



National  
Qualifications  
2014

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# **2014 Biology**

## **National 5**

### **Finalised Marking Instructions**

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## General Marking Principles for National 5 Biology

*This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.*

- (a) Marks for each candidate response must always be assigned in line with these General Marking Principles and the Detailed Marking Instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) There are no half marks awarded.
- (d) Where a candidate makes an error at an early stage in a multi-stage calculation, credit should normally be given for correct follow-on working in subsequent stages, unless the error significantly reduces the complexity of the remaining stages. The same principle should be applied in questions which require several stages of nonmathematical reasoning.
- (e) Unless a numerical question specifically requires evidence of working to be shown, full marks should be awarded for a correct final answer (including unit) on its own.
- (f) Where a wrong answer (for which no credit has been given) is carried forward to another step, credit will be given provided the end result is used correctly.
- (g) In the mark scheme, if a word is underlined then it is essential; if a word is (bracketed) then it is not essential.
- (h) In the mark scheme, words separated by / are alternatives.
- (i) If two answers are given where one is correct and the other is incorrect, no marks are given.
- (j) Clear indication of understanding is what is required, so:
  - if a description or explanation is asked for, a one word answer is not acceptable
  - if the question asks for letters and the candidate gives words and they are correct, then give the mark
  - if the question asks for a word to be underlined and the candidate circles the word, then give the mark
  - if the result of a calculation is in the space provided and not entered into a table and is clearly the answer, then give the mark
  - chemical formulae are acceptable eg CO<sub>2</sub>, H<sub>2</sub>O
  - contractions used in the mandatory knowledge eg DNA, ATP are acceptable
  - words not required in the syllabus can still be given credit if used appropriately eg metaphase of meiosis
- (k) Incorrect spelling is given. Sound out the word(s),
  - if the correct item is recognisable then give the mark
  - if the word can easily be confused with another biological term then do not give the mark eg ureter and urethra
  - if the word is a mixture of other biological words then do not give the mark, eg

mellum, melebrum, amniosynthesis

(l) Presentation of data:

- if a candidate provides two graphs or bar charts (eg one in the question and another at the end of the booklet), mark both and give the higher score
- if question asks for a line graph and a histogram or bar chart is given, then do not give the mark(s). Credit can be given for labelling the axes correctly, plotting the points, joining the points either with straight lines or curves (best fit rarely used)
- if the x and y data are transposed, then do not give the mark
- if the graph used less than 50% of the axes, then do not give the mark
- if 0 is plotted when no data is given, then do not give the mark (ie candidates should only plot the data given)
- no distinction is made between bar charts and histograms for marking purposes. (For information: bar charts should be used to show discrete features, have descriptions on the x-axis and have separate columns; histograms should be used to show continuous features; have ranges of numbers on the x-axis and have continuous columns)

## Marking Instructions for each question

### Section 1

Question	Answer	Max Mark
1.	B	1
2.	D	1
3.	B	1
4.	C	1
5.	D	1
6.	C	1
7.	A	1
8.	C	1
9.	A	1
10.	A	1
11.	C	1
12.	A	1
13.	D	1
14.	B	1
15.	C	1
16.	C	1
17.	D	1
18.	A	1
19.	B	1
20.	D	1

## Section 2

Question			Expected Answer(s)	Max Mark	Additional Guidance
1.	(a)	(i)	Plant, bacterial and fungal	1	All three required
		(ii)	Bacteria(l)	1	Extra answers negate
		(iii)	Ribosome - (site of/involved in) protein synthesis Mitochondria - (site of/involved in) energy or ATP production/aerobic respiration	1	
	(b)		Y axis scale and label, including units 1 Bars correctly plotted 1	2	Tops of bars clearly shown Label copied exactly

Question			Expected Answer(s)	Max Mark	Additional Guidance
2.	(a)		Osmosis	1	
	(b)		Water moves into the (model) cell/bag/salt solution 1  From a high water concentration to a low water concentration/down a concentration gradient 1  <b>OR</b> alternative answer for 2 marks: Water moves from a high water concentration outside to a low water concentration inside the (model) cell/bag/salt solution	2	Direction = 1 mark  Explanation = 1 mark  Not Acceptable - '.....along a concentration gradient' <b>OR</b> HWC / LWC
	(c)		0.9	1	
	(d)		Description of concentration change - must be a smaller concentration gradient than shown/ lower temperature/ wider capillary tube/ seal not tight/ less water in the beaker/bag not fully submerged	1	

