Rewarding Learning

General Certificate of Secondary Education
2024

Biology

Unit 2

Higher Tier

[GBL22]

TUESDAY 11 JUNE, MORNING

MARK SCHEME

General Marking Instructions

Introduction

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses.

Assessment objectives

Below are the assessment objectives for GCSE Biology.

Candidates must:

AO1 demonstrate knowledge and understanding of: scientific ideas; and scientific techniques and procedures;

AO2 apply knowledge and understanding of and develop skills in: scientific ideas; scientific enquiry, techniques and procedures; and

AO3 analyse scientific information and ideas to: interpret and evaluate; make judgements and draw conclusions and develop and improve experimental procedures.

Quality of candidates' responses

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

Flexibility in marking

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

Positive marking

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

Awarding zero marks

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

Marking calculations

In marking answers involving calculations, examiners should apply the 'own figure rule' so that candidates are not penalised more than once for a computational error.

Types of mark schemes

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

Levels of response
Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the 'best fit' bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

Threshold performance: Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.

Intermediate performance: Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.

High performance: Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

Quality of written communication
Quality of written communication is taken into account in assessing candidates' responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within bands of response as follows:

Band A: Quality of written communication is excellent.
Band B: Quality of written communication is good.
Band C: Quality of written communication is basic.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

Band A (Excellent): The candidate successfully selects and uses the most appropriate form and style of writing. Relevant material is organised with a high degree of clarity and coherence. There is widespread and accurate use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are of a sufficiently high standard to make meaning clear.

Band B (Good): The candidate makes a reasonable selection and use of an appropriate form and style of writing. Relevant material is organised with some clarity and coherence. There is some use of appropriate specialist vocabulary. Presentation, spelling, punctuation and grammar are sufficiently competent to make meaning clear.

Band C (Basic): The candidate makes only a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary. Presentation, spelling, punctuation and grammar may be such that intended meaning is not clear.

					AVAILABLE MARKS
1	**(a)**	Any **three** from: evaporation; from mesophyll cells; diffusion; through stomata;		[3]	
	(b)	**(i)** 19.5; ÷ 6 = 3.25; 3.3 g per hour;		[3]	
		(ii) curve drawn lower than curve on the graph;		[1]	
	(c)	Any **two** from: support; photosynthesis; transport;		[2]	9
2	**(a)**	**(i)** cholesterol/fat/atheroma;		[1]	
		(ii) blockage in artery; reduced blood flow to brain; less oxygen/glucose (to cells); cells die;		[4]	
	(b)	**Stage 2:** balloon **inflated**; wire cage expands (against artery wall/blockage); **Stage 3:** balloon (and fine tube) removed; wire cage remains open/wire cage holds artery open;		[4]	9
3	**(a)**	**(i)** lumen;		[1]	
		(ii) artery has a **thicker** layer B; **more** muscle/elastic fibres; withstand blood flowing at **high pressure**;		[3]	
	(b)	**(i)** valve; prevents backflow of blood;		[2]	
		(ii) arrow drawn diagonally from left to right;		[1]	7

					AVAILABLE MARKS
4	**(a)**	many villi; large surface area; good blood supply; maintains diffusion gradient; thin membranes; short diffusion distance;		[4]	
	(b)	**(i)**	less/decreases; glucose/amino acids;	[2]	
		(ii)	**reduced** growth/development;	[1]	7
5	**(a)**		mutation;	[1]	
	(b)		antibiotic kills non-resistant bacteria/resistant bacteria survive; reproduce; pass on resistant **gene** to offspring; whole **population** of bacteria become resistant;	[4]	
	(c)		further treatment with other antibiotics; becomes resistant to more than one antibiotic;	[2]	7
6	**(a)**	**(i)**	communicable;	[1]	
		(ii)	droplet infection; airborne; cough/sneeze;	[3]	
	(b)	**(i)**	(224 980 – 120 706)/104 274; ÷ 120 706 (×100); 86.39%;	[3]	
		(ii)	cost of treatment/loss of work force;	[1]	
	(c)	**(i)**	To test effectiveness against a particular disease; to check it is not **toxic**/**poisonous**;	[2]	
		(ii)	To check for **side effects**/to find best **dosage**;	[1]	11
7	**(a)**		breeder/human; **selects**/**chooses** cats with small amount/no Fd proteins and breeds them; repeats over many generations;	[3]	
	(b)		no/reduced/less allergic reaction;	[1]	
	(c)		appearance/personality/lack of aggression;	[1]	5

AVAILABLE MARKS

8 **(a)** modifying a genome/DNA;
to introduce **desirable** characteristics; [2]

(b) **Indicative content:**

1. use **restriction** enzyme;
2. to **remove** insulin gene (from human DNA)/**cut open** plasmid;
3. use **same** (restriction) enzyme to **cut open** plasmid/**remove** insulin gene;
4. insert insulin gene into plasmid/bacterial DNA;
5. sticky ends join by complementary base pairing;
6. place plasmid/bacterial DNA back into bacterium;

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]

(c) **(i)** so that it is not contaminated with **bacteria**; [1]

(ii) Any **two** from:
More insulin available/not limited by the number of animals;
faster extraction of insulin/slower process with animals;
animal insulin creates ethical issues for some people;
less/no risk of allergic reaction;
less risk of transferring animal diseases; [2]

11

					AVAILABLE MARKS
9	**(a)**		carried on sex chromosome/X chromosome;	[1]	
	(b)		pedigree (diagram);	[1]	
	(c)		normal/does not have haemophilia;	[1]	
	(d)	**(i)**	Ian receives Y chromosome from his father; receives **X^H** allele/chromosome from his mother;	[2]	
		(ii)	Paul – X^H; Helen – X^H and X^h; genotypes – X^HX^H X^HX^h; X^HY X^hY;	[4]	
	(e)	**(i)**	25%;	[1]	
		(ii)	Any **three** from: test would have shown Helen is a carrier; (half her daughters could be carriers)/25% chance of (girl) carrier; (half her sons would be haemophiliacs)/25% chance of having a haemophiliac (son); could have decided to adopt/not have children;	[3]	13
10	**(a)**	**(i)**	immunotherapy;	[1]	
		(ii)	protein 3; proteins 1 and 2 are found on both cancer cell and normal body cell/ protein 3 is **only** found on cancer cell (and not on normal body cell);	[2]	
		(iii)	less side effects than other treatments/only affects cancer cells/ doesn't affect normal cells;	[1]	
		(iv)	*cancer cell has a*: larger nucleus; thicker cell membrane;	[2]	
	(b)	**(i)**	recognise/attach to protein;	[1]	
		(ii)	produce **large number** of antibodies;	[1]	
		(iii)	antibodies attach to antigens and clump/agglutinate/immobilise the cancer cells; phagocyte; engulfs and digests cancer cell;	[3]	11
				Total	**90**