



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2011**

Biology

Assessment Unit AS 2

assessing

Organisms and Biodiversity

[AB121]

WEDNESDAY 22 JUNE, MORNING

MARK SCHEME

/ denotes alternative marking points
 ; denotes separate marking points
Comments on mark values are given in bold
Comments on marking points are given in italics

Section A

1 Any three from

- large surface area provided by alveoli
- thin respiratory surface of (simple) squamous epithelium (of alveoli and of blood capillary wall)/so diffusion distance is short
- moist (outer) surface (of alveoli) into which gases are absorbed/diffuse (before entering/leaving gaseous phase)
- with surfactant in moisture layer to reduce surface tension/prevents collapsing
- mass flow of air to respiratory surface maintaining diffusion gradients/ keeps oxygen level in lungs high
- rich vascular supply maintaining diffusion gradients/so oxygen is carried away

[3]

3

2 (a) 9 squares covered (allow $8\frac{1}{2} - 9\frac{1}{2}$);
 each representing 4%/36% of quadrat [**consequential to number of squares × 4%**];

[2]

(b) Any four from

- mark line of transect down the shoreline/from lower shore to upper shore (allow converse)
- use of belt (line) transect/systematic sampling
- quadrats placed contiguously (end-to-end)/interrupted (say every two metres)/record species at intervals (for line transect)
- % cover (density) measured in each quadrat
- results displayed in kite diagrams/series of histograms

[4]

6

3 Drawing skills:

block diagram showing tissue layers;
 all tissue layers drawn (completeness of drawing to show the tissues obvious in the photograph);
 accurate representation of the photograph, i.e. a drawing rather than a diagram;
 accurate positioning and proportionality of the tissue layers;
 quality of drawing (e.g. clear – smooth and continuous – lines drawn, not sketchy);

[5]

Any four labels:

- parenchyma/cortex
- endodermis
- Casparian strip
- pericycle
- xylem
- protoxylem (arms of ‘star’) and metaxylem (central) distinguished
- cambium
- phloem
- stele

[4]

9

- 4 (a) It is adapted to a warm/dry climate/xerophytic adaptation/water availability limited; the waxy cuticle reduces transpiration/reduces evaporation/prevents water loss; [2]
- (b) Figures correct: $526(525) + 371(370) \div 897(896)$; 0.51; [2]
- (c) The leaf mining larvae is protected within the mesophyll/more likely to survive; from predators/temperature extremes; [2]
- (d) The yew (since it supports fewest species); [1]
- (e) Oak/birch (since they support high numbers of insect species); which in turn support many other animals/allows other plants to grow beneath them/drops leaves to provide humus for other species to grow; [2] 9
- 5 (a) The elephant; since at low ppO_2 levels it remains highly saturated/only releases oxygen at very low ppO_2 /has the highest saturation at the same ppO_2 , compared to dog and mouse; [2]
- (b) The mouse's tissues have a high oxygen demand/high rate of respiration; its haemoglobin more readily releases oxygen/dissociates at higher ppO_2 ; [2]
- (c) (i) A curve to the right of the dog haemoglobin curve; [1]
- (ii) When it is exercising; [1]
- (iii) The increase in carbon dioxide causes haemoglobin to unload more oxygen; supplying oxygen for the exercising tissue (muscle)/supplying the extra oxygen required/enabling aerobic respiration to continue/delaying onset of anaerobic respiration; [2] 8

- 6 (a) Phylum;
order;
genus;
[Insist on correct spelling] [3]
- (b) Barn owls feed on rodents;
accumulates in predator, since an owl feeds on many mice/rats/rodenticides
are persistent (non-biodegradable)/few rodents left to feed on; [2]
- (c) **Any two from**
- feathers waterlog easily
 - small mammals are not active in wet weather
 - rodents may be killed in flooded conditions
 - reduced visibility makes hunting difficult [2]
- (d) **Any three from**
- reward farmers to leave field margins ungrazed/uncultivated
 - restoration of field boundaries/hedges
 - provision of supplementary feeding (dumps of grain/root crops)
to attract mice
 - artificial nest boxes
 - encourage reduction in the use of rodenticides/use of non-persistent
rodenticides
 - other appropriate responses [3]
- (e) Genetic diversity means that the species is able to adapt/possesses
adaptability;
so that it survives environmental change/hazard/is able to
evolve/avoids extinction;
[Allow converse arguments] [2]

