reduce diffusion/concentration gradient; [1]	[4]	
	(c)		Water used for photosynthesis/turgidity;	[1]	10
9	(a)	(i)	Plasma;	[1]	
		(ii)	**X** – carbon dioxide/urea/water;	[1]	
		(iii)	Diffusion;	[1]	
	(b)		No haemoglobin/red blood cells present; [1] (Red blood cells) **too large** to pass through the capillary **wall**/into lymph; [1]	[2]	
	(c)		Oxygen used by body cells; [1] In respiration; [1]	[2]	7
10	(a)		Phagocyte;	[1]	
	(b)		**Stage 1** – bacteria engulfed inside food vacuole; [1] **Stage 2** – enzymes (from vesicles); [1] break down/digest bacteria; [1] **Stage 3** – products released; [1]	[4]	
	(c)		Any **two** from: More than one white blood cells/phagocytes present; [1] Many bacteria in one food vacuole; phagocyte; [1] More than one food vacuole in each white blood cell; [1] Enzymes can be reused/multiple vesicles; [1]	[2]	
	(d)		Any **four** from: Lymphocyte; [1] White blood cell recognises/attaches to **antigen**; [1] Produce antibodies; [1] Antibodies **complementary** to antigens; [1] Attach/bind/clump **bacteria** together; [1] Produce memory cells; [1]	[4]	11

					AVAILABLE MARKS
11	(a)	(i)	Nuclear membrane disappears/breaks down; [1] **Chromosomes** replicate; [1]	[2]	
		(ii)	2 cells each with 2 chromosomes (identical cells similar to stage 1); [1] Nuclear membranes drawn; [1]	[2]	
		(iii)	Any **three** from; • Two cells produced by mitosis, four in meiosis; • Mitosis 1 division, meiosis 2 divisions; • Chromosome number remain same/diploid in mitosis, haploid daughter cells produced by meiosis; • Mitosis happens all over the body, meiosis in avaries/testes; • Cells genetically identical in mitosis, variation in meiosis	[3]	
	(b)	(i)	Tissue culture;	[1]	
		(ii)	Prevent contamination by bacteria/fungi;	[1]	
		(iii)	For (shoot and root) growth;	[1]	
		(iv)	**Genetically** identical offspring produced;	[1]	
		(v)	**Advantage:** Any **two** from: Known characteristics; Many plants produced; Can be used to conserve rare species; Quick; All year round; One parent/small piece of tissue;	[2]	13
12	(a)	(i)	Preschool-age children;	[1]	
		(ii)	Non-pregnant women;	[1]	
		(iii)	Women **lose blood** during menstruation;	[1]	
		(iv)	Pregnant women 41.8%, Non-pregnant 30.2%; [1] Foetus requires iron; [1] to make red blood cells/haemoglobin; [1] Iron is from woman/mother [blood]/leaves mother lacking red blood cells; [1]	[4]	
		(v)	Mother has reduced/low ability to transport oxygen to foetus/foetus has reduced oxygen levels; [1] Foetus cells have limited respiration/energy [released]; [1] Foetus has reduced **growth**; [1]	[3]	
	(b)		Any **two** from: Diet of iron rich foods/described; Iron supplements/tablets; Blood transfusion;	[2]	12

AVAILABLE MARKS

13 (a) (i) Any **one** from:
Volume of bacterial culture;
Volume antibiotic/type;
Incubation time;
Temperature; [1]

(ii) Antibiotic not strong enough to kill bacteria; [1]

(iii) 16 and 32 mol l^{-1}; [1]

(iv) Any **four** from:
- Minimum concentration needed is 64 mol l^{-1}
- Antibiotic concentrations 16–128 mol l^{-1} (tubes D–G) stopped growth/bottom clear after 24 hours;
- Tube D(16) and E(32) cloudy after 48 hours incubation showing bacteria not killed/grew;
- Tubes F(64) (and G(128)) clear after second incubation showing **bacteria killed/not growing** [4]

(b) (i) Fluoroquinolone; [1]

(ii) Indicative Content
1. Resistance to penicillin **and** tetracycline decreased.
2. Less penicillin **and** tetracycline being used.
3. Resistance to penicillin **and** tetracycline had no survival advantage.
4. Resistance to fluoroquinolone increased.
5. Mutation caused resistance to fluoroquinolone.
6. Resistant bacteria survived/reproduced.
7. Gene for resistance passed on to offspring.

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[6] 14

Total **115**