



*Rewarding Learning*

**General Certificate of Secondary Education  
2023**

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**Double Award Science  
Biology**

Unit B2

Higher Tier

**[GDW42]**

**FRIDAY 9 JUNE, AFTERNOON**

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**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 Double Award Science.

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; and
  - 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. The exception to this for GCSE Double Award Science is when examiners are marking complex calculations when the Examiners are briefed to mark by error or omission. 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 'carry error through' rule so that candidates are not penalised more than once for a computational error. To avoid a candidate being penalised, marks can be awarded where correct conclusions or inferences are made from their incorrect calculations.

### **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**

In deciding which level of response to award, examiners should look for the number of indicative content points in candidate responses to ensure that the answer has been written to coincide with the question. In deciding which mark within a particular level to award to any response, quality of communication will be assessed and 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.
- **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 bands of response. The description for each band 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.

Band D: Response not worthy of credit.

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

**Band A (Excellent):** Excellent reference to scientific terminology. 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):** Good reference to scientific terminology. 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):** Basic reference to scientific terminology. 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.

- 1 (a) once a month; [1]
- (b) (i) A; [1]
- (ii) B; [1]
- (c) (i) X on at least one oviduct; [1]
- (ii) stops **sperm** reaching egg/prevent **sperm** passing through the oviducts; [1]
- (iii) permanent/not easily reversed; [1]
- (d) contains hormones/contains a female hormone (named female hormone)/changes hormone levels; stops egg/ovum production/prevents ovulations/stops egg maturing; [2]

AVAILABLE  
MARKS

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2 (a)

Statement	True	False	Can't tell
The amount of chemical X in the saliva of children looked after by a child minder who <b>smokes</b> is the same as in those children who are looked after by a child minder who does <b>not</b> smoke.		✓	
The amount of chemical X in the saliva of children where <b>neither</b> parent smokes is the lowest amount for any category.	✓		
The amount of chemical X in the saliva of children who have <b>only</b> a father who smokes is lower than the amount in children who have <b>only</b> a mother who smokes.	✓		
The amount of chemical X in the saliva of children aged between 4 and 7 is <b>exactly the same</b> as the amount in children aged between 8 and 11.			✓
The amount of chemical X in the saliva of children where <b>both</b> parents smoke is equal to the figure for the amounts where <b>only</b> the father and the figure for <b>only</b> the mother smokes <b>added together</b> .	✓		

[1] for each correct allow only one tick in each row

[5]

(b) nicotine is addictive;

[1]

(c) less exposure;

to smoke/fumes/nicotine;

parents or childminders may have given up smoking following the ban/

parents or childminders may smoke less inside the home following the

ban;

[3]

AVAILABLE  
MARKS

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### 3 Indicative content

1. recognise/detect/presence of foreign microorganism/foreign protein/foreign antigen/structure Z is the antigen;
2. white blood cells produce antibodies
3. lymphocytes named as correct white blood cell
4. antibodies complementary (described) to antigen
5. clump produced/clumping
6. clumping prevents spread/reproduction of bacteria
7. C is the (correct/complementary) antibody

Must have correct reference to antibody C to get into the top band

Band	Response	Mark
A	Candidates use appropriate terms throughout to give <b>at least five</b> points from the indicative content. They use good spelling, punctuation and grammar skills. Form and style are of a high standard.	[5]–[6]
B	Candidates use appropriate terms throughout to give <b>at least three or four</b> points from the indicative content. They use satisfactory spelling, punctuation and grammar. Form and style are of a satisfactory standard.	[3]–[4]
C	Candidates use appropriate terms throughout to give <b>one or two</b> points from the indicative content. They use limited spelling, punctuation and grammar and have made little use of specialist terms.	[1]–[2]
D	Response not worthy of credit.	[0]

[6]

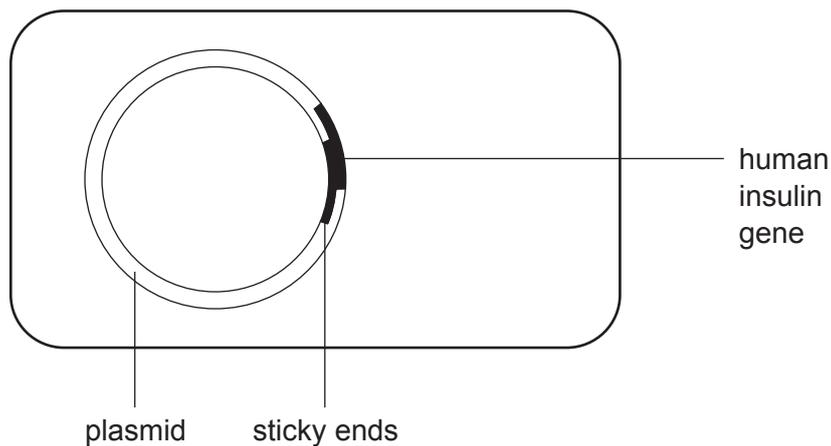
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AVAILABLE  
MARKS

