



N5 Biology
SQA Past Paper Answers

2019, 2018, 2017, 2016, 2015,
2014 and Specimen

Marking instructions for each question

Section 1

Q4

DNA Strand		Complementary DNA strand	
830	A	T	830
929	C	G	929
774	G	C	774
615	T	A	615

929 Guanine on Complementary DNA.
Answer D.

Q16

CO_2 in exhaled air = 4%
 CO_2 in inhaled air = 0.04%

$$4 \div 0.04 = 100$$

CO_2 exhaled is 100 greater than CO_2 inhaled air.

Answer C

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

Q5

Protein : Polypeptide
60 : 36
10 : 6
5 : 3
Answer B.

Q17

2010 = 44,200
2012 = 46,000
Increase = 1,800 every 2 years.
2016 = 49,600
2018 = 49,600 + 1800 = 51,400
2020 = 51,400 + 1800 = 53,200
Answer B

Q21

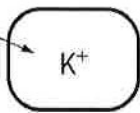
10-20 = 26 increase
20-30 = 25 increase
30-40 = 23 increase
40-50 = 9 increase

10-20 has biggest increase
Answer A

Q24

50 predator kill 1500 whitefly
1 predator kills $1500 \div 50 = 30$ whitefly
 $21,000$ whitefly $\div 30 = 700$ predators
Answer 700 B.

Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Controls/allows entry/exit of materials/substances/molecules OR Controls what enters/leaves	1	Not acceptable: 'Things' Decides what enters/exits the cell To be selectively permeable (not negating otherwise correct answer)
		(ii)	Ribosome	1	Acceptable: Cytoplasm
	(b)	(i)	285	1	
		(ii)	They have high(er) energy requirements/need lots of/use more energy OR They require high(er) levels/lots of/use more ATP	1	If example is given it must apply to both types of cells. Not acceptable: Produce more energy (negates an otherwise correct answer)
2.	(a)		Diffusion	1	
	(b)	(i)	K ⁺ 	1	Must be an indication of direction not just a line.
		(ii)	Protein(s)	1	
	(c)		29	1	
3.	(a)		Amylase	1	
	(b)		Synthesis	1	
	(c)		Cellulose	1	
	(d)		Substrate	1	

Q1 b

$$250 + 330 + 275 = 855$$

$$855 \div 3 = 285$$

Answer 285

Q2c

concentration of chloride ions

outside cell = 116

inside cell = 4

$$116 \div 4 = 29$$

Concentration outside is

29 times greater

Answer 29.

Question			Expected response	Max mark	Additional guidance												
4.	(a)	(i)	S Pyruvate (1) T Water (1)	2													
		(ii)	Oxygen	1													
		(iii)	2	1													
	(b)	(i)	Scale, label (1) Points plotted and line drawn (1)	2													
			<table border="1"> <thead> <tr> <th>Time (minutes)</th> <th>Volume of dough (cm³)</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>8</td> </tr> <tr> <td>20</td> <td>14</td> </tr> <tr> <td>30</td> <td>22</td> </tr> <tr> <td>40</td> <td>26</td> </tr> <tr> <td>50</td> <td>28</td> </tr> <tr> <td>60</td> <td>28</td> </tr> </tbody> </table>	Time (minutes)	Volume of dough (cm ³)	10	8	20	14	30	22	40	26	50	28	60	28
Time (minutes)	Volume of dough (cm ³)																
10	8																
20	14																
30	22																
40	26																
50	28																
60	28																
		(ii)	Prediction - Any value greater than 0 cm ³ and less than 28 cm ³ (1) Reason - <u>Enzymes</u> (in the yeast) not as active/less active (1)	2	Must be comparative												
5.	(a)		(Embryonic) stem (cells)	1	Not acceptable: Adult/tissue stem (cells)												
	(b)		Organ(s)	1													
	(c)		Repair (tissues/organs) OR Replace (dead/damaged) cells	1	Not acceptable: Repair (dead/damaged) cells												
	(d)		Phagocytes engulf/digest pathogens (1) Lymphocytes produce/release antibodies (1)	2	Not acceptable: Phagocytes destroy/surround pathogens/carry out phagocytosis (not negating otherwise correct answer) Phagocytes eat (negates an otherwise correct answer)												
	(e)		Immune	1													

Question			Expected response	Max mark	Additional guidance
6.	(a)		19:00	1	Acceptable: 7pm
	(b)		30	1	
	(c)		1. Pancreas produces/releases glucagon (1) 2. (Glucagon) travels in the blood (1) 3. To the liver/in the liver (1) 4. Glycogen is broken down into glucose (1) 5. Glucose is released (into the blood) (1)	4	To achieve 4 marks candidate must include: Points 1, 3 and 4 AND Either points 2 or 5 4. Acceptable: Glycogen is converted/turned into glucose
7.	(a)	(i)	(Both) alleles are the same/identical	1	Not acceptable: Both genes are the same
		(ii)	F1 were (all) tall/none of the F1 were dwarf OR There were more tall/less dwarf overall	1	
	(b)	(i)	108	1	
		(ii)	5:2	1	
8.	(a)		A - fatty acids/glycerol (1) B - glucose/amino acids (1)	2	Not acceptable: Sugar
	(b)		Increases/provides/creates/gives a large surface area	1	
	(c)		Thin walls/walls one cell thick OR Good/extensive blood supply or description	1	Not acceptable: Thin cell walls

Q6b % Decrease = $\frac{\text{decrease}}{\text{starting}} \times 100$

9:00 = 6

11:00 = 4.2

decrease = 6 - 4.2
= 1.8

Answer 30%

$$\frac{1.8}{6} \times 100 = 30\%$$

Q7b 144 plants.

$\frac{3}{4}$ expected to be tall

$$144 \times \frac{3}{4} = 108$$

Answer 108 Tall

Q7c Ratio Tall : Dwarf

90 : 36

15 : 6

5 : 2

Answer 5 : 2

Question		Expected response	Max mark	Additional guidance
9.	(a)	30	1	
	(b)	27	1	
	(c)	<p>Any one of:</p> <p>The 1st injection takes 28 days to reach the maximum (concentration), whereas the 2nd injection takes 27 days (to reach the maximum concentration)</p> <p>OR</p> <p>The 1st injection</p> <ul style="list-style-type: none"> • increases slower • takes longer to reach its maximum (concentration) • is slower to reach its maximum (concentration) <p>OR</p> <p>The 2nd injection</p> <ul style="list-style-type: none"> • increases faster • takes less time to reach its maximum (concentration) • is quicker to reach its maximum (concentration) (1) <p>Any one of:</p> <p>1st injection - higher for a shorter period of time/decreases faster</p> <p>OR</p> <p>2nd injection - higher for a longer period of time/decreases slower (1)</p> <p>OR</p> <p>Any other suitable difference (1)</p>	2	<p>Any 2 marks from 3</p> <p>Not acceptable (in question stem): 1st injection produces less antibodies/2nd injection produces more antibodies</p> <p>Not acceptable: 1st injection longer/slower/takes 28 days</p> <p>Not acceptable: 2nd injection shorter/faster/takes 27 days</p> <p>Not acceptable: 1st/2nd injection higher/increases</p>
	(d)	84	1	

Q 9b.