Question			Expected Answer(s)	Max Mark	Additional Guidance
3.	(a)	(i)	Hydrogen peroxide	1	Accept $H_2O_2$
		(ii)	Numbers (in each group) different <b>OR</b> Overall numbers used too small	1	Acceptable - use of actual numbers / comparative words such as less / more  Not Acceptable - 'Amount' instead of number
		(iii)	If they have a low level of catalase/ only use sheep with low levels of catalase/ don't use sheep with high levels of catalase	1	Answer must relate level of catalase
	(b)		(Activity is) decreased / Slows down reaction	1	Stop negates Not Acceptable - it wouldn't work at its best

Question			Expected Answer(s)	Max Mark	Additional Guidance
4.			(A villus has) a thin wall a large surface area a good blood supply/many capillaries 2  <ul style="list-style-type: none"> <li>There are a large number of villi</li> <li>So this also increases surface area/creates a large surface area</li> </ul> <b>OR</b> makes absorption/diffusion fast(er)/more 1	3	Not Acceptable - cells have thin walls/villus is one cell thick Acceptable - Villus wall is one cell thick  Any 2 from 3  Both parts needed  (If candidate includes information about any other biological system, then <b>maximum</b> mark available is 2)

Question			Expected Answer(s)			Max Mark	Additional Guidance
5.	(a)		Statement	Stage 1	Stage 2	2	1 mark for each correct column  Any additional ticks in a column negate the marks for that column.
			Carbon dioxide required		✓		
			Light energy required	✓			
			Water required	✓			
			Sugar produced		✓		
			ATP + Hydrogen required		✓		
			Oxygen produced	✓			
	(b)		Photosynthesis is controlled by enzymes / enzymes are needed 1  (At high temperatures) enzymes are denatured/do not work. 1			2	
	(c)		Light Intensity Temperature } either order			1	Both required  Not Acceptable - Heat or light

Question	Expected Answer(s)	Max Mark	Additional Guidance
6. (a)	C A B F E D	1	
(b)	<p><b>Sperm</b></p> <p>F reproduction/ fertilisation (or correct description)</p> <p>E tail to swim/mitochondria for energy/haploid to allow fusion at fertilisation producing a diploid zygote</p> <p><b>Egg cell</b></p> <p>F reproduction/ fertilisation (or correct description)</p> <p>E yolky cytoplasm/large cell to provide food or haploid to allow fusion at fertilisation producing a diploid zygote</p> <p><b>Red blood cell</b></p> <p>F carry oxygen</p> <p>E contain haemoglobin/ carries oxygen as oxyhaemoglobin or large surface area/ biconcave/no nucleus to transport more oxygen or small/flexible to go through capillaries</p>	2	<p>1 mark for function (F)</p> <p>1 mark for explanation (E)</p> <p>Accept any other appropriate answer not listed.</p> <p>If cell type not circled, do not penalise if obvious which one is being referred to - if cannot tell, then do not award function mark, but explanation can still be gained if correct for function.</p> <p>Do not penalise on Explanation mark for an error carried through from Function part of question and already penalised here.</p>
(c)	Unspecialised/ undifferentiated/ not specialised	1	Not Acceptable - They can become specialised / They are totipotent etc.
(d)	<p>Growth of new skin <input checked="" type="checkbox"/></p> <p>Transmission of nerve impulses <input type="checkbox"/></p> <p>Muscle contraction <input type="checkbox"/></p> <p>Repair of broken bones <input checked="" type="checkbox"/></p> <p>Production of insulin <input type="checkbox"/></p>	1	Both required Extra ticks negate

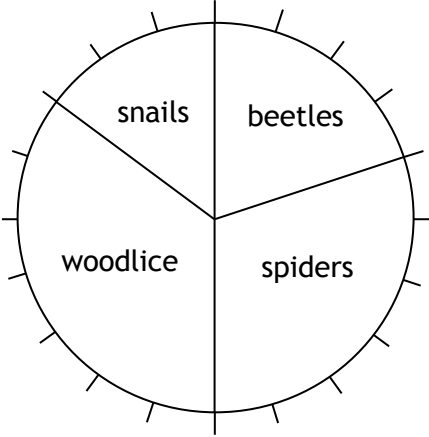


Question	Expected Answer(s)	Max Mark	Additional Guidance
7. (a)	<u>Aerobic respiration</u>	1	Not Acceptable - anaerobic / this is the 2 <sup>nd</sup> stage of respiration
(b) (i)	Glucose	1	
(ii)	ADP + Phosphate/Pi/ PO <sub>4</sub> → ATP	1	Complete answer required for mark Balancing not required, but wrongly balanced negates
(c) (i)	Sprinter 1  Highest lactic acid produced when oxygen is not used to release energy OR Highest percentage light tissue OR Highest fermentation OR Highest percentage of cells that do not use oxygen. 1	2	Second mark can be awarded for correct justification even if first answer is incorrect  Acceptable - most, more than all the rest etc. as substitutes for 'highest'  Not Acceptable - 'Lowest dark tissue cells'
(ii)	Swimmer	1	