12

| | | | |
|---|---|-----|----|
| 7 | (a) (i) Correct label; | [1] | |
| | (ii) Aorta; | [1] | |
| | (b) (i) Any three from | | |
| | <ul style="list-style-type: none"> • endothelium is initially damaged (e.g. from high blood pressure, poisons in cigarette smoke) • white blood cells (macrophages) enter the artery wall • cholesterol builds up in the artery wall • an atheroma is the build up of these deposits in the artery wall • calcium salts/fibrous tissue also build up at the site/a plaque is formed (leading to atherosclerosis) | [3] | |
| | (ii) Any two from | | |
| | <ul style="list-style-type: none"> • the narrowing of the artery/plaque initiates clotting • blood supply to the heart is blocked/heart muscle is starved of oxygen • heart muscle dies/stops contracting • if the zone of dead cells occupies only a small area the heart attack is less likely to prove fatal (allow converse) | [2] | |
| | (c) (i) Without prothrombin, no thrombin is formed (allow converse); thrombin converts fibrinogen to fibrin/so fibrinogen is not converted to fibrin (the protein mesh of the clot); | [2] | |
| | (ii) Low concentrations have little effect on clotting time/at higher concentrations, clotting time increases steeply; a reasonably high level of heparin (more than 0.2 units) is required before there is any significant effect on clotting time; | [2] | |
| | (iii) Heparin works immediately; warfarin takes some days before it takes effect; | [2] | 13 |

Section A

60

Section B

8 Any thirteen points

The movement of water into and through the root:

- root hairs provide a large surface area for the uptake of water (by osmosis)
- uptake into the root is from high (outside) to low water potential/movement through the root tissues is along a water potential gradient
- water moves through plant tissues via the apoplast or symplast pathway
- most water moves via the apoplast pathway/movement through the apoplast is faster
- the apoplast pathway involves water moving (by capillarity) along the cellulose walls
- water may also move through the cytoplasm of cells via the symplast pathway
- which are directly connected by plasmodesmata
- water may not pass through the endodermis by the apoplast pathway/must pass through the endodermis via the symplast pathway
- since the Casparian strip/suberin prevents passage through the cell walls/apoplast pathway
- water passing through the endodermis via the symplast pathway comes under the control of the cells' metabolism

Allow once only

The movement of water through the stem:

- water is essentially pumped into the xylem in the root
- causing a root pressure
- water creeps along the walls of xylem vessels by capillarity
- because of the adhesive properties of water
- water molecules also attract neighbouring water molecules/there is cohesion in the water column
- the forces of adhesion and cohesion are caused by the polarity of water molecules
- the whole water column is moved upwards because of a negative pressure in the leaf
- due to water being drawn out of xylem vessels in the leaf

The movement of water through and out of the leaf:

- the evaporation of water from the mesophyll surface/into air space system
- and subsequent diffusion through open stomata
- causes water to be drawn through the mesophyll cells (mostly apoplast pathway)
- water moves through plant tissues via the apoplast or symplast pathway
- most water moves via the apoplast pathway/movement through the apoplast is faster
- the apoplast pathway involves water moving by capillarity along the cellulose walls
- water may also move through the cytoplasm of cells via the symplast pathway
- which are directly connected by plasmodesmata
- the mesophyll cells ultimately draw water out of the leaf's xylem vessels

Allow once only

[13]

Quality of written communication

2 marks: The candidate expresses ideas clearly and fluently, through well-linked sentences, which present relationships and not merely list features. Points are generally relevant and well-structured. There are few errors of grammar, punctuation and spelling.

1 mark: The candidate expresses ideas clearly, if not always fluently. The account may stray from the point or may not indicate relationships. There are some errors of grammar, punctuation and spelling.

0 marks: The candidate produces an account that is of doubtful relevance or obscurely presented with little evidence linking ideas. Errors in grammar, punctuation and spelling are sufficiently intrusive to disrupt the understanding of the account.

[2] 15

Section B 15

Total 75