

Cell Structure, Reproduction and Development - Mark Scheme

Q1.

Question number	Answer	Mark
(a)	<ul style="list-style-type: none"> {restricted / native} to a particular area 	(1)

Question number	Answer	Additional guidance	Mark
(b)(i)	<ul style="list-style-type: none"> subtraction (1) percentage (1) <p>Example of calculation: $5\,500 - 3\,000 / 2\,500$ $(2\,500 \div 5\,500) \times 100 = 45.45$</p>	Accept 45.5 and 45	(2)

Question number	Answer	Mark
(b)(ii)	<p>An explanation that includes three of the following points:</p> <ul style="list-style-type: none"> because of habitat destruction there is no food (1) because of habitat destruction there is no shelter (1) fragmentation of habitat makes it harder to find a mate (1) therefore, there is a decrease in genetic diversity (1) 	(3)

Question number	Answer	Mark
(c)(i)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> sperm observed under a microscope to assess {motility / ability to swim in a straight line} (1) use of {stains / microscope} to observe the integrity of the acrosome (1) comparisons need to be made to freshly collected sperm so that effects can be calculated (1) 	(3)

Question number	Answer	Mark
(c)(ii)	<p>An explanation that includes any four of the following points:</p> <ul style="list-style-type: none"> • because sperm can be frozen from different males to increase genetic diversity (1) • because frozen sperm will always be available if numbers of Baird's tapir decrease too far (1) • can freeze sperm so that they are available when females come in to season (1) • freezing could reduce the number of successful fertilisations because of poor viability (1) • more sperm would need to be used as viability is low, reducing stocks (1) 	(4)

Q2.

Question number	Answer	Mark
(a)(i)	<ul style="list-style-type: none"> • Archaea 	(1)

Question number	Answer	Mark
(a)(ii)	<p>A diagram that includes any three of the following structures:</p> <ul style="list-style-type: none"> • circular DNA (1) • plasmid (1) • (70S) ribosomes (1) • membrane (1) • flagellum (1) • pili (1) • capsule (1) 	(3)

Question number	Answer	Mark
(b)	<p>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.</p> <p>The indicative content below is not prescriptive and candidates are not required to include all the material indicated as relevant. Additional content included in the response must be scientific and relevant.</p> <p>Indicative content</p> <ul style="list-style-type: none"> • numbers of bacteria increase along the digestive system • <i>Veillonella</i> can tolerate only low pHs • <i>Streptococcus</i> found in pH 6 - 8 with reasonably high oxygen content • <i>Streptococcus</i> requires oxygen for aerobic respiration • <i>Enterobacterium</i> can tolerate low oxygen concentrations • <i>Enterobacterium</i> requires less ATP or can respire anaerobically • pH affects enzyme activity • pH affects the ionisation of R groups • small change in pH drastically affects enzyme activity 	(6)

Level	Marks	Descriptor
	0	No awardable content.
1	1-2	<p>An explanation may be attempted but with limited interpretation or analysis of the scientific information and with a focus on mainly just one piece of scientific information.</p> <p>The explanation will contain basic information, with some attempt made to link knowledge and understanding to the given context.</p>
2	3-4	<p>An explanation will be given, with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows some linkages and lines of scientific reasoning with some structure.</p>
3	5-6	<p>An explanation is made that is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information.</p> <p>The explanation shows a well-developed and sustained line of scientific reasoning, which is clear and logically structured.</p>

Q3.

Question number	Answer	Mark
(a)	<ul style="list-style-type: none"> {expressed / observable} characteristics 	(1)

Question number	Answer	Mark
(b)(i)	<ul style="list-style-type: none"> genotype 	(1)

Question number	Answer	Mark
(b)(ii)	B 1, 4	(1)

Question number	Answer	Mark
(c)(i)	B bar chart, histogram	(1)

Question number	Answer	Mark
(c)(ii)	<ul style="list-style-type: none"> calculation of one correct difference (1) or mean height for male and female calculated <p>Example of calculation: $3.2 \div 2.2 = 1.5$ $3.2 \div 2.6 = 1.2$ $4.0 \div 2.2 = 1.8$ $4.0 \div 2.6 = 1.5$ 3.6 and 2.4</p> <ul style="list-style-type: none"> range of difference given 1.2 – 1.8 (1) 	(2)

Q4.

Question number	Answer	Mark
(a)	C they can produce some types of cell	(1)

Question number	Answer	Mark
(b)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> ribosomes involved in translation resulting in two different polypeptides (1) endoplasmic reticulum involved in folding each polypeptide into tertiary structure (1) endoplasmic reticulum involved in transporting each polypeptide (1) 	(3)

Question number	Answer	Mark
(c)(i)	<p>A description that includes the following points:</p> <ul style="list-style-type: none"> • α polypeptide increases to maximum by 6 months before birth and then stays constant (1) • β polypeptide rises slowly during pregnancy but then increases rapidly after birth (1) • γ polypeptide increases to maximum by 6 months before birth and then drops rapidly after birth (1) 	(3)

Question number	Answer	Additional guidance	Mark
(c)(ii)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • gene for α polypeptide remains switched on as this polypeptide is present both before and after birth (1) • gene for γ polypeptide is switched off at birth so levels fall (1) • gene for β polypeptide switched on during pregnancy so levels rise (1) • credit given for an epigenetic mechanism that switches {on / off} gene expression (1) 	<p>For example, {DNA / histone} methylation switches off {genes / gene for γ polypeptide} or transcription factors switch on {genes / gene for β polypeptide}</p>	(4)

Q5.

Question number	Answer	Mark
(a)	A J	(1)

Question number	Answer	Additional guidance	Mark
(b)	<p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> • because this structure is very small (1) • and only an electron microscope has the ability to magnify this much (1) 	Accept converse statement	(2)

Question number	Answer	Mark
(c)	An explanation that includes the following points: <ul style="list-style-type: none"> • because the two membranes are very close together (1) • and the resolution of this microscope is not high enough (1) 	(2)

Question number	Answer	Mark
(d)(i)	An explanation that includes the following points: <ul style="list-style-type: none"> • mitosis results in two cells that each have a nucleus (1) • each bud contains a full set of chromosomes (1) • so the buds are genetically identical to the parent yeast cell (1) 	(3)

Question number	Answer	Mark
(d)(ii)	An answer that includes the following points: <ul style="list-style-type: none"> • because new cell structures need to be made in order for the bud to grow (1) • therefore oxygen is needed to produce the ATP (1) • therefore {glucose is needed to produce the ATP / amino acids are needed to make proteins} (1) 	(3)