

1 (a) (i)	hair / fur / whiskers ; external ears / pinna(e) ; nose / snout ;	ma [1]																									
(ii)	<table border="1" data-bbox="389 319 837 1135"> <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>C</td></tr> <tr><td><i>Vombatus ursinus</i></td><td>B</td></tr> <tr><td><i>Sminthopsis longicaudata</i></td><td>A</td></tr> <tr><td><i>Macropus rufus</i></td><td>D</td></tr> <tr><td><i>Paljara tirarensis</i></td><td>F</td></tr> <tr><td>go to 6</td><td></td></tr> <tr><td><i>Sarcophilus harrisii</i></td><td>E</td></tr> <tr><td><i>Dasyurus maculatus</i></td><td>G</td></tr> </table>	go to 2		go to 3		go to 4		go to 5		<i>Phascolarctos cinereus</i>	C	<i>Vombatus ursinus</i>	B	<i>Sminthopsis longicaudata</i>	A	<i>Macropus rufus</i>	D	<i>Paljara tirarensis</i>	F	go to 6		<i>Sarcophilus harrisii</i>	E	<i>Dasyurus maculatus</i>	G	[3]	5 or 6 correct = 3 3 or 4 correct = 2 1 or 2 correct = 1
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1	(b) (i)	meiosis ;	[1]	
	(ii)	maintains / increases, population ; allows variation ; ora 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]	ignore survival unqualified
	(c)	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]	ignore food / nutrition for nutrients A glucose / amino acids / ions / water A urea / (nitrogenous) waste A progesterone / oestrogen / HCG / HPL / HCS
	(ii)	protection from (mechanical) shock (of fetus) ; maintains (constant) temperature (of fetus) ; allows movement (of fetus) ; prevents dehydration ; AVP ;	max [2]	
			[Total: 14]	

2 (a) (i)	A – oviduct ; B – ovulation ; C – zygote ;	[3]	
	(ii) follicle stimulating hormone/FSH ; luteinising hormone/LH ;	[2]	
	(iii) <ol style="list-style-type: none"> 1 flagellum/ 'tail', for swimming/ movement ; 2 small/streamlined shape, for (efficient) swimming ; 3 mitochondria, for providing energy ; 4 acrosome/ (packet of) enzymes, for digestion of (follicle) cells/ to reach ovum ; 5 haploid nucleus to fuse with egg (nucleus) ; 6 nucleus, to transfer genetic information to zygote ; 	max [3]	R produce/ create/ forms energy AW ,
	(b) <ol style="list-style-type: none"> 1 maintain/ increase, population ; 2 allows variation ; 3 (variation) caused by meiosis ; 4 for example through crossing over/ independent assortment ; 5 random fusion of gametes ; 6 ability to express recessive traits/ AW ; 7 adaptation to <u>new/changed</u> environments ; 8 (allows) natural selection/ evolution/ formation of new species ; 	max [5]	
		[Total:13]	

	Answer	Marks	Guidance for Examiners
3 (a)	DNA / genome is the same / similar ; genes are same ; AVP ; e.g. ref to DNA bases / sequence, same / similar	[max 2]	
(b) (i)	<ol style="list-style-type: none"> 1 mitosis ; 2 no fertilisation ; 3 budding off (of spores) / fragmentation ; 4 vertical hyphae ; 5 production of spores ; 6 sporangium bursts / opens / releases ; 7 ref to number of nuclei per spore ; 8 method of spore dispersal i.e. air / water / wind ; 9 AVP ; e.g. DNA replication 	[max 3]	
(ii)	(named) favourable characteristics of parent passed on ; dense colonies outcompete other species ; rapid ; less, energy / resources used ; no gametes ; <i>idea of</i> only one parent required ;	[ma 3]	
		[Total: 8]	

4 (a)	cell wall, peptidoglycan/murein; no nucleus/no nuclear membrane/have nucleoid; loop of DNA; no mitochondria; no chloroplasts; no vacuoles; smaller ribosomes; have pili; have capsule; small/1–2 μm; A correct reference to size	max 2	A plasmids;
(b) (i)	lag (phase); log/exponential (phase); stationary/plateau (phase); death (phase);	4	
(ii)	no longer reproducing/death rate greater than or equal to 'birth' rate; ref to <u>limiting</u> factor(s); no/less, (named) nutrients; no/less, space; no/less, oxygen; build-up of (named) waste; waste is toxic; idea that pH could change to be unsuitable;	max 2	A reached carrying capacity A lactose/sugar/glucose/salts/minerals e.g. carbon dioxide/lactic acid
(c)	increase in, size/length/mass/volume/AW; increase in <u>dry</u> mass; increase in <u>cell</u> number; ref to permanent;	max 2	note: increase in dry mass = 2 marks A ref to cell division/mitosis/ reproduction of cells/tissues R reproduction unqualified I development

4	(d) asexual (reproduction) / binary fission;	max 1	R mitosis
	(e) advantages: longer shelf-life / stop foods going off; stop / reduce, growth of (unwanted) bacteria / fungi / microbes; prevent food poisoning; improve / give, taste / flavor; give colour / improve appearance; give texture; emulsify / stabilise, food components; disadvantages: hyperactivity (in children); allergies; vomiting / nausea / headache; asthma; possible link with cancer; AVP;	max 4	advantages to max 3 A reproduction / multiplication / AW disadvantages to max 3
		[Total: 15]	