Biology A (Salters-Nuffield) Advanced Subsidiary Paper 1 (8BN0/02)

Question Number	Answer	Additional Guidance	Mark
1(a)	B (ribosomes, centrioles, amyloplasts)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
1(b)(i)	• correct measurement of diameter of nucleus divided by magnification (1) • conversion of units to micrometres (1)	<u>Example of calculation</u> {4.0- 4.3cm / 40- 43mm } divided by 6000 6.66 – 7.71 (µm) Allow full marks for correct answer with no working out	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
1(b)(ii)	A description that makes reference to the following: • double membrane / envelope (1) • nuclear pores (1) • nucleolus (1)		**(3)**

(Total for Question 1 = 6 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
2(a)(i)	C (haemophilia)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
2(a)(ii)	An explanation that makes reference to the following: • colour blindness caused by a recessive allele on the X chromosome (1) • males only need one recessive allele and females need two recessive alleles to be colour blind (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
2(b)	• genetic diagram to show that males can only inherit one of the fur colour alleles (1) An explanation that makes reference to the following: • tortoiseshell cats must have alleles for black and for orange fur (1) • males can only inherit one allele – either black or orange (1)	Accept appropriate symbols for the fur colour alleles as long as they are associated with the relevant sex chromosome Example of suitable diagram $\begin{array}{\|c\|c\|c\|}\hline & X^B & Y \\ \hline X^B & X^B X^B & X^B Y \\ \hline X^b & X^B X^b & X^b Y \\ \hline\end{array}$	**(3)**

(Total for Question 2 = 6 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
3(a)	An answer that makes reference to: collection of different tissues working together to carry out one or more functions		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
3(b)(i)	• correct readings from x axis (1) • correct answer using appropriate units (au min^{-1}) (1)	<u>Example of calculation</u> 52-25 = 27 27 ÷ 13 = 2.1 au min^{-1}	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
3(b)(ii)	• correct description of route taken by labelled amino acids from rER to Golgi apparatus to secretory vesicles (1) An explanation that makes reference to three of the following: • amino acids incorporated into { polypeptides / proteins } on the rER (1) • proteins transferred from rER to Golgi apparatus in (transport) vesicles (1) • proteins modified inside the Golgi apparatus (1) • packaged into secretory vesicles by the Golgi apparatus (1)		**(4)**

(Total for Question 3 = 7 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
4(a)(i)	B (anatomical and physiological)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(a)(ii)	A description that makes reference to the following: • using tissues or animals (1) • testing different concentrations (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(b)(i)	C (they belong to the same genus)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
4(b)(ii)	An answer that makes reference to the following: • chemical stimulus from the tomato hornworm's saliva activates a gene (1) • gene for enzyme inhibitor is activated (1) • transcription of this gene to produce mRNA (1) • mRNA translated (on ribosome) to produce the enzyme inhibitor (1)		**(4)**

(Total for Question 4 = 8 marks)

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	C (0.32)	<u>Example of calculation</u> 286÷900 =0.32	**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(a)(ii)	• population R (1) A justification that makes reference to one of the following: • the lowest heterozygosity (1) • high number of homozygous recessives (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(b)(i)	An explanation that makes reference to two of the following: • occupies a different habitat (1) • occupies a different niche (1) • feeds on{ smaller prey / different animals} (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
5(b)(ii)	An answer that makes reference to the following: • increase population size (1) Plus any four from: • use of { IVF / surrogates } (1) • use of stud books to { prevent inbreeding / encourage outbreeding } (1) • increase { heterozygosity /genetic diversity } (1) • (greater genetic diversity) increases chance of survival (1) • low genetic diversity may not be an issue as species has survived for 50 000 years (1) • enables survival of species if they become extinct in the wild (1)		**(5)**

(Total for Question 5 = 10 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
6(a)	A description that makes reference to the following: • communicating theory to scientific community (1) • peer review (1) • checking of evidence to ensure its validity (1)	Allow reference to scientific journals and conferences	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(b)(i)	B (Bacteria, Archaea, Eukaryota)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
6(b)(ii)	A description that makes reference to three of the following: • sequence of bases in { DNA / RNA } (1) • sequence of amino acids in { proteins / enzymes} (1) • structure of { cell membrane / cell wall} (1) • size of ribosomes (1)		**(3)**