Second injection occurs at 35 days

Maximum antibody value after 2nd injection occurs at 62 days

$$62 - 35 = 27 \text{ days later.}$$

Question			Expected response	Max mark	Additional guidance
10.	(a)		Does exercise reduce/affect the risk/chance of cancer?	1	
	(b)		Bar	1	
	(c)		Participants could have forgotten/exaggerated/under-estimated/not told the truth (about recording their own exercise)	1	
	(d)		Age - participants should be the same age/similar ages Duration - participants should exercise for the same length of time Type - participants should carry out the same exercise	1	
11.	(a)	(i)	Photosynthesis	1	
		(ii)	Carnivore/predator/prey	1	Not acceptable: Secondary consumer
		(iii)	(Pyramid) A	1	
	(b)	(i)	15	1	
		(ii)	Growth	1	Extra boxes ticked negates

Q 11 b(i)

Energy used for growth = 3J

Total energy intake = 20J

$$\% \text{ energy used for growth} = \frac{3}{20} \times 100$$

$$= 15\%$$

Answer 15%

Question		Expected response	Max mark	Additional guidance
12.	(a)	As the soil moisture increases, the (percentage) ground cover/moss increases OR The higher the soil moisture, the higher the ground cover OR The lower the soil moisture, the lower the ground cover	1	
	(b)	Repeat the (whole) investigation OR Do more quadrats AND soil moisture readings OR (Use) more sample sites	1	Not acceptable: Repeat it/repeat the experiment/ take more measurements/readings/ samples
	(c)	(i) Insert thermometer into soil same depth each time OR Leave for a time to adjust before reading	1	
		(ii) pH/light intensity/wind speed/ humidity/mineral concentration/ nitrate concentration	1	Not acceptable: Light
	(d)	(i) Species that by their presence or absence indicate (levels of) pollution/environmental quality	1	
		(ii) 4	1	

Question			Expected response	Max mark	Additional guidance
13.	(a)	(i)	Control	1	Extra boxes ticked negatives
		(ii)	To allow a comparison to those where carbon dioxide and/or light have been removed OR To show that carbon dioxide and/or light are required	1	Not acceptable: For comparison
		(iii)	There are two variables altered/ both carbon dioxide and light are absent OR Carbon dioxide is absent/a chemical is absorbing carbon dioxide AND light absent/in a black box	1	
		(iv)	Light	1	Not acceptable: Dark/lack of light/light intensity
	(b)		Sugar	1	Acceptable: Glucose
14.	(a)	(i)	7.2 (million)	1	If answer not in the table then million is required
		(ii)	Not caused by bacteria/pathogen is not a bacterium	1	Not acceptable: Antibiotics do not affect viruses Common cold is caused by a virus Resistant to antibiotics
	(b)	(i)	(D) A E C B	1	
		(ii)	Natural selection/survival of the fittest	1	
		(iii)	Radiation/some chemicals Named examples of either	1	

Q 14 a (i)

number of cases treated with antibiotics = 15 million

% success rate = 48%

Number of cases successfully treated = $15 \times \frac{48}{100}$

= 7.2 million

Answer 7.2 million

Question		Expected response	Max mark	Additional guidance
15.	(a)	Chromosome(s)	1	
	(b)	<p>Any reference to required gene being extracted should be ignored (including any reference to enzymes)</p> <p>1. Plasmid extracted from bacteria/bacterial cell OR Plasmid cut open (1)</p> <p>2. (Required) gene inserted into plasmid (1)</p> <p>3. (Modified) plasmid inserted into a bacterial/host cell (1)</p> <p>4. A correct mention of enzyme cutting plasmid OR Sealing gene into plasmid (1)</p>	4	<p>Not acceptable:</p> <p>3. Any implication that the plasmid is returned to the original bacterial cell</p> <p>4. Any other use of enzyme negates</p>

[END OF MARKING INSTRUCTIONS]



National
Qualifications
2018

2018 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. Marks should be awarded for what is correct and not deducted for 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 should 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 the first part of a question, credit should normally be given for subsequent answers that are correct with regard to this original error. Candidates should not be penalised more than once for the same error.
- (f) Unless a numerical question specifically requires evidence of working to be shown, full marks should be awarded for a correct final answer (including units, if appropriate) on its own.
- (g) In the detailed marking instructions, if a word is underlined then it is essential; if a word is (bracketed) then it is not essential.
- (h) In the detailed marking instructions, words separated by / are alternatives.
- (i) A correct answer can be negated if:
 - an extra, incorrect, response is given
 - additional information that contradicts the correct response is included.
- (j) Unless otherwise required by the question, use of abbreviations (eg DNA, ATP) or chemical formulae (eg CO₂, H₂O) are acceptable alternatives to naming.
- (k) Where incorrect spelling is given, sound out the word(s).
 - If the correct word is recognisable then give the mark.
 - If the word can easily be confused with another biological term then do not give the mark eg mitosis and meiosis.
 - If the word is a mixture of other biological words then do not give the mark, eg osmotis, respirduction, protosynthesis.
- (l) Presentation of data
 - If a candidate provides two graphs or charts, mark both and give the higher score.
 - If a question asks for a particular type of graph and the wrong type is given, then full marks cannot be awarded. Candidates cannot achieve the plot mark but **may** be able to achieve the mark for scale and label.
 - If the x and y data are transposed, then do not give the scale and label mark.
 - If the graph uses less than 50% of the axes, then do not give the scale and label mark.
 - If 0 is plotted when no data is given, then do not give the plot mark (ie candidates should only plot the data given).
 - No distinction is made between bar graphs and histograms for marking purposes.
 - In a pie chart lines must originate from the central point and extend to tick marks. Labels must be given in full.

- (m) Marks are awarded only for a valid response to the question asked. For example, in response to questions that ask candidates to:
- **identify, name, give or state**, they need only answer or present in brief form;
 - **describe**, they must provide a statement as opposed to simply one word;
 - **explain**, they must provide a reason for the information given;
 - **compare**, they must demonstrate knowledge and understanding of the similarities and/or differences between topics being examined;
 - **calculate**, they must determine a number from given facts, figures or information;
 - **predict**, they must indicate what may happen based on available information;
 - **suggest**, they must apply their knowledge and understanding to a new situation.

Marking instructions for each question

Section 1

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

\rightarrow 1 increased from 25 to 30g = 5g
 $\frac{5g}{25g} \times 100 = 20\%$

Question	Answer	Mark
21.	C	1
22.	B	1
23.	A	1
24.	D	1
25.	A	1

\rightarrow to show effect of temperature, the only variable that should change is temp - everything else should remain the same

Section 2

Question		Expected response	Max mark	Additional guidance
1.	(a)	<p>1. Mitochondrion: (site of) <u>aerobic</u> respiration or releases energy/produces ATP.</p> <p>2. Cytoplasm: (site of) chemical reactions.</p> <p>3. Ribosome(s): (site of) protein synthesis.</p> <p>4. Cell membrane: controls or allows entry/exit of materials/substances/molecules or controls what enters/exits.</p> <p>Any 2 for 1 mark each</p>	2	<p>Acceptable: additional correct information.</p> <p>Not acceptable: - (site of) all chemical reactions - specific example of a reaction eg fermentation.</p> <p>Not acceptable: 'things'</p>
	(b)	100	1	<p><i>2mm = 0.1mm</i></p> <p><i>20 0.1 x 1000 = 100micrometers</i></p>
2	(a)	Does not require energy/ATP.	1	Acceptable: additional correct information.
	(b)	2	1	<i>high salt conc. would cause the cell to shrivel.</i>
	(c)	Plasmolysed	1	Not acceptable: flaccid
	(d)	<p>Plant cells/cell 4 have a cell wall or animal cells/cell 3 do not have a cell wall. (1)</p> <p>Cell wall prevents cells from bursting/no cell wall so cell bursts. (1)</p>	2	Not acceptable: cell wall protects it, but would not negate an otherwise correct answer.
3.	(a)	(i) Double (stranded) helix	1	
		(ii) Complementary bases or base pairs/base pairing or adenine pairs with thymine and cytosine pairs with guanine.	1	<p>Acceptable: - hydrogen bonds.</p> <p>Not acceptable: - use of letters - names of bases linked with a (-) dash - 'bases' alone.</p>
	(b)	<u>Nucleus</u>	1	