Question	Expected Answer(s)	Max Mark	Additional Guidance
8. (a) (i)	A = low      B = high      1  C = glucagon      D = insulin      1	2	
(ii)	Organ X = pancreas      1 Organ Y = liver      1	2	
(b)	Any 2 features from: <ul style="list-style-type: none"> <li>Made of protein</li> <li><u>Chemical</u> messengers</li> <li>Specific for some (target) tissues</li> <li>Shaped to fit receptors</li> <li>Released or produced by endocrine glands/ system</li> <li>Carried in blood</li> <li>Can have a long term effect</li> </ul>	2	1 mark for each feature

Question	Expected Answer(s)		Max Mark	Additional Guidance
9. (a)	Genotypes: BB and bb	1	2	
	F <sub>1</sub> phenotype: black (coat)	1		
(b) (i)	More than one/several genes control one/a characteristic	1		
(ii)	Continuous	1		

Question	Expected Answer(s)		Max Mark	Additional Guidance														
10. (a) (i)	<ul style="list-style-type: none"><li>(The general trend is) as the distance increases, numbers/population/ lugworms increases up to 12 metres 1</li><li>After that, numbers/ population remains steady/ stays the same 1</li></ul>		2	Must mention change point at 12 metres for both marks For example ‘numbers increase then levels off’ = 1 mark  If the candidate accurately describes the pattern from 1m to 4m that is acceptable, but wrongly described will forfeit 1 mark.														
	(ii)	3	1															
(b) (i)	<table><tr><th rowspan="2">Predator</th><th colspan="2">Type of Competition</th></tr><tr><th>Intraspecific</th><th>Interspecific</th></tr><tr><td>rex sole and curlew</td><td></td><td>✓</td></tr><tr><td>curlew and curlew</td><td>✓</td><td></td></tr><tr><td>rex sole and dover sole</td><td></td><td>✓</td></tr></table>		Predator	Type of Competition		Intraspecific	Interspecific	rex sole and curlew		✓	curlew and curlew	✓		rex sole and dover sole		✓	1	Extra ticks negate
Predator	Type of Competition																	
	Intraspecific	Interspecific																
rex sole and curlew		✓																
curlew and curlew	✓																	
rex sole and dover sole		✓																
	(ii)	16.5 kJ (Third box down from the top)	1															

Question			Expected Answer(s)	Max Mark	Additional Guidance
11.	(a)		<p>Named abiotic factor, eg moisture, pH, light intensity 1</p> <p>Description of method, including instrument name eg 'Stick the probe of the pH meter in the soil' 1</p>	2	<p>If candidate chooses temperature, they forfeit the marks.</p> <p>Answer must relate to a woodland. Name of instrument alone not sufficient for mark.</p>
	(b)	(i)	<p>Left traps too long/ Traps too high above soil/ Traps not camouflaged/ Traps too shallow</p>	1	<p>Must identify error the students made, not just reason why empty</p> <p>Not Acceptable - the use of the term 'lid' as it implies that it seals the container</p>
		(ii)		2	<p>1 mark for appropriate sized sections (Segments do not need to be in order shown here)</p> <p>1 mark for labels (Mark for labels can be given if sections are incorrect but proportions correct)</p> <p>If pie chart is complete but 'slugs' are labelled on it, do not award labelling mark</p>
	(c)		Able to fly/flew away	1	Not Acceptable - They have wings

Question	Expected Answer(s)	Max Mark	Additional Guidance
12. (a)	<ul style="list-style-type: none"> <li>Initial population is separated / split (or idea of this) 1</li> <li>(Different) mutations occur in each subpopulation/ group (need indication that it is more than the original one population) 1</li> <li>Some mutations are advantageous 1</li> <li>Natural selection occurs <b>OR</b> selection pressures are different in each group <b>OR</b> advantageous mutations are selected for 1</li> <li>Subpopulations / groups are no longer able to interbreed to produce fertile offspring 1</li> </ul> <p><b>Any two from last three bullet points</b></p>	<b>4</b>	
(b)	<p>Mutation - a (random) change to genetic material/chromosome structure or number/bases in DNA</p> <p>Species - organisms which can interbreed/reproduce to produce fertile offspring</p>	<b>1</b>	
(c)	<p>Allows population to adapt to changing environmental conditions <b>OR</b> suitable example of coping with change <b>OR</b> makes it possible for population to evolve in response to changing conditions</p>	<b>1</b>	Not Acceptable - answers which are about 'if they are all same'

[END OF MARKING INSTRUCTIONS]