



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

60 Minutes

Score

/49

Percentage

%

Biology

**AQA
AS & A LEVEL**

Mark Scheme

3.3 Organisms exchange substances with their environment



- 1.(a) Calculations made (from raw data) / raw data would have recorded initial and final masses. 1
- (b) Add 4.5 cm³ of (1.0 mol dm⁻³) solution to 25.5 cm³ (distilled) water.
If incorrect, allow 1 mark for solution to water in a proportion of 0.15:0.85 2
- (c) 1. Water potential of solution is less than / more negative than that of potato tissue;
Allow Ψ as equivalent to water potential
2. Tissue loses water by osmosis. 2
- (d) 1. Plot a graph with concentration on the x-axis and percentage change in mass on the y-axis;
2. Find concentration where curve crosses the x-axis / where percentage change is zero;
3. Use (another) resource to find water potential of sucrose concentration (where curve crosses x-axis). 3

[8]



- 2.(a) 1. Dissolve in alcohol, then add water;
2. White emulsion shows presence of lipid. 2
- (b) Glycerol. 1
- (c) Ester. 1
- (d) **Y** (no mark)
Contains double bond between (adjacent) carbon atoms in hydrocarbon chain. 1
- (e) 1. Divide mass of each lipid by total mass of all lipids (in that type of cell);
2. Multiply answer by 100. 2
- (f) Red blood cells free in blood / not supported by other cells so cholesterol helps to maintain shape;
Allow converse for cell from ileum – cell supported by others in endothelium so cholesterol has less effect on maintaining shape. 1
- (g) 1. Cell unable to change shape;
2. (Because) cell has a cell wall;
3. (Wall is) rigid / made of peptidoglycan / murein. 2 max

[10]

- 3 .(a) 1. (Overall) outward pressure of 3.2 kPa; 2.
Forces small molecules out of capillary. 2
- (b) Loss of water / loss of fluid / friction (against capillary lining). 1
- (c) 1. High blood pressure = high hydrostatic pressure;
2. Increases outward pressure from (arterial) end of capillary / reduces inward pressure at (venule) end of capillary;
3. (So) more tissue fluid formed / less tissue fluid is reabsorbed.
Allow lymph system not able to drain tissues fast enough 3
- (d) 1. Water has left the capillary;
2. Proteins (in blood) too large to leave capillary;
3. Increasing / giving higher concentration of blood proteins (and thus wp). 3
- [9]



4

- (a) 1. (No grease)
means stomata are open
OR
allows normal CO₂ uptake;
Allow 'gas exchange' for CO₂ uptake.
'As a control' is insufficient on its own.
2. (Grease on lower surface)
seals stomata
OR
stops CO₂ uptake through stomata
OR
to find CO₂ uptake through stomata
OR
shows CO₂ uptake through cuticle / upper surface;
3. (Grease on both surfaces) shows sealing is effective
OR
stops all CO₂ uptake.

3

- (b) (i) 1. (Mean rate of) carbon dioxide uptake was constant *and* fell after the light turned off;
Ignore absence of arbitrary units in both marking points.



Both ideas needed for mark.

Accept 'stayed at 4.5' as equivalent to 'was constant'.

2. Uptake fell from 4.5 to 0 / uptake started to fall at 60 minutes and reached lowest at 80 minutes / uptake fell over period of 20 minutes;

One correct use of figures required.

Accept fell to nothing / no uptake for 0.

2

- (ii) 1. (Because) water is lost through stomata;
2. (Closure) prevents / reduces water loss;
3. Maintain water content of cells.

This marking point rewards an understanding of reducing water loss e.g. reduce wilting, maintain turgor, and is not related to photosynthesis.

2 max

- (c) (i) (Carbon dioxide uptake) through the upper surface of the leaf / through cuticle.

1

- (ii) 1. No use of carbon dioxide in photosynthesis (in the dark);
2. No diffusion gradient (maintained) for carbon dioxide into leaf / there is now a diffusion gradient for carbon dioxide out of leaf (due to respiration).

2

[10]

5

(a) Regulator protein.

Accept regulator protein antigen
Reject regulator protein receptor
Ignore regular protein

1

- (b) 1. Lipid soluble / hydrophobic
2. Enters through (phospholipid) bilayer

OR

3. (Protein part of) LDL attaches to receptor
4. Goes through carrier / channel protein.
4. Accept by facilitated diffusion or active transport
4. Reject active transport through channel protein

2

(c) Any **two** from:

1. (Monoclonal antibody) has a specific tertiary structure / variable region / is complementary to regulator protein

Do not award MP1 if reference to active site.

2. Binds to / forms complex with (regulator protein)
"It" refers to monoclonal antibody in MP1 and MP2
3. (So regulator protein) would not fit / bind to the receptor / is not complementary to receptor
3. Reject receptor on LDL

2 max

- (d) 1. Injection with salt solution
1. Accept inject placebo in salt solution

2. Otherwise treated the same.

2

[7]



6

- (a) 1. (Releases) toxins;
2. Kills cells / tissues.
*2. Accept any reference to cell / tissue damage
Ignore infecting / invading cells*

2

- (b) 1. Water potential in (bacterial) cells higher (than in honey) / water potential in honey lower (than in bacterial cells);
*Q candidates must express themselves clearly
1. Must be comparative e.g. high WP in cell and low WP in honey*
2. Water leaves bacteria / cells by osmosis;
3. (Loss of water) stops (metabolic) reactions.
3. Needs a reason why lack of water kills the cell

3

[5]