			AVAILABLE MARKS			
4	(a)	(i) osmosis;	[1]	11		
		(ii) transpiration;	[1]			
	(b)	(i) 12 midday – 2pm/12pm – 2pm;	[1]			
		(ii) Any <b>four</b> from: (maximum stomata open) to get CO <sub>2</sub> in/CO <sub>2</sub> is used up; for photosynthesis; there is maximum light/highest temperature; to produce glucose/to produce starch; transpiration; to draw up water/draw up minerals/cooling;	[4]			
	(c)	(i) closes stomata;	[1]			
		(ii) conserve water/stop water loss/prevent drying out;	[1]			
	(d)	get less CO <sub>2</sub> ; less photosynthesis; (less needed once)	[2]			
	5	(a)	B and D; (in either order) more flowers/big flowers/larger flower part/wide stem/thick stem;		[2]	4
		(b)	Any <b>two</b> from: whiter flowers; fast growing/increased crop yield; drought resistant/disease resistant/pest resistant; tasty; long shelf life/long lasting;		[2]	
	6	(a)	(i) penicillin;		[1]	8
(ii) bacterium that is resistant to antibiotics/bacteria that antibiotics do not work against/bacteria that are not killed by antibiotics;			[1]			
(b)		(i) 10 – 14;	[1]			
		(ii) under 1; immune system not fully developed/not received their vaccinations;	[2]			
		(iii) immune system weakened/weakened defence system/in hospitals or care homes;	[1]			
(c)		(i) kills MRSA/bacteria;	[1]			
	(ii) stops/reduces transmission or spread;	[1]				

7 (a) Genome; [1]

(b) (i)



drawing of plasmid two rings;  
(human) insulin gene clearly defined, labelled and plasmid labelled;  
one sticky end labelled correctly;  
bacterial cell drawn; [4]

(ii) restriction; [1]

(iii) Any **two** from:  
**bacteria** reproduce/multiply;  
**plasmids** reproduce/multiply;  
protein synthesis; [2]

(iv) downstreaming; [1]

8 (a) (large muscular foot) gives better grip on rocks/attach to rocks/stick to rocks;  
waves rougher;  
less likely to be washed off rocks; [3]

(b) Any **two** from:  
less likely to be eaten **by crabs/crabs** won't kill them/**crabs** don't predate them;  
because it is harder for crabs to pull them out of their shell/crabs cannot reach them;  
long shelled dog whelk can reproduce and pass on their genes [2]

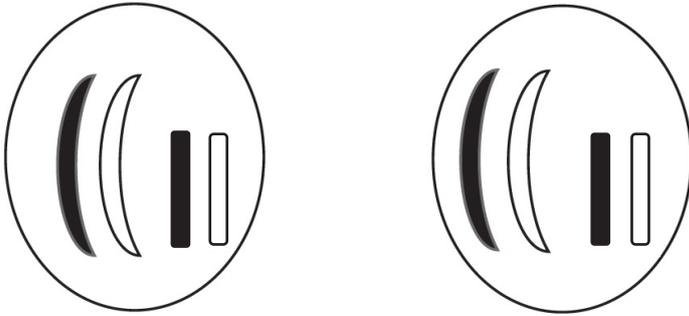
(c) discontinuous; [1]

AVAILABLE MARKS

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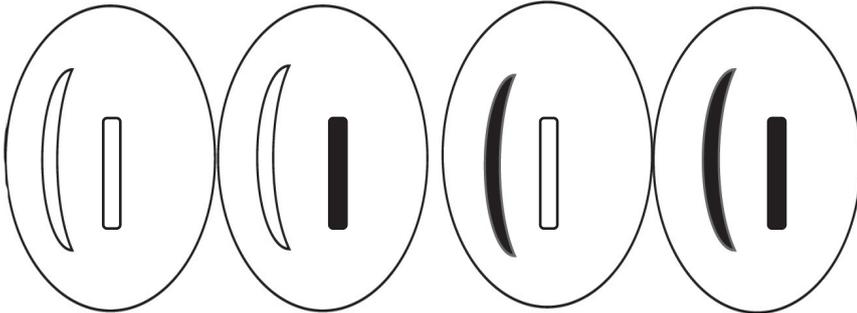
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9 (a)



2 cells produced;  
4 chromosomes in each cell;  
identical combinations of chromosomes to the parent cell in each cell; [3]

(b) (i)



4 cells drawn;  
2 chromosomes in each cell;  
1 bendy and 1 straight in each;  
Four shaded and four clear chromosomes distributed between cells; [4]

(ii) produces variation/produces **genetically** different (gametes or cells); [1]

(c) (i) X and Y; [1]

(ii) each sperm cell has one sex chromosome/germ cells have two sex chromosomes;  
sperm cells have X or Y/germ cells have X and Y [2]

10 (a) base triplet (hypothesis); [1]

(b) (i) proline, cysteine, isoleucine, asparagine [2]  
(all correct = [2], two correct = [1])

(ii) tryptophan; [1]

(iii) a new/different protein would be made/protein cannot be made; [1]

(c) (i) homozygous recessive; [1]

(ii) heterozygous; [2]  
homozygous dominant;

**Total**

**AVAILABLE MARKS**

11

8

**80**