Question		Expected response	Max mark	Additional guidance															
4.	(a)	Degradation/breakdown	1																
	(b)	<p>1. Enzyme and substrate join/fit/bind together OR substrate joins/fits/binds with active site OR enzyme-substrate complex forms OR enzyme and substrate are complementary/specific. (1)</p> <p>2. Reaction occurs at <u>active site</u> of the enzyme OR enzyme has an <u>active site</u>. (1)</p> <p>3. (Two/smaller) <u>product(s)</u> made/formed/released. (1)</p>	3	Do not award mark for point 3 if description relates to synthesis reaction.															
5.	(a)	<table border="1"> <thead> <tr> <th>Statement</th> <th>Aerobic</th> <th>Fermentation</th> </tr> </thead> <tbody> <tr> <td>Oxygen is required</td> <td>✓</td> <td></td> </tr> <tr> <td>Pyruvate is formed</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Lactate is formed</td> <td></td> <td>✓</td> </tr> <tr> <td>Carbon dioxide is formed</td> <td>✓</td> <td></td> </tr> </tbody> </table> <p>(1) (1)</p>	Statement	Aerobic	Fermentation	Oxygen is required	✓		Pyruvate is formed	✓	✓	Lactate is formed		✓	Carbon dioxide is formed	✓		2	
Statement	Aerobic	Fermentation																	
Oxygen is required	✓																		
Pyruvate is formed	✓	✓																	
Lactate is formed		✓																	
Carbon dioxide is formed	✓																		
	(b)	Muscle contraction/cell division/protein synthesis/transmission of nerve impulses/active transport.	1	<p>Acceptable: carbon fixation or any other correctly named example.</p> <p>Not acceptable: - photosynthesis - reproduction.</p>															

Question			Expected response	Max mark	Additional guidance
6.	(a)	(i)	1.5	1	the pH at which the enzyme works best.
		(ii)	4	1	at pH 2.5 = 8 mm clear
	(b)		Temperature Volume of pepsin/solution Concentration of pepsin Spacing of holes Size/depth/diameter/volume of holes/wells Any two for 1 mark each	2	Acceptable: amount of pepsin/solution. Not acceptable: - time left for - level of solution - depth of agar.
	(c)		Three values between 0.5 and 2.5 ensuring that there are values above and below the optimum (1.5).	1	If (a)(i) is incorrect, adjust for figures above and below the optimum given, within a similar range. Not acceptable: 0.5 or 2.5
7.			1. Chromosomes/chromatids move to/ line up at/across the <u>equator</u> . (1) 2. Spindle (fibres) form/attach/contract/shorten/pull. (1) 3. (Pairs of) <u>chromatids</u> are separated/pulled apart. (1) 4. Chromosomes move to poles/opposite ends of cell. (1) 5. Nuclear membrane(s) form/develop OR 2 nuclei form. (1) 6. Cytoplasm divides/splits. (1)	4	Any 4 marks from 6 but must include point 3 and any other three points to get full marks. Not acceptable - chromatids move to opposite poles.

Question		Expected response	Max mark	Additional guidance									
8.	(a)	Testis OR Ovary	1	Singular or plural accepted									
	(b)	(i)	1										
		(ii)	1										
9.	(a)	(Mixture of) genetics and environment(al).	1										
	(b)	Suitable headings for the columns and rows (either order). (1) Correct values included in table (1) (in the absence of suitable headings this mark can be accessed if the context of the values can still be determined).	2	People/adults must be given in the heading of the columns or after every entry. <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="border: none;">Country</th> <th style="border: none;">number of people with MI</th> <th style="border: none;">number of people without MI</th> </tr> </thead> <tbody> <tr> <td style="border: none;">Sweden</td> <td style="border: none;">1620</td> <td style="border: none;">2788</td> </tr> <tr> <td style="border: none;">USA</td> <td style="border: none;">1159</td> <td style="border: none;">1172</td> </tr> </tbody> </table>	Country	number of people with MI	number of people without MI	Sweden	1620	2788	USA	1159	1172
Country	number of people with MI	number of people without MI											
Sweden	1620	2788											
USA	1159	1172											
	(c)	Control (group)	1										
	(d)	Reliable: - as there was a large number of people involved - two countries were used (rather than one). OR Not reliable: - as there were only two countries/studies involved.	1	Not acceptable: suggestions of how to improve the study.									
	(e)	Any reasonable answer about the people chosen eg gender, diet, age, health issues, drug use, smoking OR about the conditions of the trial eg strength of coffee, time over which it was consumed etc.	1	Not acceptable: - genetics - 'lifestyle' unless accompanied by a suitable example.									

Question		Expected response	Max mark	Additional guidance									
10.	(a)	Arteries: 2 and 5 OR Veins: 1 and 3	2	1 mark for each correct number. Accept descriptions in place of numbers.									
	(b)	(i) As the heart rate increases the volume of blood (pumped) increases until 100(bpm) and then decreases.	2	1 mark for correct description of increase and then decrease (without mention of 100(bpm)).									
		(ii) 6.0 / 6	1	<i>extend the line on the graph</i>									
	(c)	(i) Higher/more in Q (than in P) OR Lower/less in P (than in Q) OR High in Q and low in P	1	Not acceptable: - P is deoxygenated and Q is oxygenated - absolute terms eg no oxygen.									
		(ii) Left ventricle	1										
11.	(a)	(i) G, H, I, J, K	1	Need all 5									
		(ii) E: tt F: Tt	2	Additional information negates. If letters other than T or t have been correctly used, only one mark can be awarded. <i>non-rollers must be tt as it is a recessive characteristic since f and f have a child who is a non-roller, F must be a carrier so Tt</i>									
		(iii) <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>T</td> <td>t</td> </tr> <tr> <td>t</td> <td>Tt</td> <td>tt</td> </tr> <tr> <td>t</td> <td>Tt</td> <td>tt</td> </tr> </table> <p>1 mark for gametes 1 mark for offspring genotypes</p>		T	t	t	Tt	tt	t	Tt	tt	2	If genotypes incorrect in (a) (ii) but carried forward and correctly used, both marks can still be awarded. If no genotypes given in (a) (ii) both marks can still be awarded if the Punnett square is correct.
	T	t											
t	Tt	tt											
t	Tt	tt											
	(b)	Discrete	1										
12.	(a)	(i) Palisade mesophyll	1										
		(ii) To absorb/capture/trap more light	1	Not acceptable: - to get / receive more light - to absorb light.									
	(b)	Xylem: lignin/hollow/no cell contents/no end walls. Phloem: sieve plates/sieve tubes/companion cells.	1	Not acceptable: Xylem - dead, but not negating. Not acceptable: Phloem - living, but not negating. Any description of function must be related to the structural feature given, otherwise would negate.									

Question			Expected response	Max mark	Additional guidance
13.	(a)	(i)	19	1	and 95% of 20 is $\frac{20}{100} \times 95 = 19$
		(ii)	(Up to 10 seeds sown, the percentage of seedlings surviving remains constant and thereafter) as the number of seeds (sown) increases the percentage (of seedlings) surviving decreases.	1	Also acceptable: 100 as the number of seeds (sown) decreases the percentage (of seedlings) surviving increases (until 10 seeds and then it remains constant). Not acceptable: percentage of seeds surviving decreases.
		(iii)	They/plants/seeds/seedlings/organisms are the same species.	1	Not acceptable: any reference to 'fighting'. Any additional reference to requiring resources must be correct.
	(b)		Tick in first box. <i>195 is a producer</i>	1	More than one tick negates.
	(c)		Light/sunlight/nutrients/minerals/space.	1	Not acceptable: - light intensity - food.
14.	(a)	(i)	Pitfall trap	1	
		(ii)	1. Springtail (1) 2. Woodlice (1)	2	<i>add male and female for each animal together</i>
		(iii)	Set several traps. Check traps more often. Repeat the investigation/experiment.	1	Not acceptable: - repeat in different areas.
	(b)	(i)	E	1	<i>as soil moisture increased, the number of plants of species F</i>
		(ii)	15	1	<i>affected more than species F or G.</i>

$$15 + 14 + 16 + 17 + 13 + 15 = 90$$

$$90 \div 6 = 15$$

Question		Expected response	Max mark	Additional guidance
15.	(a)	X-axis scale and label including units. (1) Plotting and joining points accurately. (1)	2	Scale - any three values to establish a linear scale. If a bar chart is drawn, only the second mark can be accessed. Any extrapolation beyond 50°C in the graph should be ignored.
	(b)	Any value less than 0.4 (including 0).	1	Not acceptable: <i>extend the graph</i> values below zero.
	(c)	Light intensity/carbon dioxide concentration.	1	
	(d)	Substance X - carbon dioxide /CO ₂ (1) Substance Y - starch (1)	2	
16.	(a)	(i) Fertiliser	1	
		(ii) To make protein/amino acids.	1	
		(iii) 20	1	<i>increased from 35 to 42 kg = 7 kg ↑</i> <i>$\frac{7}{35} \times 100 = 20\%$</i>
	(b)	(i) (Algal) bloom	1	
		(ii) Bacteria have more food/more algae to feed on.	1	
		(iii) Drop in oxygen concentration/lower oxygen concentration/less oxygen for fish due to bacteria using up oxygen.	1	Not acceptable: - no oxygen - bacteria use up all the oxygen.

