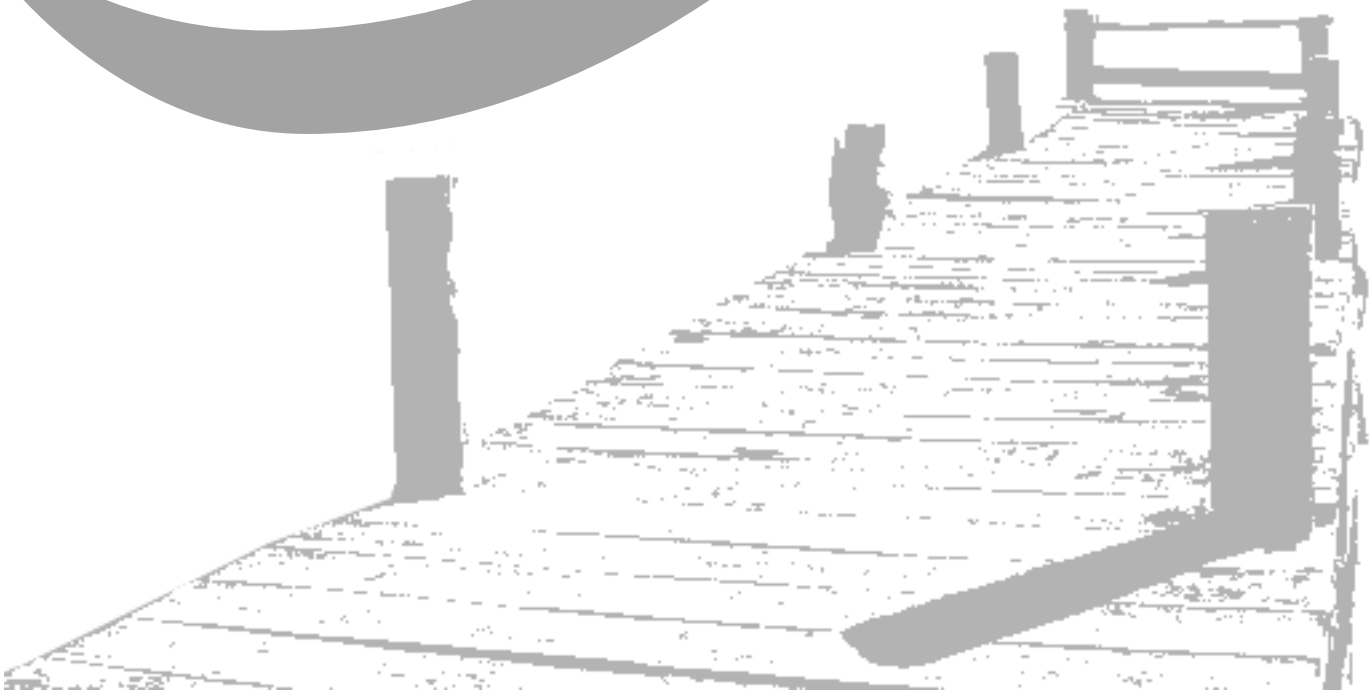
GCE
AS and A Level

Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 2:
Specimen mark scheme

Version 0.3



Version 0.3: 1109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Biology 2410

BIOL2 The variety of living organisms

Mark Scheme

Specimen Paper

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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*Although specific marks are not awarded in this unit, marks awarded will take into account the quality of written communication. Credit will only be awarded where candidates have presented information clearly and coherently and used the specialist vocabulary indicated in the mark scheme for this unit. Specific references to quality of written communication are marked **Q** in this mark scheme.*

Question 1

(a) Diagram showing two identical molecules;
Each with one original and one new strand; 2

(b) (i) 7.31 – 7.36;
Same as liver cell/blood cell/twice sperm cell; 2

(ii) 5.78;
Sperm cell + egg cell, both with 2.89/twice sperm cell; 2

Total 6

Question 2

(a) Made up of different tissues/more than one tissue; 1
*(**Q** Made up of tissues implies more than one so allow. Ignore references to function)*

(b) Deoxygenated/less pressure; 1
*(**Q** Unqualified pronouns in the context of this question refer to pulmonary artery)*

(c) Thick muscular walls;
Greater elastic content;
Do not have valves;
Small/narrow lumen; 2 max
(QWC Unqualified pronouns in the context of this question refer to artery)

(d) (i) Decreases with increased distance from the heart; 1

(ii) Friction /resistance to flow; 1

Total 6

Question 3

(a) Kingdom, class, family, genus; 1

(b) (i) (Human)
Fish
Rhesus monkey
Horse; 1

(ii) As animals closely related, more amino acids in sequence; 1

(c) The more similar the DNA, the more similar the base sequences;
The greater the number of hydrogen bonds/bonds between base pairs;
More energy/heat needed to separate strands; 3
(***Q*** *Correct terminology of base, base pair and hydrogen bond must be used as specified in scheme.)*

