Mark schemes

Q1.

21-25	Extended Abstract Generalised beyond specific context	Response shows holistic approach to the question with a fully integrated answer which makes clear links between several different topics and the theme of the question. Biology is detailed and comprehensive A-level content, uses appropriate terminology, and is very well written and always clearly explained. No significant errors or irrelevant material. For top marks in the band, the answer shows evidence of reading beyond specification requirements.
16-20	Relational Integrated into a whole	Response links several topics to the main theme of the question, to form a series of interrelated points which are clearly explained. Biology is fundamentally correct A-level content and contains some points which are detailed, though there may be some which are less well developed, with appropriate use of terminology. Perhaps one significant error and, or, one irrelevant topic which detracts from the overall quality of the answer.
11-15	Multistructural Several aspects covered but they are unrelated	Response mostly deals with suitable topics but they are not interrelated and links are not made to the theme of the question. Biology is usually correct A-level content, though it lacks detail. It is usually clearly explained and generally uses appropriate terminology. Some significant errors and, or, more than one irrelevant topic.
6-10	Unistructural Only one or few aspects covered	Response predominantly deals with only one or two topics that relate to the question. Biology presented shows some superficial A-level content that may be poorly explained, lacking in detail, or show limited use of appropriate terminology. May contain a number of significant errors and, or, irrelevant topics.
1-5	Unfocused	Response only indirectly addresses the theme of the question and merely presents a series of biological facts which are usually descriptive in nature or poorly explained and at times may be factually incorrect. Content and terminology is generally below A-level. May contain a large number of errors and, or, irrelevant topics.
0		Nothing of relevance or no response.

Commentary on terms and statements in the levels mark scheme

The levels mark scheme for the essay contains a number of words and statements that are open to different interpretations. This commentary defines the meanings of these words and statements in the context of marking the essay. Many words and statements are used in the descriptions of more than one level of response. The definitions of these remain the same throughout.

Levels mark scheme word/statement	Definition
Holistic	Synoptic, drawing from different topics (usually sections of the specification)
A fully integrated answer which makes clear links between several different topics and the theme of the question.	All topics relate to the title and theme of the essay; for example, explaining the biological importance of a process. When considering, for example, the importance of a process, the explanation must be at A-level standard. 'Several' here is defined as at least four topic areas from the specification covered. This means some sentences, not just a word or two. It does not mean using many examples from one topic area.
Biology is detailed and comprehensive A-level content, uses appropriate terminology, and is very well written and always clearly explained.	Detailed and comprehensive A-level content is the specification content. Terminology is that used in the specification. Well written and clearly explained refers mainly to biological content and use of terminology. Prose, handwriting and spelling are secondary considerations. Phonetic spelling is accepted, unless examiners are instructed not to do so for particular words; for example, glucagon, glucose and glycogen.
No significant errors or irrelevant material.	A significant error is one which significantly detracts from the biological accuracy or correctness of a described example. This will usually involve more than one word. Irrelevant material is several lines (or more) that clearly fails to address the title, or the theme of the title.
For top marks in the band, the answer shows evidence of reading beyond specification requirements.	An example that is relevant to the title and is not required in the specification content. The example must be used at A-level standard.
Response mostly deals with suitable topics but they are not interrelated and links are not made to the theme of the question.	Not addressing the biological theme of the essay (eg importance) at A-level standard.

The mechanisms and importance of transport within organisms.

- 3.1.3 Phospholipids
- 3.1.4 Proteins
- 3.1.6 ATP
- 3.1.7 Water
- 3.2.1.1 Structure of eukaryotic cells
- 3.2.2 All cells arise from other cells
- 3.2.3 Transport across cell membranes
- 3.2.4 Cell recognition and the immune system
- 3.3.1 Surface area to volume ratio
- 3.3.2 Gas exchange
- 3.3.3 Digestion and absorption
- 3.3.4.1 Mass transport in animals
- 3.3.4.2 Mass transport in plants
- 3.4.2 DNA and protein synthesis
- 3.4.3 Genetic diversity can arise as a result of mutation or during meiosis
- 3.5.1 Photosynthesis
- 3.5.2 Respiration
- 3.6.1.1 Survival and response (IAA)
- 3.6.1.2 Receptors
- 3.6.1.3 Control of heart rate
- 3.6.2.1 Nerve impulses
- 3.6.2.2 Synaptic transmission
- 3.6.3 Skeletal muscles
- 3.6.4.1 Principles of homeostasis and negative feedback
- 3.6.4.2 Control of blood glucose concentration
- 3.6.4.3 Control of blood water potential
- 3.8.1 Alteration of the sequence of bases in DNA can alter the structure of proteins
- 3.8.2.2 Regulation of transcription and translation
- 3.8.2.3 Gene expression and cancer

In order to fully address the question and reach the highest mark bands students must also include at least four topics in their answer, to demonstrate a synoptic approach to the essay.

Students may be able to show the relevance of other topics from the specification.

Note, other topics from beyond the specification can be used, providing they relate to the title and contain factually correct material of at least an A-level standard. Credit should not be given for topics beyond the specification which are below A-level standard.

[25]

Q2.

