Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2012

Biology

Assessment Unit AS 2

assessing

Organisms and Biodiversity

[AB121]

FRIDAY 15 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

AVAILABLE MARKS

Section A

1 **(a)** (Potassium hydroxide to absorb) CO_2;
(Potassium pyrogallate to absorb) oxygen (and CO_2); [2]

(b) Increasing CO_2: orange/red to yellow;
Decreasing CO_2: orange/red to purple; [2] 4

2 **(a)** **(i)** Fungi; [1]

(ii) Chitin cell wall/fungal cells multinucleate; [1]

(b) **(i)** Enzymes released by exocytosis/secretion;
extracellular digestion;
absorption of soluble products; [3]

(ii) Cellulase/lignase/pectinase
[allow description of appropriate enzyme]; [1] 6

3 **(a)** **Any three from**
- thin (walls) for short diffusion pathway
- folding (invaginations/evaginations) to provide large surface area
- (rich) capillary network/blood supply to maintain diffusion gradient
- means of bringing fresh water over gills to maintain diffusion gradient [3]

(b) Mesophyll; [1] 4

AVAILABLE MARKS

4 (a) Any four from

- the diaphragm and intercostal muscles relax/internal intercostal muscle contract
- the volume (of the thorax) is decreased as the diaphragm is forced up/ rib cage falls
- the pressure inside the thorax/lungs is increased
- air is forced out (to equalise pressure between inside and outside the lungs)
- elasticity in the lungs allows recoil assisting the expulsion of air [4]

(b) (i) D;
C; [2]

(ii) (Increase due to) atrial systole/walls of atrium contracting;
(decrease is due to) blood moving out of atrium/into ventricle; [2]

Ventricular contraction increases pressure/ventricular pressure exceeds aortic pressure;
so blood is forced through the semi-lunar valve/blood enters aorta; [2]

(iii) Ventricular systole *[Insist on term]*; [1]

(c) (i) Myogenic; [1]

(ii) Sino-atrial/SA node; [1]

(d) The (QRS) peaks are not evenly spaced; [1]
[Do not accept reference to heights of peaks]

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5 (a) Any two from

- transport in xylem is up the plant (from roots to leaves), while in phloem it is from leaves to growing tips/roots/both up and down plant
- transport in xylem is passive, while in phloem it is active/requires energy/relies on metabolism of companion cells
- transport in xylem is not impeded by cell walls, while in phloem there are sieve plates
- substances transported in hollow tubes in xylem, while substances move along cytoplasmic filaments/cytoplasm in phloem
- in xylem substances move at the same rate, while in phloem different substances may move at different rates
- transport in xylem is achieved via tension in the leaf, creating a negative pressure (pull), while in phloem transport may be achieved by a positive pressure (push) from source to sink [2]

[Insist on reference to both xylem and phloem]

(b) Tissue: phloem;
Structure Z: sieve plate; [2]

(c) Vertical line; [1]

(d) (Lignin is arranged in) rings/spiral pattern;
to allow for growth/elongation; [2]

(e) Magnified length = 42 mm (allow up to 42.5 mm);
= 42 × 1000 = 42 000 µm (allow up to 42 500 µm); (allow ncm)
42 000 ÷ 140 = 300 µm (allow up to 304 µm); (allow ncm) [3]

10

AVAILABLE MARKS

6 **(a)** Place two measuring tapes at right angles to mark out sample area/ place one tape parallel to shoreline and place several tapes perpendicular to this tape/other appropriate method of determining sampling positions;
use random numbers to determine co-ordinates/position for sampling;
use quadrat and estimate % cover (of each species)/use sampling pin and record species present/other suitable method;
sample many points to improve reliability *[insist on link between repetition and reliability]*; [4]

(b) **(i)** To ensure all of the water has evaporated/to determine dry mass; [1]