Total 5

Question 4

(a) Independent assortment/random alignment of (homologous) chromosomes;
Different combinations of maternal and paternal chromosomes;

OR

*C*rossing over;
Different combination of alleles/exchange of genetic material; 2

(b) (i) Variety **A** plants are taller;
Variety **A** with a greater range of heights;
Variety **A** plants are normal distribution/less skewed; 2 max
*(**Q** Do not credit imprecise references to plant **A** being taller. Accept unambiguous description for third point. Unqualified pronouns in the context of this question refer to artery)*

(ii) Will give higher yield as shorter stems;
More energy goes to producing grain/less likely to be blown down; 2
(***Q*** *Do not accept unqualified references to such features as expense*)

(c) Show greater variation;
Likely some individuals will have alleles/characteristics for survival; 2

Total 8

Question 5

(a)	(i)	(D) B E A C;	1
	(ii)	Metaphase;	1
(b)	Interphase/S phase;		1
(c)	(i)	Healthy cells not dividing so number stays constant; Cancer cells dividing (uncontrollably) so increasing in number;	2
	(ii)	Drug only kills some cancer cells; These continue to divide;	2

Total 7

Question 6

(a)	(i)	Two marks for correct answer of 3.03;; One mark for incorrect answer that clearly shows understanding of $\sum n(n\text{-}1)$;	2
	(ii)	Measures number of individuals and number of species; Some species only present in small numbers; (***Q*** *First marking point can only be awarded if there is a reference to species*)	2
(b)	(i)	Directly proportional/positive correlation/bird species diversity depends on plant structural diversity;	1
	(ii)	The more varied the structure, the greater the number of habitats/ niches/places for birds to live; Birds feed/nest at different heights in vegetation; (***Q*** *Since candidates will not have studied ecological principles in detail, they cannot be expected to use such terms as habitat and niche in this question*)	2
	(iii)	Increase, more habitats/niches/variety of food sources;	1

Total 8

Question 7

(a) More than one polypeptide chain; 1

(b) In lungs, there is a high partial pressure of oxygen;
And low carbon dioxide concentration; 2
*(**Q** Candidates should refer to partial pressure of oxygen since this is the terms in the graph. Do not credit references to "more oxygen" in the context of this part of the question)*

(c) (i) Carbon dioxide is a product of respiration; 1

(ii) Displaces dissociation curve to the right/Bohr shift;
Lower affinity for oxygen/less saturated with oxygen; 2

(d) In ground squirrel lower partial pressure of oxygen in lungs;
Haemoglobin can be saturated/load more oxygen;
at lower partial pressure of oxygen; 2 max

Total 8

Question 8

(a) (Similar) individuals/organisms that reproduce/ interbreed;
To produce fertile offspring; 2
(Q Do not credit "viable" offspring. The context required here is fertile.)

(b) (i) Species **A** has extra element/missing from species **B/**scissor wings; 1

(ii) Similar sequence/(most of the) same elements in the courtship; 1

(c) Female recognises own species sound;
Responds to that sound only/courtship sequence continues; 2

Total 6

Question 9

(a) Small surface area to volume ratio;
Loses less heat (to the water); 2

(b) (i) Diffusion through cell/body surface; 1
(**Q** The key term here is diffusion)

(ii) Small organisms have large surface area to volume ratio;
Rate of diffusion depends on surface area;
All parts of cell only a short distance from exchange surface; 2 max

(c) Surface area of leaves;
Different shoots will have leaves with different surface areas; 2

(d) Draw line/curve of best fit/from line/curve of best fit;
Find slope/gradient/divide distance moved by time; 2

(e) 1 Air enters through (open) spiracles;
2 Through tracheae;
3 Diffusion gradient in trachea
4 Tracheae associated with all cells/closely associated with cells;
5 Oxygen diffuses into cells;
6 Ventilation replacing air in tracheae;
7 Body covered with (waterproof) waxy layer/cuticle;
8 Spiracles are able to close; 6 max

Total 15

Question 10

(a) Eat the same food as native birds;
Eat native birds/eggs/young of native birds; 2

(b) Provides a suitable/previously tried protocol/method; 1

(c) (i) Allows comparison;
Between different species/between two different years; 2

(ii) No mark awarded for yes or no

Higher ratio for stoats means greater reduction;
Small sample size so conclusions may not be reliable; 2

(d) Avoids bias/only collecting where there were few/many seeds; 1

(e) (i) Draw line of best fit;
Read of percentage of traps in which rats would be expected from number of seeds in sample area; 2

(ii) Plot shows positive correlation/increase in rat numbers as number of seeds increases;
Relationship could be due to another factor/factor influencing both plotted variables; 2

(f) Do not credit for yes or no, only for underpinning content

Tui numbers generally higher in area where rats were trapped;
However there are large fluctuations in number;
Only relates to a single species/other species may show different pattern;
A single area cleared of rats/need to consider more areas/
may have been other factors; 3 max

Total 15