National Qualifications 2015

2015 Biology

National 5

Finalised Marking Instructions

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) If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader.

(d) There are no half marks awarded.

(e) 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 non-mathematical reasoning.

(f) 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.

(g) 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.

(h) In the mark scheme, if a word is underlined then it is essential; if a word is (bracketed) then it is not essential.

(i) In the mark scheme, words separated by / are alternatives.

(j) If two answers are given where one is correct and the other is incorrect, no marks are given.

(k) 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_2, H_2O . Subscript, superscript and normal size numbers are all acceptable, eg CO^2 and CO2
- contractions used in the Course Support Notes eg DNA, ATP are acceptable. Minor errors, eg Mrna, etc. (instead of mRNA) should not be penalised
- words not required in the syllabus can still be given credit if used appropriately e.g. metaphase of meiosis.

(l) 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.

(m) 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 discontinuous 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 contiguous columns)
- any given scale must consist of:
  - an appropriate number at the origin
  - the top plotted value (or higher)
  - at least one other value in-between.

Detailed Marking Instructions for each question

Section 1

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

Section 2

Question			Expected Answer(s)	Max Mark	Additional Guidance
1.	(a)	(i)	4	**1**	
		(ii)	4	**1**	Incorrect answer can only be awarded the mark if this number is the same as the response to a(i).
	(b)		Meristem(s)/shoot tip/root tip	**1**	Not roots/shoots alone. Additional **wrong** answers negate.
2.	(a)	(i)	+25	**1**	**+** symbol must be included. Accept answer not written in table (don't need % sign).
		(ii)	To remove excess/surface water/liquid/solution **OR** So water/liquid/solution doesn't affect the results or alter the mass/weight	**1**	To remove excess <u>vinegar</u> is not acceptable, but answer must refer to water/liquid/ solution.
		(iii)	<u>Beaker A</u> Water entered (the egg) from a high **water** concentration (outside) to a low **water** concentration (inside)/down a concentration gradient **OR** <u>Beaker B</u> Water left/leaves (the egg) from a high **water** concentration (inside) to a low **water** concentration (outside)/down a concentration gradient	**2** **OR** **2**	Referring to 'egg' as 'cell' anywhere does not negate. Must have direction (1) and down concentration gradient/high water concentration to low water concentration (1). **Along** a concentration gradient alone is insufficient but would not negate a correct response. HWC to LWC is not acceptable. Must have direction (1) and down concentration gradient/high water concentration to low water concentration (1). **Along** a concentration gradient alone is insufficient but would not negate a correct response.

Question			Expected Answer(s)	Max Mark	Additional Guidance
					HWC to LWC is not acceptable.
	(b)		Passive transport doesn't require energy/ATP, but active transport does **OR** Passive transport moves down a concentration gradient/from high to low, but active transport goes up/against a concentration gradient/from low to high	**1**	Accept reference to diffusion or osmosis in place of passive transport. Comparison required. Along a concentration gradient is not acceptable.
3.	(a)		TAC GCT ACG CGA CAG	**1**	
	(b)	(i)	Protein	**1**	Protein synthesis is not acceptable (this is a process).
		(ii)	Molecule P: mRNA/messenger RNA (**1**) Description: The order/sequence of <u>bases</u> (determines the order/sequence of amino acids) (**1**)	**2**	Reference to **DNA** bases, instead of mRNA bases is not acceptable unless molecule P is labelled as DNA.
		(iii)	Nucleus Nucleus (chromosomes)	**1**	Chromosomes alone is unacceptable.
4.	(a)		**Name of the first stage:** light reactions (**1**) **Diffuses out of the leaf:** oxygen (**1**) **Two products used in second stage:** hydrogen and ATP (**1**)	**3**	both answers required.
	(b)		Forms sugar/glucose/starch (**1**) <u>ATP</u> provides energy/hydrogen combines/reacts/joins with CO_2 (**1**)	**2**	Any additional wrong biology negates this mark. Any additional wrong biology negates this mark. Indicate correct and incorrect points and give overall mark by annotating with ticks/crosses.
5.	(a)		<u>Aerobic respiration</u>	**1**	
	(b)		3	**1**	
	(c)		(Sperm) require more energy/ATP **AND** as they move (more)/are (more) active/to swim	**1**	Must be comparative in terms of energy/ATP.

<table>
<tr><th colspan="3">Question</th><th>Expected Answer(s)</th><th>Max Mark</th><th>Additional Guidance</th></tr>
<tr><td>6.</td><td>(a)</td><td></td><td>Electrical impulse/electrical message/electrical signal</td><td>1</td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>J = Sensory (neuron) - carries/sends message/impulse/signal from sense organ→ relay neuron/CNS/spinal cord

K = Motor (neuron) - carries/sends message/impulse/signal from CNS/Relay neuron/spinal cord→ muscle/organ/effector

L = Relay (neuron) – carries/sends message/impulse/signal from sensory→ motor neuron/within CNS</td><td>2</td><td>1 mark for correct name

and

1 mark for origin → destination.

Brain is not an acceptable alternative to CNS.

If no named neuron, award function mark based on the box ticked.

