Mark Scheme (Results)

October 2017

Pearson Edexcel International Advanced Level Biology (WBI06) Paper 01
Practical Biology and Investigative Skills

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with and alternative response.

Question Number	Answer	Additional guidance	Mark
1(a)	1. difference shown as either 372-44 or 328; 2. percentage increase calculated ;	Correct answer with no working shown gains 2 marks **ACCEPT** 745.5 / 745.45 / 745 (%)	**(2)**

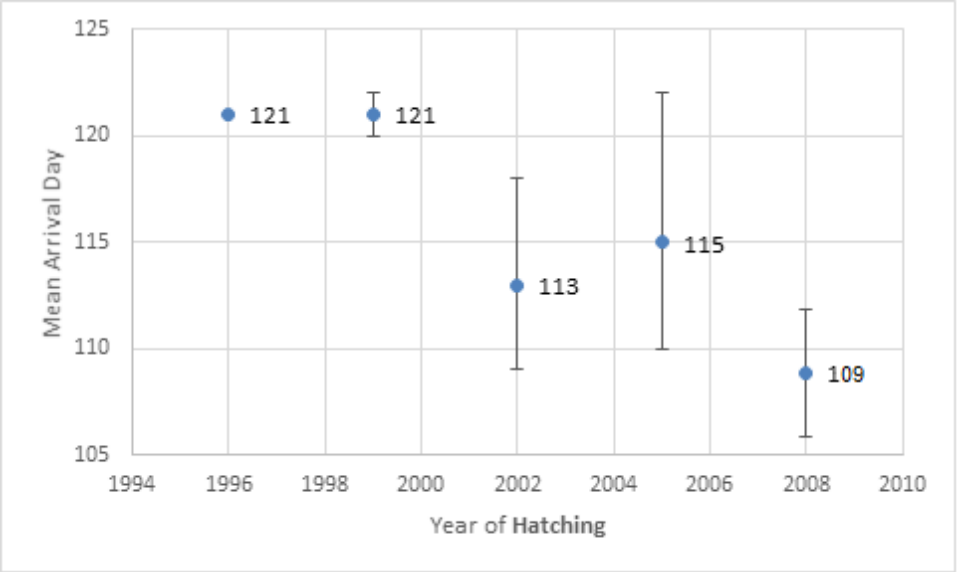
Question Number	Answer	Additional guidance	Mark
1(b)(i)	1. description of method of extraction of fruit juice (from each variety) ; 2. same or stated mass of fruit ; 3. use of { same /known/ stated } concentration of DCPIP ; 4. titrate juice into DCPIP until colour changes ; 5. from blue to { colourless / juice colour } ; 6. use of a standard vitamin C solution ; 7. calculation of vitamin C concentration ; 8. repeats (for each variety) and calculate a mean ;	**4.ACCEPT** adding DCPIP drop by drop **6. ACCEPT** use of a stock vitamin C solution **7. ACCEPT** idea of using a calibration curve	**(6)**

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	1. age of fruit (when picked) / eq ; 2. storage time ; 3. storage conditions ; 4. part of fruit used / eq ;	**1.ACCEPT** idea of ripeness/freshness **3.ACCEPT** temperature /humidity storage conditions	**(2)**

Question Number	Answer	Additional guidance	Mark
1(b)(iii)	1. variable with suitable control method described ; 2. results are not valid / the concentration of vitamin C is affected / eq ;		**(2)**

Question Number	Answer	Additional guidance	Mark
2(a)	1. there is no **significant correlation** ; 2. between the age of the bird and the day it arrived (in Iceland) ;	**1.ACCEPT** there is no significant relationship **2.ACCEPT** year of hatching for age, alternative wordings such as time of migration, day of arrival (in Iceland)	**(2)**

Question Number	Answer	Additional guidance	Mark
2(b)	1. table with clear headings ; 2. raw data shown correctly ; 3. all means correctly calculated and given to the **nearest whole day** ;	Example table: **Year of hatching** | **Days of arrival** | **Mean day of arrival** 1996 | 121 | 121 1999 | 120, 121, 122 | 121 2002 | 109, 113, 113,113, 118 | 113 2005 | 110, 111, 115, 116, 118, 122 | 115 2008 | 107, 110, 111 | 109	**(3)**

Question Number	Answer	Additional guidance	Mark
2(c)	1. axes with linear scales (using at least half the graph paper) ; 2. axes fully fully labelled; 3. means plotted accurately ; 4. range bars plotted ;	**3.ACCEPT** points or bars **ALLOW** ECF from means in 2(b) **Ignore** lines of best fit Example graph:  	**(4)**

