



EXAM PAPERS PRACTICE

Boost your performance and confidence
with these topic-based exam questions

Practice questions created by actual
examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and
thoroughly prepare you

2002

XVIII

1583

Time allowed
65 Minutes

Score

/54

Percentage

%

Biology

**AQA
AS & A LEVEL**

Mark Scheme

3.2 Cells

1. (a) 1. How to break open cells and remove debris; 2. Solution is cold / isotonic / buffered; 3. Second pellet is chloroplast. 3
- (b) 1. **A** stroma; 2. **B** granum. *Accept thylakoid* 2
- (c) $\left(\frac{\text{length of chloroplast}}{\text{length of bar}} \right) \mu\text{m}$ 1
- (d) **Two** of the following for **one** mark: Mitochondrion / ribosome / endoplasmic reticulum / lysosome / cell-surface membrane. 1 max

[7]

2

- (a) 1. Fields of view randomly chosen;
2. Several fields of view;
3. All same species (of animal / hamster);
Reject general statements related to sample size. All mark points relate directly to information provided in Resource A.
Accept 'all (Mesocricetus) auratus'.
4. Same muscle / organ used / only diaphragm used;
5. Used at least 8 (animals) in each (age) group.

4 max

(b) (i) 15

Correct answer = 2 marks.

Allow 1 mark for showing

$69 \div 4.6$

OR

answer of 10 / 10.1 (correct calculation using fast in error.)

2

- (ii) 1. (Calculation) used mean (number of capillaries);
2. Variation in number of capillaries per fibre.
Note: maximum of 1 mark for this question.
Ignore reference to an anomaly or calculation errors.

1 max

- (c) (i) (Removing diaphragm means) animals / hamsters are killed.

1

- (ii) 1. (Suggests) significant (difference) between young and adult;
MP1, MP2, MP4 and MP5 can include use of figures but check figures are used correctly.
2. (Suggests) not significant (difference) between adult and old;
Statements related to 'results being significant / not significant' do not meet the marking points. It is the difference that is significant or not. However, only penalise this error once.
3. For slow **and** fast fibres;
This MP can be given in the context of either MP1 or MP2 but only allow once. As well as this context there must be a reference to 'both' types of fibre.
4. (Suggests) significant (difference) between young and old for fast (fibres)
OR
(Suggests) not significant (difference) between young and old for slow (fibres);
All aspects of either approach required to gain credit.
5. (Suggests) significant (difference) where means $\pm$ SD do not overlap
OR
(Suggests) not significant (difference) where means $\pm$ SD overlap;
All aspects of either approach required to gain credit.
6. Stats test is required (to establish whether significant or not).

4 max

[12]

- 3 (a) 1. Large / dense / heavy cells;
 2. Form pellet / move to bottom of tube (when centrifuged);
 3. Liquid / supernatant can be removed.

Must refer to whole cells.

3

- (b) Break down cells / cell parts / toxins.

Idea of 'break down / digestion' needed, not just damage

1

- (c) 1. To stop / reduce them being damaged / destroyed / killed;

Reject (to stop) bacteria being denatured.

2. By stomach acid.

Must be in context of stomach.

2

- (d) 1. More cell damage when both present / A;

2. Some cell damage when either there on their own / some cell damage in B and C;

MP1 and MP2 – figures given from the graph are insufficient.

3. Standard deviation does not overlap for A with B and C so difference is real;

*MP3 and MP4 **both** aspects needed to gain mark.*

4. Standard deviations do overlap between B and C so no real difference.

MP3 and MP4 accept reference to significance / chance for 'real difference'

3 max

- (e) 1. Enzyme (a protein) is broken down (so no enzyme activity);

Accept hydrolyse / digested for 'broken down'.

2. No toxin (as a result of protein-digesting enzyme activity);

Must be in the correct context.

3. (So) toxin is protein.

This must be stated, not inferred from use of 'protein-digesting enzyme'.

3

[12]

4

- (a) 1. DNA replicated;
Reject: DNA replication in the wrong stage
2. (Involving) specific / accurate / complementary base-pairing;
Accept: semi conservative replication
3. (Ref to) two identical / sister chromatids;
4. Each chromatid / moves / is separated to (opposite) poles / ends of cell.
Reject: meiosis / homologous chromosomes / crossing over
Note: sister chromatids move to opposite poles / ends = 2 marks for mp 3 and mp 4
Reject: events in wrong phase / stage

4

- (b) (i) 1. To allow (more) light through;
Accept: transparent
2. A single / few layer(s) of cells to be viewed.
Accept: (thin) for better / easier stain penetration

2

- (ii) 1. More / faster mitosis / division near tip / at 0.2 mm;
Neutral: references to largest mitotic index
2. (Almost) no mitosis / division at / after 1.6 mm from tip;
Accept: cell division for mitosis
Penalise once for references to meiosis
3. (So) roots grow by mitosis / adding new cells to the tip.
Accept: growth occurs at / near / just behind the tip (of the root)
Accept: converse arguments

2 max

[8]

- 5 (a) Any **five** from:
1. Cell homogenisation to break open cells;
1. Accept suitable method of breaking open cells.
 2. Filter to remove (large) debris / whole cells;
2. Reject removes cell walls.
 3. Use isotonic solution to prevent damage to mitochondria / organelles;
3. Ignore to prevent damage to cells.
 4. Keep cold to prevent / reduce damage by enzymes / use buffer to prevent protein / enzyme denaturation;
 5. Centrifuge (at lower speed / 1000 g) to separate nuclei / cell fragments / heavy organelles;
5. Ignore incorrect numerical values.
 6. Re-spin (supernatant / after nuclei / pellet removed) at higher speed to get mitochondria in pellet / at bottom.

6. Must have location

Reject ref to plant cell organelles only once

5 max

(b) Principles:

1. Electrons pass through / enter (thin) specimen;
2. Denser parts absorb more electrons;
3. (So) denser parts appear darker;
4. Electrons have short wavelength so give high resolution;

Principles:

Allow maximum of 3 marks

Limitations:

5. Cannot look at living material / Must be in a vacuum;
6. Specimen must be (very) thin;
7. Artefacts present;
8. Complex staining method / complex / long preparation time;
9. Image not in 3D / only 2D images produced.

Limitations:

Context of limitation must be clear, not simply explaining how TEM works

E.g "allows you to see organelles as a thin section is used" is not a limitation

Allow maximum of 3 marks

Ignore ref to colour

5 max

[10]

6

(a)

Protein synthesis	L;
Modifies protein	H;
Aerobic respiration	N;

3

(b) 1800–2200;

1.8, 2.0 or 2.2 in working or answer = 1 mark.

Ignore units in answer.

1 mark for an incorrect answer in which student clearly divides measured length by actual length (of scale).

Accept I / A or I / O for 1 mark but ignore triangle.

Accept approx 60mm divided by 30μm for 1 mark

2

[5]