[END OF MARKING INSTRUCTIONS]



National
Qualifications
2017

2017 Biology

National 5

Finalised Marking Instructions

with notations

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Marking instructions for each question

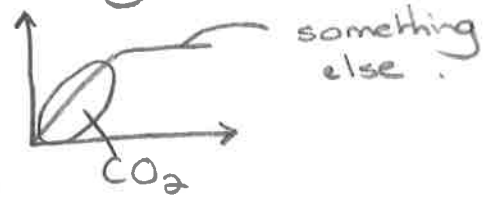
Section 1

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

The difference

2 Identify which direction of movement => know definitions of active transport + diffusion.

4. Must know the limiting factors of photosynthesis



10 movement of water + structures in a plant / leave.

13 Think about what table (data) shows.

17. Where are producers in a food chain?

18. 1950 = 2 tonnes
 2000 = 7 tonnes
 Difference = 5 tonnes
 % increase = $\frac{\text{Difference}}{\text{original}} \times 100$
 $\% \uparrow = \frac{5}{2} = \underline{\underline{250}}$

Section 2

Question			Expected answer(s)	Max mark	Additional guidance
1.	(a)	(i)	Cytoplasm - site of (chemical) reactions OR Cell membrane - controls/allows/lets entry and/or exit/passage of materials/substances/molecules or Controls what enters/exits OR Nucleus - controls (all) cell activity/activities	1	Not acceptable - things/particles Not acceptable - contains genetic material; but not negating
		(ii)	Osmosis	1	
	(b)		Cell wall	1	
2.	(a)	(i)	3 Pairs of chromatids are pulled apart	1	No penalty for any other number in any other place - ignore. More than one '3' negates
		(ii)	Spindle (fibre)	1	
	(b)		40	1	$\overleftarrow{20} + \overrightarrow{20} = 40$
3.	(a)		1 = cytosine 2 = thymine	2	Not acceptable - letters instead of words, thymine/thiamine
	(b)		Sequence/order of bases	1	Accept - examples of differing base order Not acceptable - reference to pairs of bases
	(c)		Messenger RNA/mRNA/MRNA	1	
4.	(a)		Appropriate scale and label (1) Scale must have 0, 108 or 120 and one other number in between * Label - Time (taken) for disc(s) to return to (the) surface s/seconds Bars correctly plotted (1)	2	Not acceptable - * common zero on scale Not acceptable - * 'secs' as an abbreviation If incorrect scale but plot is accurate to that scale (1 mark)
	(b)		Liver has the highest catalase activity/apple has the lowest catalase activity/different tissues have different catalase activity/ animal tissue has higher catalase activity (than plants) or other appropriate conclusion	1	Answer must relate to catalase activity/rate and be comparative Not acceptable - restatement of results
	(c)		Decrease	1	

$$\frac{14}{20} = 0.7$$

$$\text{so } \frac{26}{20} = \underline{\underline{1.3}}$$

Question			Expected answer(s)	Max mark	Additional guidance
5.	(a)	(i)	1.3	1	Acceptable - correct answer but not in table
		(ii)	Temperature	1	
		(iii)	(Respiration is) controlled by enzymes/enzymes are needed 1	2	Enzymes must be mentioned at least once for both marks to be awarded. Not acceptable - reference to denaturing at temperatures 'above optimum'
			Enzymes have been denatured (at 60°C) or description of denatured 1		
		(iv)	To show it is the germinating/live peas that are producing the result/using oxygen/respiring OR To show that <u>dead</u> peas do not respire	1	Reference to 'temperature having no effect on dead peas' does not negate an otherwise correct answer
	(b)		X - Pyruvate OR Y - Ethanol/alcohol	1	
6.	(a)		Discrete (1) Heterozygous (1)	2	
	(b)	(i)	Testis/testes	1	Accept testicles
		(ii)	Sperm <u>nucleus</u> and egg <u>nucleus</u> fuse or join together/sperm and egg <u>nuclei</u> fuse/gamete <u>nuclei</u> fuse or join together	1	Must be clear it is the two nuclei which are involved
		(iii)	Haploid cell or egg has half the number of chromosomes OR Diploid cell or zygote has double/twice the number of chromosomes OR Haploid cell or egg has one set of chromosomes/ 23 chromosomes whereas diploid cell or zygote has two sets of chromosomes/46 chromosomes	1	Must refer to <u>chromosomes</u> Accept - sex cell or gamete as an alternative to egg

$$\begin{aligned} \div 15 &= 165 \div 105 \div 15 \\ &= 11 \div 7 \end{aligned}$$

Question		Expected answer(s)	Max mark	Additional guidance
7.	(a)	11:7	1	
	(b)	(i) Oxygen/nutrients/glucose/amino acids	1	Not acceptable - food/blood
		(ii) Reduce/stop smoking Reduce fat in diet/cholesterol in diet/salt intake/sugar intake/ alcohol intake/stress Lose weight/healthier diet/ healthier eating	1	Must be comparative or imply change
	(c)	(Large) surface area / (rich) blood supply/ (dense) capillary network	1	$0.04 = 6$ stomata
8.	(a)	150	1	$\frac{1}{0.04} = 25$
	(b)	(i) Will be less evaporation/water loss OR Plant will not require as much water	1	so $25 \times 6 = 150$
		(ii) Dry	1	
9.	(a)	Cerebellum	1	
	(b)	1. Detected by <u>receptors</u> (1) 2. Sent by <u>electrical</u> impulse/ signal (1) 3. (Message/information/ impulse goes) from sensory to relay neuron/sensory → relay neuron (1) 4. Across synapse OR Chemical transfer between neurons (1)	4	If the brain is mentioned as being involved in the process this negates one correct point. Not acceptable - reference to 'electrical impulse' crossing synapse
10.	(a)	(i) Pancreas	1	Not acceptable - pancrease
		(ii) Glucose is needed to release/give out <u>energy</u> OR If cells do not have glucose they release/give out less/no <u>energy</u>	1	
	(b)	(i) S = Fast Acting	1	
		(ii) P = Duration in Blood	1	
	(c)	Receptor (protein)	1	

