

# Characteristics and Classification of Living Organisms

## Mark Scheme 4

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Characteristics and Classification of Living Organisms
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 4

**Time Allowed:** 68 minutes

**Score:** /56

**Percentage:** /100

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1 (a) (i)	hair / fur / whiskers ; external ears / pinna(e) ; nose / snout ;	max [1]																									
(ii)	<table><tr><td>go to 2</td><td></td></tr><tr><td>go to 3</td><td></td></tr><tr><td>go to 4</td><td></td></tr><tr><td>go to 5</td><td></td></tr><tr><td><i>Phascolarctos cinereus</i></td><td><b>C</b></td></tr><tr><td><i>Vombatus ursinus</i></td><td><b>B</b></td></tr><tr><td><i>Sminthopsis longicaudata</i></td><td><b>A</b></td></tr><tr><td><i>Macropus rufus</i></td><td><b>D</b></td></tr><tr><td><i>Paljara tirarensis</i></td><td><b>F</b></td></tr><tr><td>go to 6</td><td></td></tr><tr><td><i>Sarcophilus harrisii</i></td><td><b>E</b></td></tr><tr><td><i>Dasyurus maculatus</i></td><td><b>G</b></td></tr></table>	go to 2		go to 3		go to 4		go to 5		<i>Phascolarctos cinereus</i>	<b>C</b>	<i>Vombatus ursinus</i>	<b>B</b>	<i>Sminthopsis longicaudata</i>	<b>A</b>	<i>Macropus rufus</i>	<b>D</b>	<i>Paljara tirarensis</i>	<b>F</b>	go to 6		<i>Sarcophilus harrisii</i>	<b>E</b>	<i>Dasyurus maculatus</i>	<b>G</b>	[3]	5 or 6 correct = 3 3 or 4 correct = 2 1 or 2 correct = 1
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<b>(b) (i)</b>	meiosis ;	[1]	
<b>(ii)</b>	maintains/increases, population ; allows variation ; <b>ora</b> adaptation to, new/changed, environment(s) ; natural selection/evolution/formation of new species ; AVP ; e.g. two parents contribute to survival of offspring e.g. allows expression of recessive, alleles/traits/genes	[3]	<b>ignore</b> survival unqualified
<b>(c)</b>	gas exchange/named example with direction ; transfer of (dissolved) nutrients, from maternal (circulation) / to fetal ; transfer of excretory products, from fetal/to maternal ; by diffusion ; produces/secretes, (named) hormone ; passive immunity/antibodies, from maternal/to fetal ; prevents/limits, mixing of blood ; ref to regulating blood pressure ; AVP ; e.g. maternal/fetal <u>attachment</u> point e.g. <i>ref to</i> counter current flow/maintains concentration gradient e.g. hormone function describ	max [4]	<b>ignore</b> food/nutrition for nutrients <b>A</b> glucose/amino acids/ions/water <b>A</b> urea/(nitrogenous) waste  <b>A</b> progesterone/oestrogen/HCG/HPL/HCS
<b>(ii)</b>	protection from (mechanical) shock (of fetus) ; maintains (constant) temperature (of fetus) ; allows movement (of fetus) ; prevents dehydration ; AVP ;	max [2]	
		<b>[Total: 14]</b>	

Question	E answers	Mark	Additional Guidance
2 (a)	unsegmented ; <b>A</b> no segments soft bodies ; (muscular) foot ; <b>ignore</b> feet mantle ; visceral mass ; AVP ;	[max 2]	<b>ignore</b> no (exo)skeleton no backbone no bones radula bilaterally symmetrical shell / exoskeleton
(b)	(8) legs / tentacles / arms / limbs / ; (large) eye ; has a head ; no shell / (completely) soft body / no exoskeleton / no external skeleton ; suckers (on tentacles) ;	[max 2]	<b>R</b> any internal features (see the question) <b>R</b> feelers / hands <b>ignore</b> no (muscular) foot / feet  <b>A</b> suction pads
(c)	<i>look for an adaptation for attachment and an adaptation for survival when exposed to air allow ecf from part (a)</i>  <i>attachment</i> threads / (muscular) foot / sticky fluid ;  <i>survival in the air</i> <i>either</i> shell / exoskeleton, prevents / reduces, water loss /  <i>or</i> shell / exoskeleton, protects against (named) predator(s) ;	[max 2]	<b>A</b> any suitable description of the threads e.g. fibres, projections, extension tentacles, etc. <b>R</b> suckers <b>A</b> slime / mucus for sticky fluid  <b>ignore</b> protection unqualified <b>ignore</b> anything to do with gas exchange <b>ignore</b> camouflage  if named must <b>not</b> be an aquatic predator

Question	E answers	Mark	Additional Guidance
2 (d) 1 2 3 4 5 6 7	<p>has no, competitor(s) / predators (therefore increase in numbers) ;</p> <p>has no, pathogens / parasites / disease-causing organism(s) ;</p> <p>competes with existing species for, food/nutrients/space/oxygen ;</p> <p>could be a, predator / consumer , of other species ;</p> <p><b>A</b> feeds on (many) other species</p> <p>could introduce, disease / parasite, for native species</p> <p>cause migration of native species ;</p> <p>AVP ; e.g. reduces <u>biodiversity</u></p> <p>causes <u>extinction</u></p> <p>decrease in numbers, higher in food web / at higher trophic levels</p> <p>increase in predators of zebra mussels</p>	[max 3]	
(e) 1 2 3 4 5 6	<p>do not move about / stay in one place, so exposed to pollutant (continuously) ;</p> <p>pollutant, kills them / reduces their numbers / prevents them breeding ;</p> <p>so presence / absence, is a good indicator ;</p> <p>pollutant accumulates (in animal's body) ;</p> <p>pollutant, detectable when concentrations are low / no longer present ;</p> <p>AVP ; they are filter feeders</p> <p>do not need to know what the pollutant is (as would be the case for a chemical test)</p> <p>no need for lab facilities / no need for equipment / can be done in the field</p>	[max 2]	<p><b>R</b> more accurate</p> <p><b>ignore</b></p> <p>easy to, see / collect ;</p> <p>quicker to do</p> <p>skills / training needed / cheaper</p>