(Total for Question 6 = 7 marks)

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	A (100)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
7(a)(ii)	• identifying correct total mean number of xylem vessels plus mean number of sclerenchyma fibres (1) • correct calculation of percentage (1)	<u>Example of calculation</u> 126 ÷ 131 = 0.96 96% Allow full marks for correct answer with no working	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
7(a)(iii)	An answer that makes reference to the following: • wider fibres have greater strength (1) • shorter fibres have greater strength (1) • the fibre 150 μm is anomalous (1) • stronger fibres have greater proportion of { tissue high in lignin / sclerenchyma fibres } (1)		**(4)**

<table>
<tr><th>Question Number</th><th colspan="2">Indicative content</th></tr>
<tr><td>*7(b)</td><td colspan="2">Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme.

The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant.

• suitable range and number of fibres selected for testing
• fibres of same length and width
• use of microscope to assess proportion of different tissue types within fibres
• environmental variables controlled { temperature / humidity }
• force applied to fibres until they break
• tensile strength calculated by dividing force applied by the
• cross sectional area</td></tr>
<tr><td>Level</td><td>Mark</td><td>Descriptor</td></tr>
<tr><td></td><td>0</td><td>No awardable content</td></tr>
<tr><td>Level 1</td><td>1-2</td><td>A description of the investigation may be attempted but with limited analysis, interpretation and/or evaluation of the scientific information. Generalised comments made.

The description will contain basic information with some attempt made to link knowledge and understanding to the given context.</td></tr>
<tr><td>Level 2</td><td>3-4</td><td>A description of the investigation will be given with occasional evidence of analysis, interpretation and/or evaluation of the scientific information.

The description shows some linkages and lines of scientific reasoning with some structure.</td></tr>
<tr><td>Level 3</td><td>5-6</td><td>A description of the investigation is given which is supported throughout by evidence from the analysis, interpretation and/or evaluation of the scientific information.

The description shows a well-developed and sustained line of scientific reasoning which is clear, coherent and logically structured.</td></tr>
</table>

(Total for Question 7 = 12 marks)

Question Number	Answer	Additional Guidance	Mark
8(a)(i)	D (nucleus with half the number of chromosomes as a somatic cell)		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)(ii)	A description that makes reference to the following: • exchange of alleles (1) • between non-sister chromatids (1)	Allow 'between chromatids'	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(a)(iii)	An explanation that makes reference to the following: • random arrangement of chromosomes (1) • maternal and paternal chromosomes / chromosomes from homologous pairs (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(i)	• select correct points from graph (1) • calculate correct percentage decrease (1)	<u>Example of calculation</u> (74-56) ÷ 74 24% / 24.32% / 24.3% less	**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(b)(ii)	An answer that makes reference to the following: • fertilisation unaffected when eggs were pre-treated (1) • fertilisation decreases when sperm are pre-treated (1) • no evidence that it is the acrosome reaction that is affected (1) • anandamide could be affecting { mitochondria / flagella } (1)		**(4)**

Question Number	Acceptable Answer	Additional Guidance	Mark
8(c)	An answer that makes reference to the following: • **Similarities (2)** - both involve vesicles (1) - both involve release of {chemicals / enzymes } by exocytosis (1) • **Difference (1)** - acrosome reaction causes digestion of zona pellucida, cortical reaction causes thickening of zona pellucida (1)	Allow description of exocytosis	**(3)**

(Total for Question 8 = 14 marks)

Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(i)	An answer that makes reference to: { position / location } on a chromosome		**(1)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(a)(ii)	An explanation that makes reference to the following: • {genes at different loci / several genes } affect fur colour (1) • cumulative effect of alleles affect the darkness of the fur (1)		**(2)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(b)	An explanation that makes reference to the following: • lower temperatures allowed expression of the C gene (1) • dark colour fur produced all over the body of the baby rabbit (1) • in the adult rabbit only { ears / tail / extremities } lower than 35°C (1)		**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
9(c)	An explanation that makes reference to the following: • have same { genotype / same DNA base sequence } but different phenotypes (1) • epigenetics involves modifications to { DNA / genes / histones } (1) • { dietary supplement / environmental factor } involved in affecting expression of genes in offspring (1)		**(3)**

(Total for Question 9 = 9 marks)