Question		Expected answer(s)	Max mark	Additional guidance																
11.	(a)	Set up more than one field for each variety/ Repeat the (whole) investigation/ Use more potatoes/plants in each field <u>reliability = repeat</u>	1	If 'both varieties' are mentioned, it must be clear that each variety is grown in a separate field Not acceptable - repeat it/ repeat the experiment																
	(b)	175 <u>250 / 425</u>	1	<u>Difference = 425 - 250</u>																
	(c)	Number of potatoes/plants; Spacing between potatoes/plants; pH of soil; Nutrient content of soil; Moisture content of soil; Fertility of soil; Type of soil } <u>SOIL</u>	1	Not acceptable- <u>= 175</u> Amount of potatoes Temperature Humidity Light intensity Rainfall CO ₂ concentration Area/size of field																
	(d)	Pesticides/insecticides/predator/ biological control/crop rotation	1																	
12.	(a)	Niche	1																	
	(b)	Mutation	1																	
	(c)	(Offspring would be) infertile/ sterile	1	Not acceptable - offspring are unable to reproduce, but not negating																
13.			3																	
		<table border="1"> <thead> <tr> <th>Statement</th> <th>True</th> <th>False</th> <th>Correction</th> </tr> </thead> <tbody> <tr> <td>Genetic variation within a population allows the population to <u>adapt</u> in a changing environment.</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Isolation barriers can be geographical, <u>environmental</u> or reproductive.</td> <td></td> <td>✓</td> <td>Ecological</td> </tr> <tr> <td>Sub-populations evolve until they become genetically <u>identical</u>.</td> <td></td> <td>✓</td> <td>Non-identical/varied/ different</td> </tr> </tbody> </table>			Statement	True	False	Correction	Genetic variation within a population allows the population to <u>adapt</u> in a changing environment.	✓			Isolation barriers can be geographical, <u>environmental</u> or reproductive.		✓	Ecological	Sub-populations evolve until they become genetically <u>identical</u> .		✓	Non-identical/varied/ different
Statement	True	False	Correction																	
Genetic variation within a population allows the population to <u>adapt</u> in a changing environment.	✓																			
Isolation barriers can be geographical, <u>environmental</u> or reproductive.		✓	Ecological																	
Sub-populations evolve until they become genetically <u>identical</u> .		✓	Non-identical/varied/ different																	

NO
CYCLE
NOT
IN
NEW
COURSE

Question			Expected answer(s)	Max marks	Additional guidance
14.	(a)	(i)	Nitrites	1	
		(ii)	3 OR 4	1	
	(b)	(i)	Plants/producers/denitrifying bacteria	1	Not acceptable - named example/leguminous plants
		(ii)	To make protein/amino acids	1	Not acceptable - to grow
	(c)		Fungi	1	
15.	(a)	(i)	Has most crusty lichen and these are common/found in high pollution	1	
		(ii)	6	1	5+2+3+14 = 24
	(b)		Indicator (species)	1	4

[END OF MARKING INSTRUCTIONS]

= 6



National
Qualifications
2016

2016 Biology

National 5

Finalised Marking Instructions

With Notations

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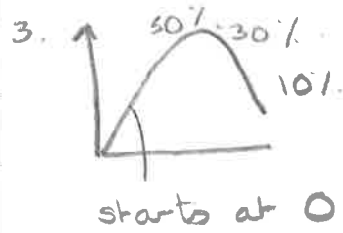


Marking Instructions for each question

Section 1

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

2. Biggest ↓ in mass
(shrink/lose water = plasmolysed)




8. Number in cell division
stays the same

10. Make sure read ALL the Q.

13. Heterozygous = different so Bb.

16. $60000000 \times (0.05)$
5% of 60000000
= 3000000



Section 2

Question		Expected Answer(s)	Max Mark	Additional Guidance
1.	(a)	Selectively permeable/ semi-permeable/ (contains) proteins/ (phospho)lipids/protein channels/ protein carriers	1	Not acceptable: porous/pores /protein gates.
	(b)	(i) Leaf cell: <ul style="list-style-type: none"> cell swells/becomes turgid (or suitable description of turgid) Red blood cell: <ul style="list-style-type: none"> cell swells/bursts /may burst 	1	Not acceptable: description of process of osmosis alone.
		(ii) 1. Diffusion/active transport 2. Definition: Diffusion – Movement of molecules/particles from a high to a low concentration. OR down the concentration gradient. Active Transport – Movement of molecules/ions from a low to a high concentration. OR against/up the concentration gradient.	1 1	To gain this mark the definition must relate to process chosen in part 1. ...across /through a selectively permeable membrane does not negate. Abbreviations of concentration eg conc. only acceptable if the full word is written at least once. Not acceptable: <ul style="list-style-type: none"> movement of ‘substances’ ‘with’ the concentration gradient ‘along’ the concentration gradient (but this would not negate a correct response). Extra wrong information negates.

Question			Expected Answer(s)	Max Mark	Additional Guidance
2.	(a)	(i)	degradation substrate (1) (1)	2	
		(ii)	Prediction - (All or some) lactose would not be removed from the milk /milk would contain lactose/it would not be lactose free (1) Explanation - Enzyme/lactase denatured OR enzyme/active site has changed shape/description of change of shape (1)	2	Not acceptable: might/may contain lactose/ milk will be the same/milk will be unchanged In the context of this particular question, enzyme destroyed/does not work will be acceptable Not acceptable: <ul style="list-style-type: none"> enzyme/active site has changed explanation including reference to above the optimum or above 37°C
	(b)		Speed up (chemical/biological/biochemical) reactions/allow reactions to occur at lower temperatures/lower the activation energy	1	..unchanged in process does not negate. Not acceptable: Control reactions Can break down/build up...
	(c)		Protein/amino acids	1	

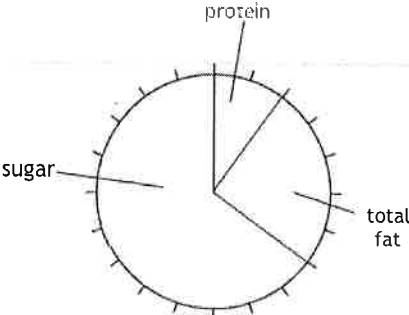
Question			Expected Answer(s)	Max Mark	Additional Guidance
3.	(a)	(i)	Plasmid	1	Not acceptable: DNA/chromosome
		(ii)	2	1	$\left. \begin{array}{l} 1000 \times 2 = 2000 \\ 2000 \times 2 = 4000 \end{array} \right\} = 2000$ <p style="text-align: right;">2 hours</p> $\left. \begin{array}{l} 4000 \times 2 \\ 8000 \times 2 \end{array} \right\} = 16000$
	(b)	(i)	To ensure there are no other microbes/bacteria (or equivalent) present OR to prevent/stop contamination /cross-contamination/growth of other cultures	1	Not acceptable: To ensure nothing affects the growth of bacteria.
		(ii)	Temperature/pH/ O ₂ or CO ₂ concentration/ nutrient or food levels	1	Additional wrong answer would negate eg light.

Question			Expected Answer(s)	Max Mark	Additional Guidance
4.	(a)	(i)	Requires/uses/needs a lot of energy/ATP AND for movement/contraction	1	Both parts required for mark. Not acceptable: <ul style="list-style-type: none"> requires energy for respiration
		(ii)	Carbon dioxide/Water/(38) ATP	1	Not acceptable: Incorrect number of ATP
	(b)		<u>Glucose</u> converted/broken down to pyruvate/pyruvic acid (1) Pyruvate/pyruvic acid converted to lactic acid (1) (2) ATP produced (1)	3	1 mark if glucose is original substrate and lactic acid is end product. The addition of CO ₂ negates. Arrows are acceptable in place of explanation. Any other number of ATP negates.