Question Number	Answer	Additional guidance	Mark
2(d)	1. (graph shows that) younger birds tend to return earlier / eq ; 2. 0.4 identified (as critical value at p=0.05 with 16 degrees of freedom) ; 3. the (magnitude of the) {calculated value / eq} is greater than the {critical value / eq} ; 4. the null hypothesis can be rejected ; 5. there is a **significant negative correlation** between year of hatching and day of arrival ;	**1.ACCEPT** converse Must be a description of the trend. **3.ACCEPT** 0.66 is greater than 0.4 = Mps 2 & 3 **4.ACCEPT** null hypothesis is not accepted **5.ACCEPT** as two phrases, eg. There is a significant correlation… This is a negative correlation.	**(4)**

Question Number	Answer		Mark
2(e)	1. idea that a named factor that may not have been taken into consideration ;	**1.ACCEPT** eg. genetic variation between birds, starting point (in the UK), food availability IGNORE factors linked to age, eg flying strength IGNORE factors affecting all birds, eg weather	
	2. not all hatching years are represented / eq ;	**2.ACCEPT** data for some years not included	
	3. small sample size / only 18 birds / only 1 bird from 1996 / data only from one { nature reserve / migration year } / eq ;		
	4. idea of wide variability in results / overlapping or long range bars ;		**(3)**

Question Number	Answer	Additional guidance	Mark
3(a)	1.credit any one appropriate safety issue ; 2. reference to an appropriate ethical issue ; **Or** there are no significant ethical issues ;	**1.ACCEPT** e.g. possible risk from (indigenous) animals / unidentified plants / insect bites / falling branches / slips and trips **2.ACCEPT** e.g. reference to minimising disturbance to the habitat / eq	**(2)**

Question Number	Answer	Additional guidance	Mark
3(b)	1. practise method to see if it will method will work / eq ; 2.find the most suitable size of quadrat to use / eq ; 3.determine the appropriate dependent variable ; 4. select suitable { location / time } for sampling / decide on total size of area for sampling / eq ; 5. idea of standardising method of taking light measurements ; 6. identify other variables that may need to be taken into { account / measured } eq ;	Ignore 'practise method' unqualified **3.ACCEPT** use of abundance scale or percentage cover	**(3)**

Question Number	Answer	Additional guidance	Mark
3(c)		**Max. 8 marks** from this section. Two marks are reserved for QWC.	
	1. a clear statement of the dependent variable i.e. exactly what is to be measured stated ;	**1.ACCEPT** e.g. percentage ground cover of *M. perennis* / eq ;	
	2. identification of one other variable that could affect growth of *M. perennis* ;	**2.ACCEPT** e.g. gradient of slope, mineral content of soil, other surrounding vegetation, trampling, grazing	
	3. description of how this variable can be {monitored/measured/controlled / minimized} ;	**3.ACCEPT** e.g. through choice of site ;	
	4. identification of second variable that could affect growth ;		
	5. description of how this second variable can be {monitored/measured/controlled / minimized} ;		
	6. stated (suitable) size of size of quadrat ;		
	7. idea of random sampling or transect ;	**7.ACCEPT** e.g. mark 100m x 100m grid and use random number tables / transect method described	
	8.suitable equipment to measure light intensity ;	**8.ACCEPT** e.g. light meter, light probe and data logger, camera with light meter	**(8) EXP + 2 QWC (see below)**
	9. standardised method of measuring light intensity ;		
	10. clear reference to need for repeats ;		

Level	Mark	Descriptor
Level 1	**0**	The account is very disorganised and is very difficult to follow. Scientific vocabulary is very limited with many spelling and grammatical errors.
Level 2	**1**	There is some disorganisation in the account which is not always in the correct sequence. Some relevant scientific vocabulary is used. The account is not always in continuous prose and there are grammatical errors and some important spelling mistakes.
Level 3	**2**	The account is well organised with no undue repetition and a correct sequence. There is good use of scientific vocabulary in the context of the investigation described. The account is written in continuous prose which is grammatically sound with no major spelling errors.

Question Number	Answer	Additional guidance	Mark
3(d)	1. clear table which matches method description with headings and units ; 2. means calculated from {repeat light intensity data / eq } ; 3. graph format appropriate to data, with correctly labelled axes e.g. scatter / line / bar ; 4. statistical test appropriate to data e.g. use of correlation test (Spearman's rank / eq) / suitable test to compare numbers (t- test / Mann-Whitney U test / eq) ;		**(4)**

Question Number	Answer	Additional guidance	Mark
3(e)	1. difficult to control all other variables affecting *M. perennis* abundance / eq ; 2. recognition that light intensity can change during sampling / angle of sun changes during the day / eq ; 3. age / stage of plant growth that would affect percentage cover / eq ; 4. idea of difficulty of identifying plant correctly ;	**Ignore** 'difficult to control variables' without qualification	**(3)**

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