Question	E answers	Mark	Additional Guidance
2 (f)	<i>non-biodegradable plastics</i>		
1	swallowed / ingested / eaten / cannot be digested ;		
2	caught around / trapped / entangled ;		
3	choke / blocks gut / smother / suffocate / injure / cut / trap / stuck in / AW ;		<b>ignore</b> kills / dies unqualified
4	plastic blocks light for <u>photosynthesis</u> ;		<b>A</b> organism is poisoned (by toxins)
5	may, contain / release, (oil-soluble) toxins / poisons ;		<b>R</b> 'plastics are toxic'
6	large pieces of plastic may block flow of water (in a river) ;		<b>A</b> suffocate in <b>MP3</b> as a consequence of
7	that reduce concentration of dissolved oxygen ;		<b>MP4</b>
8	effect of loss of organism at a trophic level ;		<b>MP6</b> and <b>MP7</b> are linked
9	AVP ; e.g. any other consequence for organisms	[max 3]	

Question	E	Answers	Marks	Additional Guidance
3	(a)	<i>Lilium</i> ;	1	
	(b)	<b>A</b> stigma ; <b>B</b> anther ; <b>C</b> petal ; <b>D</b> style ;	4	
	(c)	parallel veins / AW ; narrow / AW, leaves ; flower parts in, 3s / 6s ;	max 2	<b>A</b> non-branching veins / no mid-rib <b>A</b> long and thin <b>A</b> for any named part <b>R</b> one cotyledon
	(d)	<b>one mark per box – ignore any neutral comments</b>		
		type of reproduction in flowering plants	advantages	disadvantages
		asexual	only one, parent / plant ; fast ; (potential) rapid spread ; less energy required / no gametes needed ; if parent well adapted, offspring will be adapted to surroundings ; <b>max 1</b>	competition ; little / no, variation ; less evolution / less able to adapt to change ; may all be killed by same disease ; converse of MP5 for asexual ; <b>max 1</b>
		sexual	variation ; evolution / formation of new species ; (seed) dispersal ; colonization / able to adapt to change ; <b>max 1</b>	may need two plants / pollinating agent; slow ; much pollen / many seeds wasted ; fertilization may not happen; loss of lots of energy ; <b>max 1</b>
			<b>[Total: 11]</b>	

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4	(a)		wings ; beak ; feathers / plumage ; scales on, legs / feet ;	[3]	ignore adjectives such as grey / long / sharp																																
	(b)	(i)	quantitative (feature) ; range between two extremes ; ref. to (many) intermediates ; not in distinct groups ; influenced by the environment (and genotype) ;	[2]	A answer in context of wing length																																
		(ii)	length of ..... anything suitable  (body) mass ; age ;	[max 1]	A height    R any discontinuous variable, e.g. colour A weight    R size / size of ..... A height																																
	(c)	(i)	1 largest number of / most, birds trapped ; 2 oldest (mean age for) birds trapped ;  3 comparative data quote for numbers ; accept fraction / percentage / proportion of total  4 comparative data quote for age ;  R 'greater life expectancy'	[max 4]	assume answer is about birds trapped unless stated otherwise <table><tr><td>wing length at ringing / mm</td><td>number of birds trapped</td><td>mean age at trapping / days</td></tr><tr><td>less than 63</td><td>24</td><td>253</td></tr><tr><td>64</td><td>72</td><td>256</td></tr><tr><td>65</td><td>1</td><td>297</td></tr><tr><td>66</td><td>1</td><td>346</td></tr><tr><td>67</td><td>1</td><td>349</td></tr><tr><td>68</td><td>1</td><td>270</td></tr><tr><td>69</td><td>66</td><td>237</td></tr><tr><td>more than 70</td><td>23</td><td>199</td></tr><tr><td></td><td>total = 771</td><td></td></tr></table>			wing length at ringing / mm	number of birds trapped	mean age at trapping / days	less than 63	24	253	64	72	256	65	1	297	66	1	346	67	1	349	68	1	270	69	66	237	more than 70	23	199		total = 771	
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Question			E	Answers	Marks	Additional Guidance
4		(ii)		1 number of young birds of each wing length ; 2 wing lengths of birds that died ; 3 length of life / length of life after trapping ; 4 results for birds in West Africa ; 5 effects of migration ; 6 wing lengths of birds that breed ; 7 number of times each bird is trapped ; 8 effect of trapping on behaviour ; 9 larger sample ; 10 other locations in, Sweden / anywhere in Europe ; 11 AVP ; 12 AVP ;	[max 3]	<i>look for types of evidence, not assertions</i> <b>R</b> wing length of newly hatched birds  <b>R</b> 'study should be repeated'  e.g. number of eggs laid by birds of each wing length / to which birds fly furthest / test which birds best at catching food
		(d)		birds with wing length 66–67, survive / live longer ; breed / reproduce / have offspring ; pass on their allele(s) for wing length ; birds with smaller and larger wings, die ; do not reproduce (as successfully) ;	[max 4]	<b>A</b> gene(s) <i>wing length may be implied</i> <b>A</b> 'the others'
					<b>[Total: 17]</b>	