Question			Expected Answer(s)	Max Mark	Additional Guidance				
5.	(a)	(i)	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"><i>Type of blood vessel</i></td> <td rowspan="3" style="vertical-align: middle;">(1)</td> </tr> <tr> <td style="text-align: center;">vein</td> </tr> <tr> <td style="text-align: center;">artery</td> </tr> </table>	<i>Type of blood vessel</i>	(1)	vein	artery	2	Not acceptable: Specific name of vessel. <i>Structure of vessels needed</i>
		<i>Type of blood vessel</i>	(1)						
vein									
artery									
		(ii)	They have thinnest/thinner <u>wall</u> (s)	1	Answer must be comparative. Any reference to diameter of central channel negates a correct response.				
	(b)		Coronary artery/arteries	1					

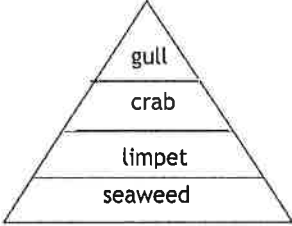
Question			Expected Answer(s)	Max Mark	Additional Guidance												
6.	(a)		<table border="1"> <thead> <tr> <th>Individual</th> <th>Possible Genotype(s)</th> <th>Phenotype</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Tt</td> <td></td> </tr> <tr> <td>B</td> <td></td> <td></td> </tr> <tr> <td>C</td> <td></td> <td>Hitchhiker's (thumb)</td> </tr> </tbody> </table>	Individual	Possible Genotype(s)	Phenotype	A	Tt		B			C		Hitchhiker's (thumb)	2	<p>(1)</p> <p>(1)</p> <p>90-25=65 65:25 ÷ 5 <u>13:5</u></p>
		Individual	Possible Genotype(s)	Phenotype													
		A	Tt														
		B															
C		Hitchhiker's (thumb)															
(b)	(i)	13:5	1														
		(ii)	Fertilisation is a random process OR Numbers in sample too small	1													

Question			Expected Answer(s)	Max Mark	Additional Guidance
7.	(a)	(i)	<p>Increase in humidity - decreases</p> <p>Increase in temperature - increases</p> <p>Increase in wind speed - increases</p>	1	Only one response required.
		(ii)	<p>humidity put the apparatus in a (transparent) bag /container</p> <p>temperature put a heater beside it/put in a water bath at a higher temperature</p> <p>wind speed use a fan/hairdryer on cool setting beside the apparatus</p>	1	<p>Accept alternative suitable description.</p> <p>Answer must be appropriate to the selected change.</p> <p>Not acceptable - move apparatus to warmer area/turn up heating/ add a thermometer</p> <p>If hairdryer must state that it is on cool setting.</p>
	(b)	(i)	P has a greater number of stomata/ Q has fewer stomata	1	<p>Answer must be comparative.</p> <p>Not acceptable: different number of stomata</p>
		(ii)	Guard (cells)	1	

Question		Expected Answer(s)	Max Mark	Additional Guidance
8	(a)	Medium (salt)	1	
	(b)		2	1 mark for divisions 1 mark for labels Mark for labels can be awarded if divisions are wrong but in correct proportions. Additional sections (labelled or not) = 0 marks
	(c) (i)	80	1	$5.6 \text{ g of } 7\text{g} \times 100 = 80$
	(ii)	8400	1	$\frac{630}{7.5} = 84 \times 100 = 8400$

Question		Expected Answer(s)	Max Mark	Additional Guidance
9.	(a)	They have receptors/receptor proteins AND these are specific/match this hormone.	1	Both parts required for mark. Any reference to active site/substrate negates.
	(b)	Endocrine	1	Named example not acceptable alone but would not negate the correct response, provided it is clearly stated as an example.
	(c)	Glucagon	1	

Question		Expected Answer(s)	Max Mark	Additional Guidance
10.	(a) (i)	Stickleback	1	
	(ii)	Perch	1	
	(b)	Heat/movement/ Undigested material/ faeces/excrement/fur/bones/hair	1	Not acceptable: Colloquial terms for faeces. Additional incorrect answer would negate eg ...and growth.

Question			Expected Answer(s)	Max Mark	Additional Guidance
11.	(a)	(i)	30 $\frac{33000}{1100} = \underline{\underline{30}}$	1	Accept correct answer if not written in table (units not required).
		(ii)		1	The addition of correct values would not negate.
	(b)	(i)	<p>Flat (periwinkle)</p> <p>Don't live on/occupy the same position on the shore/ live on different/separate parts of the shore/small live at high tide and flat live at low tide/one lives at low tide and one at high tide</p>	1	<p>Not acceptable:</p> <ul style="list-style-type: none"> • don't live in the same place • they are further or furthest apart/away from each other
		(ii)	They are different species/they are not the same species/more than one species are competing	1	The addition of information about resources it must be 'similar'.

15 → 5 over 5 years
 10 over 5 years

$$\frac{10}{5} = \underline{\underline{2}}$$

Question			Expected Answer(s)	Max Mark	Additional Guidance
12.	(a)	(i)	2	1	
		(ii)	Increased competition from Meadow grass or appropriate description of the increased competition; eg less space for Ragwort to grow	1	Not acceptable: <ul style="list-style-type: none"> Meadow grass is increasing/overgrown/dominant (with no mention or description of competition) NO space for Ragwort to grow
	(b)		Sampling Technique: Pitfall trap (1) Source of error: (1) Traps left too long/not checked regularly Too high above soil surface/too low below soil surface/not level with soil surface Not camouflaged Too shallow No drainage holes	2	Not acceptable: <ul style="list-style-type: none"> use of the term 'lid' as it implies it seals the container description of how to minimise an error If additional explanation given it must match the error. If wrong technique given eg quadrat, the second mark could be awarded for correct source of error for quadrat. If technique left blank or incorrectly named eg trap then the correct error can still be awarded mark.
	(c)		<u>Go to 3</u> (1) Buttercup (1) Pink Campion (1)	3	

Question			Expected Answer(s)	Max Mark	Additional Guidance
13.	(a)		Mutation	1	
	(b)	(i)	Different numbers released/ marked/ captured OR to compare results	1	Not acceptable: different numbers recaptured.
		(ii)	Fewer were eaten (by predators/birds)/ better camouflaged so not eaten/ camouflaged from predators/birds less likely to be eaten/ seen by predators or birds/ more dark moths eaten by predators or birds	1	Must have reference to being eaten or predators/birds. Must be comparative.
		(iii)	Natural selection/ survival of the fittest	1	'Evolution' not acceptable

Question			Expected Answer(s)	Max Mark	Additional Guidance
14.	(a)	(i)	When predators are present (the number of red spider) mites decrease / there are more (red spider) mites when there is no predator OR converse	1	Additional correct information would not negate.
		(ii)	To allow it to be compared to the one with the predator/ to compare the number of (red spider) mites with and without the predator/ to show any difference is due to the predator	1	Not acceptable: for comparison.
	(b)		<u>Biological control</u>	1	Additional words negate.

[END OF MARKING INSTRUCTIONS]



National
Qualifications
2015

2015 Biology

National 5

Finalised Marking Instructions

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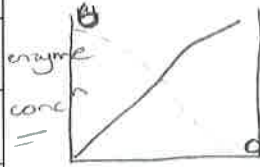
Detailed Marking Instructions for each question

Section 1

1. HIGH → LOW

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

DOES NOT



Substrate Concⁿ

Be careful when reading scales
enzyme = left
substrate = right

50% of 6 = 3

Takes 4 days

8. homozygous = SAME
heterozygous = DIFFERENT



13 DO NOT TEACH BIOMES ANYMORE } 2017

14. $Pop^n = \frac{40 \times 35}{14} = 100$

18. 1975 = 4000
2000 = 6000 ↓ Increase of 2000
6000 + 2000 = 8000

19. 5 → 20

Difference = 15

$\% \uparrow = \frac{\text{Difference}}{\text{original}} \times 100$

$= \frac{15}{5} \times 100 = \underline{300}$

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 $54 \rightarrow 67.5 = 13.5$ $\frac{13.5}{54} \times 100 = \underline{\underline{25}}$	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 <i>38 ATP for each</i> <i>so 114 % 38 = 3</i>	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.

