



*Rewarding Learning*

**General Certificate of Secondary Education  
2016**

---

**Double Award Science: Biology**

Unit B2

Higher Tier

**[GSD42]**

**FRIDAY 10 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) | any antigen labelled  | [1]             |    |
|   | (ii)    | Any three from:<br>antigen or microbe is recognised as foreign;<br>WBC/lymphocytes;<br>produce antibodies/specific presence of antibodies;<br>antibodies attached to antigen/complementary shape  | [3]             |    |
|   | (iii)   | stops microbes spreading/stops reproducing/easier phagocytosis  | [1]             |    |
|   | (b)     | phagocytosis;<br>engulf;<br>digest/accept destroy <b>using enzymes</b>  | [3]             | 8  |
| 2 | (a) (i) | years scale on x-axis;<br>points plotted correctly<br>([−1] for each error plotting)<br>line/points joined with straight lines  | [4]             |    |
|   | (ii)    | number of people living with AIDS increases with time from 2006 to 2013   | [1]             |    |
|   | (b) (i) | $2.2 - 1.9 = 0.3 / \frac{1.9}{2.2} / 86.36;$  | [2]             |    |
|   | (ii)    | Any <b>two</b> from four<br><b>money</b> spent on treatment/education/research/data, e.g. 8.8 billion more in 2013 than 2006;<br><b>people</b> receiving/get treatment;<br><b>fewer</b> new infections/fewer people newly infected with HIV;<br><b>more people</b> living with AIDS (not dying) | [2]             |    |
|   | (c) (i) | Jenner  | [1]             |    |
|   | (ii)    | smallpox  | [1]             | 11 |

- 3 no clear area around amoxicillin;  
clear area around neomycin;  
Explanation: amoxicillin didn't kill X/X is resistant to amoxicillin  
Neomycin kills X/X is not resistant to neomycin [4]
- 4 (a) Any **two** from:  
radiotherapy or chemotherapy  
fails to produce sex **hormones**/or named correct hormone/drugs  
mucus hostile to sperm  
STI or named; STI  
blocked oviducts  
radiotherapy or chemotherapy [2]
- (b) **Indicative Content**  
**hormones** given/fertility hormones given;  
to increase ova production/egg production/super ovulation;  
eggs collected/gathered/harvested  
sperm **added** to ova/eggs  
fertilisation/**nucleus** of sperm fuse with **nucleus** of ova  
in Petri dish;  
kept until 8 cell stage/ensure normal development  
embryos inserted into the uterus  
(Any **six** points) [6]

AVAILABLE  
MARKS

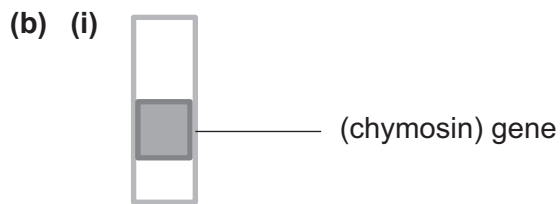
4

| Band | Response  | Mark    |
|------|---|---------|
| A    | Candidates use appropriate terms throughout to give at least <b>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 at least <b>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]     |