If no box/wrong box ticked, award function mark based on name given.

Accept intermediate/inter instead of relay neuron.</td></tr>
<tr><td></td><td>(c)</td><td></td><td>0.01</td><td>1</td><td></td></tr>
<tr><td>7.</td><td>(a)</td><td>(i)</td><td>Jon is heterozygous/Hh/has both alleles/both forms of the genes

AND

is hearing</td><td>1</td><td>‘Both genes’/‘copies of genes’ is not acceptable

Both parts needed</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><th>Individual</th><th>Genotype</th><th>Phenotype</th></tr><tr><td>Paul</td><td>hh</td><td>non-hearing</td></tr><tr><td>Lyall</td><td>Hh</td><td>hearing</td></tr></table></td><td>2</td><td>One mark per column.

Gender not necessary but incorrect gender negates.

Accept equivalent description of phenotype eg. deaf etc.</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>3 in 4/75%</td><td>1</td><td>3:1 is unacceptable but does not negate an otherwise correct answer.
75 is unacceptable (must have % symbol).</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Polygenic</td><td>1</td><td></td></tr>
</table>

Question			Expected Answer(s)	Max	Additional Guidance
8.	(a)	(i)	Both scale and axis label completed correctly (**1**) Points plotted correctly and joined (**1**)	**2**	At least half of the grid must be used. Do not penalise for extrapolation **all the way** to 35°C.
		(ii)	1300	**1**	
	(b)		Water moves into/enters/is absorbed by root hairs by osmosis/diffusion (**1**) (Water) travels upwards in the xylem (**1**) (water) travels to the stomata /pores and evaporates/transpires /diffuses out (**1**)	**3**	Each mark requires a structure **and** a process. 'Movement through **transpiration stream'** in xylem is equivalent to 'upwards' in xylem. Annotate script to indicate where marks awarded. Any additional wrong Biology negates a maximum of 1 mark.
9.	(a)	(i)	Alveolus/alveoli/air sac	**1**	
		(ii)	Large surface area Thin walls/walls are one cell thick Good/rich blood supply/dense capillary network Moist	**2**	Any two – one mark each. Thin cells/thin lining/alveolus is one cell thick is not acceptable. Large number of them/lots of them not acceptable.
	(b)		Dirt/dust/microorganisms are trapped in the mucus Cilia move these up and away from the lungs	**1** **1**	Germs – not acceptable (but would not negate an otherwise correct answer). Must imply direction away from lungs but not out of the lungs.

Question			Expected Answer(s)	Max Mark	Additional Guidance
10.	(a)		<table><tr><th>Stage</th><th>Number</th></tr><tr><td></td><td>3, 4 or both</td></tr><tr><td></td><td>8</td></tr></table> **1** **1**	**2**	
	(b)		soil/root nodules	**1**	Nodules alone is not acceptable.
	(c)		Chemical R = nitrate(s) (**1**) Importance to plants = needed to make protein (**1**)	**2**	
11.	(a)	(i)	As the (number of) bacteria increases, the oxygen (level in the water) decreases **OR** As the (number of) bacteria decreases, the oxygen (level in the water) increases	**1**	Do **not** accept 'as the oxygen (level) decreases, the (number of) bacteria increases'.
		(ii)	2	**1**	
	(b)	(i)	Mayfly nymphs/stonefly nymphs/caddis fly larvae	**1**	Only one of these organisms necessary to gain mark. Additional wrong answers negate.
		(ii)	(The pollution/sewage results in) fewer/less types (of organism/animals) **OR** (Pollution) decreases biodiversity **OR** 'They would decrease' (as this refers to the types of organisms)	**1**	Results in fewer/less organisms/animals is not acceptable.
	(c)		Organisms which, by their presence/absence, show level of pollution/environmental quality	**1**	
12.	(a)		36	**1**	Units required (mm) if answer not in table.
	(b)		Continuous	**1**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
	(c)		Too few leaves/taken/sampled **OR** More than 5 leaves should be measured **OR** Only five leaves were taken **OR** Too small a sample	**1**	Did not repeat it/experiment is not acceptable. Answer should refer to leaves. 'Only one stem of each type taken' is not acceptable but would not negate. Any reference to accuracy, fairness or validity negates.
	(d)		To make sure the leaves belong to the same species/type of ivy **OR** Different plants could be affected by different factors/growing conditions **OR** So there is only one variable **OR** To limit/reduce the number of variables	**1**	Any one for 1 mark. 'So they all have the same growing conditions' is unacceptable. Any reference to accuracy or reliability negates.
	(e)		Light intensity/temperature/wind speed/humidity (or moisture in the air)	**1**	Light on its own/moisture/ soil moisture/pH are not acceptable.
13.	(a)	(i)	65	**1**	
		(ii)	To prove that the mutation was causing the effect/high bone density (or equivalent description)	**1**	As a control/to compare is not acceptable.
	(b)		Radiation or example/Chemicals or example/High temperature	**1**	Only one answer required. Must be high temperature, not low or temperature on its own.
	(c)		• (Allows the species) to evolve/adapt • in response to changing environmental conditions	**1**	Both parts required.

[END OF MARKING INSTRUCTIONS]