Question		Expected Answer(s)	Max Mark	Additional Guidance											
6.	(a)	Electrical impulse/electrical message/electrical signal	1												
	(b)	<p>J = Sensory (neuron) - carries/sends message/impulse/signal from sense organ → relay neuron/CNS/spinal cord</p> <p>K = Motor (neuron) - carries/sends message/impulse/signal from CNS/Relay neuron/spinal cord → muscle/organ/effector</p> <p>L = Relay (neuron) - carries/sends message/impulse/signal from sensory → motor neuron/within CNS</p> $\frac{90}{0.9} = \frac{100}{50}$	2	<p>1 mark for correct name and</p> <p>1 mark for origin → destination.</p> <p>Brain is not an acceptable alternative to CNS.</p> <p>If no named neuron, award function mark based on the box ticked.</p> <p>If no box/wrong box ticked, award function mark based on name given.</p> <p>Accept intermediate/inter instead of relay neuron.</p>											
	(c)	0.01 $\frac{1}{100} = 0.01$	1												
7.	(a)	(i) Jon is heterozygous/Hh/has both alleles/both forms of the genes AND is hearing	1	<p>'Both genes'/'copies of genes' is not acceptable</p> <p>Both parts needed</p>											
		(ii)	2	<p>One mark per column.</p> <p>Gender not necessary but incorrect gender negates.</p> <p>Accept equivalent description of phenotype eg. deaf etc.</p>											
		<table border="1"> <thead> <tr> <th>Individual</th> <th>Genotype</th> <th>Phenotype</th> </tr> </thead> <tbody> <tr> <td>Paul</td> <td>hh</td> <td>non-hearing</td> </tr> <tr> <td>Lyall</td> <td>Hh</td> <td>hearing</td> </tr> </tbody> </table>	Individual	Genotype	Phenotype	Paul	hh	non-hearing	Lyall	Hh	hearing				
Individual	Genotype	Phenotype													
Paul	hh	non-hearing													
Lyall	Hh	hearing													
		(iii) 3 in 4/75% $F_{\text{ora}} = \underline{\underline{Hh}}$ <table border="1"> <tr> <td>H</td> <td>h</td> <td></td> </tr> <tr> <td>H</td> <td>Hh</td> <td rowspan="2">3 in 4 or <u>75%</u></td> </tr> <tr> <td>h</td> <td>Hh</td> </tr> <tr> <td>h</td> <td>hh</td> <td></td> </tr> </table>	H	h		H	Hh	3 in 4 or <u>75%</u>	h	Hh	h	hh		1	<p>3:1 is unacceptable but does not negate an otherwise correct answer.</p> <p>75 is unacceptable (must have % symbol).</p>
H	h														
H	Hh	3 in 4 or <u>75%</u>													
h	Hh														
h	hh														
	(b)	Polygenic	1												

Question			Expected Answer(s)	Max	Additional Guidance
8.	(a)	(i)	Both scale and axis label completed correctly (1) Points plotted correctly and joined (1) <i>use graph & line drawn to</i>	2	At least half of the grid must be used. Do not penalise for extrapolation all the way to 35°C.
		(ii)	1300 <i>predict value *</i>	1	
	(b)		Water moves into/enters/is absorbed by <u>root hairs</u> 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.	

N CYCLE.

DO NOT

TEACH NOW

2017 *

Question		Expected Answer(s)	Max Mark	Additional Guidance							
10.	(a)	<table border="1"> <thead> <tr> <th>Stage</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td></td> <td>3, 4 or both</td> </tr> <tr> <td></td> <td>8</td> </tr> </tbody> </table>	Stage	Number		3, 4 or both		8	1 1	2	
	Stage	Number									
		3, 4 or both									
	8										
(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 <u>As Highest Bacteria</u>	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 $32 + 34 + 35 + 44 + 35$ <u>5 = 36</u>	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 $\frac{13}{20} \times 100 = \underline{65\%}$	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)	<ul style="list-style-type: none"> (Allows the species) to evolve/adapt in response to changing environmental conditions 	1	Both parts required.

[END OF MARKING INSTRUCTIONS]



National
Qualifications
2014

2014 Biology

National 5

Finalised Marking Instructions

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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

9. Got to remember to include length of egg laying period.

18.
DO NOT TEACH N CYCLE
2017 *

Reliability = Repeat

20 : 90 = 4.5
20 : 1 = 4.5

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 OR 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' OR HWC / LWC
(c)	0.9	1	10 → 64 over 60 mins
(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	$\frac{54}{60} = \underline{\underline{0.9}}$

Question			Expected Answer(s)	Max Mark	Additional Guidance
3.	(a)	(i)	Hydrogen peroxide	1	Accept H ₂ O ₂
		(ii)	Numbers (in each group) different OR 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 negatives 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	3	Not Acceptable - cells have thin walls/villus is one cell thick Acceptable - Villus wall is one cell thick Any 2 from 3
			<ul style="list-style-type: none"> • There are a large number of villi • So this also increases surface area/creates a large surface area OR makes absorption/ diffusion fast(er)/more 1		Both parts needed (If candidate includes information about any other biological system, then maximum mark available is 2)

Question		Expected Answer(s)		Max Mark	Additional Guidance	
5.	(a)	<i>Statement</i>	<i>Stage 1</i>	<i>Stage 2</i>	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	

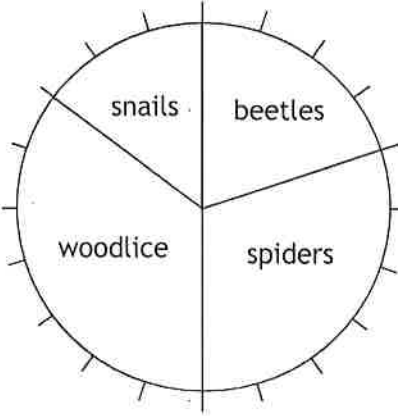
Question	Expected Answer(s)	Max Mark	Additional Guidance
6. (a)	C A B F E D	1	
(b)	<p>Sperm</p> <p>F reproduction/ fertilisation (or correct description)</p> <p>E tail to swim/mitochondria for energy/haploid to allow fusion at fertilisation producing a diploid zygote</p> <p>Egg cell</p> <p>F reproduction/ 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>Red blood cell</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 nd stage of respiration
(b) (i)	Glucose	1	
(ii)	ADP + Phosphate/Pi/ PO ₄ → 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' $\frac{90}{360} \times 100 = 25\%$ $360 - 90 = 270$ dark $\frac{270}{360} \times 100 = 75\%$
(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"> • Made of protein • <u>Chemical</u> messengers • Specific for some (target) tissues • Shaped to fit receptors • Released or produced by endocrine glands/ system • Carried in blood • Can have a long term effect 	2	1 mark for each feature

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

Question	Expected Answer(s)	Max Mark	Additional Guidance														
10. (a) (i)	<ul style="list-style-type: none"> (The general trend is) as the distance increases, numbers/population/lugworms increases up to 12 metres 1 After that, numbers/population remains steady/stays the same 1 	2	<p>Must mention change point at 12 metres for both marks For example 'numbers increase then levels off' = 1 mark</p> <p>If the candidate accurately describes the pattern from 1m to 4m that is acceptable, but wrongly described will forfeit 1 mark.</p>														
(a) (ii)	3	1	$\begin{matrix} 11 = 27 \\ 7 = 9 \end{matrix} \left. \vphantom{\begin{matrix} 11 = 27 \\ 7 = 9 \end{matrix}} \right\} \text{Difference} = 18 \quad (3 \times)$														
(b) (i)	<table border="1"> <thead> <tr> <th rowspan="2">Predator</th> <th colspan="2">Type of Competition</th> </tr> <tr> <th>Intraspecific</th> <th>Interspecific</th> </tr> </thead> <tbody> <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> </tbody> </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		✓															
(b) (ii)	16.5 kJ (Third box down from the top)	1	$10\% \text{ of } 165 = 16.5 \text{ kJ}$														

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

Each segment = 5

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

[END OF MARKING INSTRUCTIONS]



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SPECIMEN ONLY

S807/75/01

Biology

Marking Instructions

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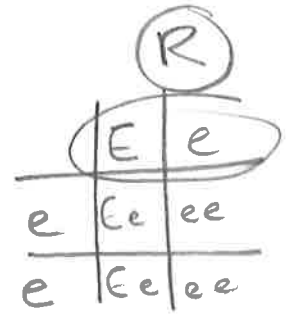
Marking instructions for each question

Section 1

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

2. Strong Salt Soln
means they will lose water
= Plasmolysed

5. $95 : 5$
 $19 : 1$ $\downarrow \div 5$



R = Ee

S = ee (recessive
homozygous)