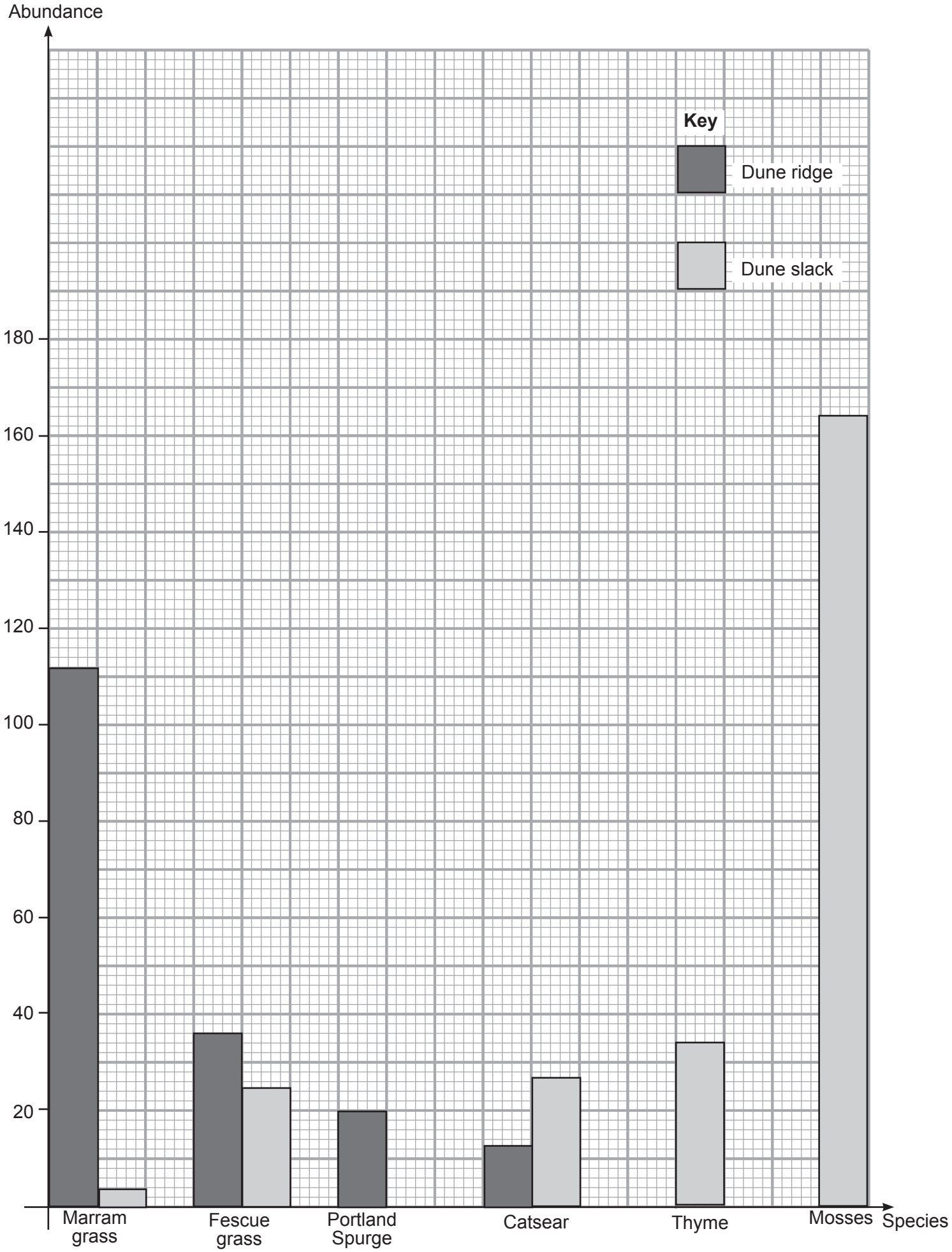
(ii) Edaphic;
(soil) pH/salinity/micro- or macronutrient content (can be by example)/ humus content/particle size/clay or sand content/aeration/temperature/ other appropriate response; [2]

(c) Bar chart used, with bars for different species not touching;
appropriate title (reference to (plant) species, sand dunes, two areas);
scale selected to make best use of grid (must cover at least half of the grid in both dimensions) and axis labels appropriate;
data accurately plotted, with key/label for each area; [4]

(d) (Accuracy/validity may be compromised due to) misidentification of species/underestimation of abundance; [1]

12

Abundance of (plant) species on a dune ridge and a dune slack



AVAILABLE MARKS

7 **(a)**

Kingdom	Animalia
Phylum	Chordata
Class	***Mammalia/mammals***
Order	***Rodentia***
Family	***Sciuridae***
Genus	***Sciurus***
Species	***vulgaris/S. vulgaris***

[½] each (rounded up) [3]

(b) **(i)** **Any four from**

- more litters per year/bigger litters (means population increases more readily)
- stocky body shape allows them to survive the winter better/they have a smaller surface area for heat loss
- stocky shape/higher body mass means they have more stored fat/more food reserves/able to survive food shortage
- being bigger they may be more able to fight for food (where they are in direct competition)
- they can eat seeds that are not fully ripe thus leaving less for the red squirrels/thus they have a longer feeding season
- they can also eat acorns, which are big seeds (better food source)/a more varied diet
- other appropriate suggestion (e.g. able to fight predators due to size/fight for nesting sites) [4]

(ii) Design: Small entrance hole will only allow the more slender red squirrels to gain access;
Placement: In the tree canopy, as that is the preferred feeding area for the red squirrels; [2]

(iii) Planting more coniferous forest/planting more of the species which favour the red squirrels/other appropriate suggestion; [1]

10

Section A **60**

Section B

AVAILABLE MARKS

8 Any thirteen points

Erythrocytes:
- main role is to carry oxygen/contain haemoglobin
- no nucleus/organelles means there is more room for haemoglobin *[not simply 'no nucleus' – some explanation is necessary]*
- biconcave (disc) shape increases their surface area to volume ratio *[not simply 'increases surface area']*
- thinness means that haemoglobin is close to the (gas exchange) membrane/ cell surface
- to maximise the uptake/release of oxygen
- small size (diameter 8 μm) enables them to move easily through capillaries

White blood cells:
- main role is to fight infection
- polymorphs (microphages) (can migrate out of capillaries to) carry out phagocytosis
- monocytes also carry out phagocytosis/monocytes move out of capillaries to form macrophages/monocytes are longer lived
- phagocytosis involves the engulfing/endocytosis of bacteria (or viruses) and their subsequent digestion
- lymphocytes (B-lymphocytes) are involved in production of antibodies *[don't allow T-lymphocytes here]*
- T-lymphocytes are involved with cell-mediated immunity/kill cells infected by bacteria or viruses *[no detail of how they do this is required]*

Platelets and plasma proteins:
- platelets are involved in blood clotting
- damaged blood vessels cause platelets to break down/rupture/activate
- so that they release thromboplastin (and other clotting agents) activate/ platelets contain thromboplastin
- thromboplastin causes the conversion of prothrombin into thrombin
- which, in turn, causes the conversion of (soluble) fibrinogen into fibrin
- (insoluble) fibrin forms a threadlike mesh that covers the wound/traps escaping blood cells/prevents further loss of blood [13]

		AVAILABLE MARKS
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**