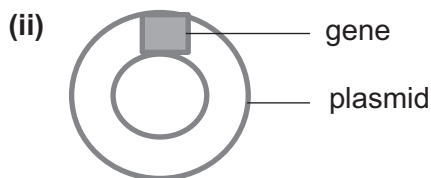
8

|   |   |    | AVAILABLE MARKS |   |   |    |    |   |    |    |  |    |
|---|---|----|-----------------|---|---|----|----|---|----|----|--|----|
| 5 | <p><b>(a) Description:</b> level raised<br/><b>Explanation</b><br/>Any <b>two</b> from:<br/>water/water moves;<br/>from dilute to a more concentrated solution;<br/>through a selectively permeable membrane/semi-permeable membrane [3]</p> <p><b>(b) vacuole</b> has shrunk<br/>cell membrane pulled away from the cell wall [2]</p>  |    | 5               |   |   |    |    |   |    |    |  |    |
| 6 | <p><b>(a)</b> Punnett;<br/>RR for parent;<br/>Rr for parent;<br/>correct offspring [4]</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; border-bottom: 1px solid black; padding: 5px;"></td> <td style="border-bottom: 1px solid black; padding: 5px;">R</td> <td style="border-bottom: 1px solid black; padding: 5px;">R</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">R</td> <td style="padding: 5px;">RR</td> <td style="padding: 5px;">RR</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">r</td> <td style="padding: 5px;">Rr</td> <td style="padding: 5px;">Rr</td> </tr> </table> <p><b>(b)</b> two crosses<br/>both with rr;<br/>1 parent RR, other parent Rr;<br/>correct crosses [4]</p> <p><b>(c) (i)</b> 3:1 [1]</p> <p><b>(ii)</b> discontinuous [1]</p> <p><b>(iii)</b> blood groups/tongue rolling/(attached) ear lobes/eye colour/gender [1]</p> |    | R               | R | R | RR | RR | r | Rr | Rr |  | 11 |
|   | R   | R  |                 |   |   |    |    |   |    |    |  |    |
| R | RR  | RR |                 |   |   |    |    |   |    |    |  |    |
| r | Rr  | Rr |                 |   |   |    |    |   |    |    |  |    |
| 7 | <p><b>(a) (i)</b> asexual [1]</p> <p><b>(ii)</b> mitosis [1]</p> <p><b>(b)</b> Any <b>two</b> from:<br/>large numbers;<br/>only needs 1 parent;<br/>identical/plants<br/>rare plants preserved;<br/>all year round/out of season; [2]</p> <p><b>(c) all have</b> the same (genetic) disease [1]</p>   |    | 5               |   |   |    |    |   |    |    |  |    |
| 8 | <p><b>(a)</b> double helix [1]</p> <p><b>(b)</b> sugar/deoxyribose;<br/>phosphate; [2]</p> <p><b>(c)</b> A–T/Adenine–Thymine<br/>C–G/Cytosine–Guanine [2]</p> <p><b>(d)</b> Franklin<br/>Wilkins [2]</p>  |    | 7               |   |   |    |    |   |    |    |  |    |

9 (a) insulin [1]



([1] for **drawing** of chymosin gene in a chromosome;  
[1] for a **correct label** – either the gene **or** chromosome) [2]



([1] for drawing; [1] for correct label) [2]

(iii) multiplication/replication/reproduction/protein synthesis [1]

(iv) amino acids [1]

(v) no animals used/vegetarians can eat the cheese  
don't have to kill animals [1]

8

10 (a) (i) transpiration [1]

(ii) arrow from a cell to the air space (must start in a cell or edge of cell);  
through the **stoma** only (only with arrow going **out**); [2]

(b) less surface area/no stomata;  
less water loss/less evaporation [2]

(c) (i) 1pm–5pm/12.30–4.30/12–4 [1]

(ii) more stomata open, greater rate of water loss (or converse) [1]

(iii) line starting at 8 squares up;  
increasing until midday (at least) and then starts to decrease at some  
stage; [2]

(iv) saltwort **better adapted**/have advantageous gene  
saltwort plants (survive) to **reproduce**  
pass on **genes**/pass on allele/favourable characteristics  
allow **converse** answers [3]

12

- 11 (a) (i) spontaneous generation [1]
- (ii) A = nutrient broth;  
boiled/sterilised; [2]
- (iii) to kill microbes [1]
- (iv) **both** flasks cloudy [1]

(b) **Indicative Content**

Any five:

**open flask**

- open flask is **cloudy**;
- because it contains microbes;
- that have entered **from the air**;
- microbes reproduced;

**swan neck flask**

- swan neck flask is **clear**;
- microbes have got **trapped in the bend**;
- microbes cannot get into the flask;

[6]

| Band | Response  | Mark    |
|------|---|---------|
| A    | Candidates use appropriate terms throughout to give at least <b>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 at least <b>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]     |

AVAILABLE  
MARKS

11

**Total**

**90**