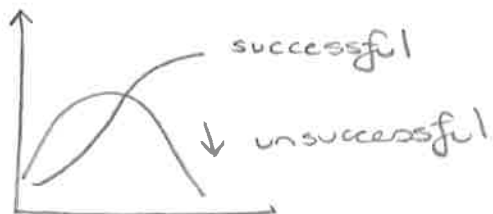
Reliability = Repeat

2 = 45
45 = 90

% ↑ = $\frac{\text{difference}}{\text{original}} \times 100$

$\frac{45}{45} \times 100$
= 100%

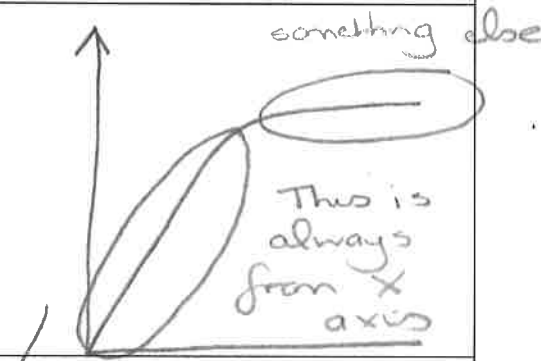
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Section 2

Question			Expected response	Max mark	Additional guidance
1.	(a)		Y	1	
	(b)		Large number of mitochondria present	1	
	(c)		Chloroplasts present 1	2	
			Contain chlorophyll/green pigment/are green 1		
2.	(a)	(i)	From cell of alveolus wall to cell of capillary wall to red blood cell	1	
		(ii)	(Oxygen) moves from a higher concentration to a lower concentration or down a concentration gradient	1	
	(b)		There is no concentration gradient/difference in concentration/concentration equal in all cells	1	
3.	(a)	(i)	mRNA/messenger RNA	1	
		(ii)	Bases 1	2	
			C 1		
	(b)		Gene	1	
	(c)		Different sequence/order of bases	1	
4.	(a)	(i)	Arginine	1	
		(ii)	Lysine	1	
		(iii)	Serine	1	
	(b)		1:3	1	$1.8 : 5.4 \div 1.8$ <u>1 : 3</u>
	(c)		Appropriate scale - must have 0, 6.4, 7 or 8 and at least one other number in between 1	2	
			Bars correctly plotted with clear bar tops 1		
5.	(a)		Carbon dioxide	1	
	(b)		pH 5 1	2	
			Highest (average) number of bubbles (for most groups) 1		Not acceptable - reference to individual results
	(c)		All flasks at same pH 1	2	
			Yeast – different types of yeast in each flask 1		
			OR		
			Temperature – different temperatures 1		
			OR		
			Glucose – different glucose concentrations used 1		

Question		Expected response	Max mark	Additional guidance																
6.	(a)	B A C E (D)	1	All required to be correct																
	(b)	(Pairs of) chromatids/chromosomes line up at equator/centre (of the cell)	1	Must have reference to what lines up and where																
	(c)	To maintain the (diploid) chromosome complement/so no genetic information is lost/so the daughter/new cells contain the same genetic information as the original cell	1	Not acceptable - so no information is lost <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <table style="border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding: 2px 5px;">0</td> <td style="padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">2</td> <td style="padding: 2px 5px;">3</td> <td style="padding: 2px 5px;">4</td> <td style="padding: 2px 5px;">5</td> <td style="padding: 2px 5px;">6</td> <td style="border-left: 1px solid black; padding: 2px 5px;">7</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 2px 5px;">1</td> <td style="padding: 2px 5px;">2</td> <td style="padding: 2px 5px;">4</td> <td style="padding: 2px 5px;">8</td> <td style="padding: 2px 5px;">16</td> <td style="padding: 2px 5px;">32</td> <td style="padding: 2px 5px;">64</td> <td style="border-left: 1px solid black; padding: 2px 5px;">128</td> </tr> </table> </div>	0	1	2	3	4	5	6	7	1	2	4	8	16	32	64	128
0	1	2	3	4	5	6	7													
1	2	4	8	16	32	64	128													
	(d)	7	1																	
7.	(a)	(i)	1																	
		(ii)	1	Any one difference Must be comparative between hormone and nerve																
	(b)	(i)	1	Both parts needed																
		(ii)	1																	
		(iii)	1																	
8.	(a)	Heterozygous	1																	
	(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>H</td> <td>h</td> </tr> <tr> <td>H</td> <td>HH</td> <td>Hh</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> </table>		H	h	H	HH	Hh	h	Hh	hh	1	All parts correct							
	H	h																		
H	HH	Hh																		
h	Hh	hh																		
	(c)	HH and Hh	1	Both needed *																
9.	(a)	To prevent water evaporating/being lost from the soil (which will affect the weight/mass)	1	$240.5 \rightarrow 232.04$ $= 8.46 \quad \frac{8.46}{6} = 1.41$																
	(b)	1.41	1																	
	(c)	Exactly the same set up but without the plant	1																	
	(d)	Decrease	1																	
	(e)	Stomata/stoma	1																	

Question		Expected response	Max mark	Additional guidance								
10.	(a)	Choose any two of arteries, veins and capillaries Comparison of: Thickness of walls Muscularity of walls Presence and absence of valves Size of channel for blood flow	3	Any three correct statements from four, comparing chosen blood vessels Must refer to structural differences								
	(b)	Carries oxygen	1									
11.	(a)	(i)	1									
		(ii)	1									
	(b)	Niche	1									
	(c)	(3)-1-5-4-2	1	All required to be correct								
	(d)	All the organisms living in a particular area and the non-living components (with which they interact)	1									
12.	(a)	(i)	1									
		(ii)	3									
		Light energy is trapped by chlorophyll 1 Light energy/it is converted into chemical energy in ATP 1 (Energy stored in sugar can be used for) respiration/converted into cellulose or starch or any other correctly named substance/protein synthesis or cell division or any other named plant process 1										
	(b)	Light intensity 1 Carbon dioxide concentration 1	2									
13.	(a)	To find out if drinking beetroot/nitrate-rich juice affects sprint and decision making performance	1	Both parts needed								
	(b)	(sprint and decision making) performance	1									
	(c)	<table border="1"> <thead> <tr> <th><i>Sprint test/Activities</i></th> <th><i>Time/Timing (seconds)</i></th> </tr> </thead> <tbody> <tr> <td>Sprint</td> <td>10</td> </tr> <tr> <td>Slow pedalling</td> <td>80</td> </tr> <tr> <td>Rest</td> <td>30</td> </tr> </tbody> </table> Suitable headings with appropriate units 1 All information given in columns of table 1	<i>Sprint test/Activities</i>	<i>Time/Timing (seconds)</i>	Sprint	10	Slow pedalling	80	Rest	30	2	Need Headings + <u>units</u>
<i>Sprint test/Activities</i>	<i>Time/Timing (seconds)</i>											
Sprint	10											
Slow pedalling	80											
Rest	30											

Question		Expected response	Max mark	Additional guidance
13.	(d)	Drinking nitrate-rich (beetroot) juice gives an (3.5%) improvement in sprint performance and an (3%) increase in their speed of making decisions	1	
	(e)	Only used males/too small a sample/ only tested on people involved in two sports	1	
14.	(a)	L	1	
	(b)	Shows the total available energy of the living organisms/population at each stage/level in a food chain	1	
	(c)	Heat/movement/undigested material	1	
15.	(a)	Initial populations all had different starting sizes	1	300 million $\frac{12.9}{300} \times 100$
	(b)	4.3	1	12.9 = 4.3
	(c)	Starling and yellow wagtail	1	Both needed
16.	(a)	(As you move from sample site 1 to sample site 5,) the abundance of Yellow Iris increases/it increases	1	
	(b)	Soil moisture	1	
	(c)	Wipe / dry the probe between samples OR Probe at the same depth each time	1	
17.	(a)	Long and thin 1 Egg wrack 1 Bladder wrack 1	3	
	(b)	Egg wrack has bladders present along its length whereas Bladder wrack's (bladders) are in pairs	1	Comparison needed
	(c)	Brown or no bladders	1	

[END OF SPECIMEN MARKING INSTRUCTIONS]