(a) 1. (Alternate) monomers/glucoses are flipped/upside down/rotated (by 180°);

2. (Joined by) glycosidic bonds;

3. (Forms) straight/linear/unbranched (chains/ molecules);

Ignore they are both polysaccharides

Accept as an additional mark point, 'contains 1-4 linkages/bonds'

Reject if reference made to 1-6

Accept as an additional mark point, 'have β glucose'

Ignore both contain C, H and O

3 max

(b) **EITHER**

1. Tracheole (wall) thin/one cell thick;

2. (So) rapid diffusion (into cells)

OR

(So) short diffusion pathway/distance;

OR

3. Tracheoles enter/supply tissues/muscle fibres;

Accept touch OR push OR 'close to' for enter

Accept cells for tissues

4. (So) diffusion direct into cells

OR

(So) short diffusion pathway/distance

OR

(So) rapid diffusion (into cells);

OR

5. Tracheoles are highly branched;

Accept 'large number' OR 'many' for highly branched

6. (So) short diffusion distance/pathway

OR

(So) large surface area for (rapid) diffusion;

Ignore SA
Ignore 'to volume ratio' OR ':vol'
***Mark as pairs**, 1 and 2 OR 3 and 4 OR 5 and 6*
Ignore 'liquid in tracheoles'

2 max

(c) 1. (Allows unbroken) water column

OR

(So) no barrier to (water) movement;

Accept idea of continuous flow OR stream of water
Ignore chain of water molecules

2. Cohesion from H bonds between (all) water (molecules)

OR

Cohesion from (polar) attraction between (all) water (molecules);

3. Evaporation/transpiration creates tension (in column)

OR

Water moves from xylem (into cells) creates tension

OR

(To) pull up water creates tension (in xylem);

If 1, 2 or 3 are not awarded accept a principle mark for correct reference to <u>cohesion-tension</u> causing water movement

3

[8]

Q3.

(a) 1. Four bands (upper epidermis, palisade, spongy, lower epidermis)

Ignore waxy cuticle and vascular bundle/xylem/phloem

Give benefit of doubt for use of printed box as borderlines of drawing bands.

2. Band widths must look similar to photograph;

Ignore waxy cuticle and vascular bundle/xylem/phloem

Give benefit of doubt for use of printed box as borderlines of drawing bands.

Reject if cells drawn

*Reject if lines are overlapping **OR** sketched*

Ignore stomata and air spaces

Must be at least 3 bands shown

3. Correct label of one tissue;

Accept (upper/lower) epidermis/palisade mesophyll/spongy mesophyll/vascular bundle/xylem/phloem

Accept cells for mesophyll

Reject stoma

Reject waxy cuticle

Reject cell

3

(b) 1. SDs do not overlap for (mean) shelf life

OR

SDs do not overlap for (mean) transpiration rate

OR

SDs do overlap for (mean) number of stomata;

2. Shelf life significantly longer/different in April;

Accept converse for December

Accept equivalent statements to significance in terms of chance, e.g. for 4. 'difference in (mean) transpiration rate is not due to chance…'

3. No significant difference in (mean) number of stomata so unlikely/not linked to shelf life;

Accept equivalent statements to significance in terms of chance, e.g. for 4. 'difference in (mean) transpiration rate is not due to chance…'

4. Significant difference in (mean) transpiration rate so (likely) linked with shelf life;

Accept equivalent statements to significance in terms of chance, e.g. for 4. 'difference in (mean) transpiration rate is not due to chance…'

4

If no marks awarded, allow 1 mark max for (mean) transpiration rate affects shelf life

(c) **Mark in groups** of either 1., 2. and 3. **OR** 4., 5. and 6.

1. Reduce light intensity;

*Accept a description of reducing light intensity, e.g. use a cupboard **OR** turn off lights*

2. Stomata close;

3. (So) decreased (rate of) evaporation/transpiration;

4. Increase humidity

OR

Prevent/reduce air movement (around cut flowers);

Accept description of reducing air movement; e.g. close windows

5. Reduces water potential gradient (between plant and air);

Accept Ψ symbol for water potential

6. (So) decreased (rate of) evaporation/transpiration;

3 max

[10]

Q4.

(a) 1. Sucrose actively transported into phloem (cell);
OR
Sucrose is co-transported/moved with H^+ into phloem (cell);
Accept sieve (element/tube/cell) for phloem (cell)

2. (By) companion/transfer cells;

3. Lowers water potential (in phloem) **and** water enters (from xylem) by osmosis;

4. (Produces) high(er) (hydrostatic) pressure;
OR
(Produces hydrostatic) pressure gradient;
Accept description of gradient, eg higher WP

5. Mass flow **to** respiring cells
OR
Mass flow to storage tissue/organ;
Accept transport OR movement for flow
Accept buds/young leaves/fruit/seeds/shoot tip/root tip/ meristems/root

6. Unloaded/removed (from phloem) by active transport;
Accept facilitated diffusion

5 max

(b) 1. Both polysaccharides;
OR
Both are glucose polymers
OR
Both are made of glucose monomers;

2. Both contain glycosidic bonds (between monomers);

3. Both contain carbon, hydrogen and oxygen/C, H and O;

4. Starch made of α-glucose **and** cellulose made of β-glucose;

5. Starch (molecule) is helical/coiled **and** cellulose (molecule) is straight;

6. Starch (molecule) is branched **and** cellulose is not/unbranched;

7. Cellulose has (micro/macro) fibrils **and** starch does not;
Must include 1, 2 OR 3 to achieve 6 marks
All statements must be clearly comparative or linked by the candidate, not inferred from separate statements

Additional mark point

*Starch has 1−6 glycosidic bonds **and** cellulose does not*

OR

*Starch contains two types of molecule **and** cellulose contains one type of molecule*

OR

*Starch is amylose and amylopectin **and** cellulose is one type of molecule;*

6 max

(c) 1. Hydrolysis;

2. (Of) glycosidic bonds;

3. (Starch) to maltose by amylase;

4. (Maltose) to glucose by disaccharidase/maltase;

5. Membrane-bound (disaccharidase/maltase);

Other than 5., do not penalise incorrect site for digestion or incorrect site of enzyme production

Accept microvilli for membrane

4 max

[15]