Question	Answer	Marks	Guidance
1 a	too many bacteria / the colonies join together (1)	1	
b	(no because) her soil has 300 000 bacteria (1) has less than the normal / less than 3 000 000 (1)	2	**allow** one mark for dish 6 being diluted 100 000 times and dish 7 being diluted 1 000 000 times **allow** 1 mark ecf for yes, her soil has 3 000 000 bacteria which is the same as normal
	Total	**3**	

Question	Answer	Marks	Guidance
2 a i	CFCs (1) aerosols / refrigeration (1)	2	if mention global warming / greenhouse gases max 1 mark **allow** (ozone) is broken down to oxygen / reacts to form oxygen (1)
ii	South America (1) (people will be more) exposed to UV radiation / (more at risk from skin) cancer (1)	2	 **allow** mutation / DNA damage as alternative to cancer
b	**[Level 3]** Identifies the names of both types of competition **and** shrinking ice caps means **competition is greater** between polar bears **in a smaller territory/area**. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks) **[Level 2]** Identifies the names of both types of competition **or** shrinking ice caps means **competition is greater** between polar bears **in a smaller territory/area**. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks) **[Level 1]** Identifies one type of competition **or** idea of **more** of polar bears **on smaller ice caps/in a smaller area.** Quality of written communication impedes communication of the science at this level. (1 – 2 marks) **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)	6	**This question is targeted at grades up to A*.** **Indicative scientific points at level 2 and 3 may include:** • competition between polar bears in a smaller territory greater. • competition between polar bears is intraspecific. • competition between polar bears and killer whales is interspecific. **Indicative scientific points at level 1 may include:** • competition between polar bears is intraspecific / within a species • competition between polar bears and killer whales interspecific / between species • idea of less land for polar bears • idea of competition between polar bears is on land and between polar bears and killer whales is in water **Use the L1, L2, L3 annotations in Scoris. Do not use ticks.**
	Total	**10**	

Question			Answer	Marks	Guidance
3	(a)	(i)	<table><tr><td>**class**</td><td></td></tr><tr><td>**family**</td><td></td></tr><tr><td>**genus**</td><td></td></tr><tr><td>**kingdom**</td><td></td></tr><tr><td>**order**</td><td></td></tr><tr><td></td><td></td></tr><tr><td>**species**</td><td></td></tr></table>	1	**ignore** ticks
		(ii)	it is the international basis of naming species / it shows or is based on relationships / removes confusion with colloquial names / universal name in all languages (1)	1	**allow** allows scientists all over world to know name of animal or plant **allow** can group them based on relatives **allow** idea that similar species can be in same genus
	(b)		(its hooks allow anchorage / flattened body for crawling under stones) so are **well suited** (1) **for limited habitats** such as fast water hiding under stones (1)	2	**allow** adapted to survive in specific habitat/environment (2)

Question			Answer	Marks	Guidance
	(c)		**[Level 3]** Identifies presence or absence of more than one named indicator species and makes a clear conclusion about the level of pollution in all three sites. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **[Level 2]** Identifies presence or absence of at least one named indicator species and links it to level of pollution at two sites. Quality of written communication partly impedes communication of the science at this level. **(3–4 marks)** **[Level 1]** Identifies the level of pollution at one site. Quality of written communication impedes communication of the science at this level. **(1–2 marks)** **[Level 0]** Insufficient or irrelevant science. Answer not worthy of credit. **(0 marks)**	6	**This question is targeted at grades up to A.** **Indicative scientific points at level 1, 2 and 3 may include:** consider following point with reference: • mayfly larvae only live in unpolluted water (high in oxygen content) • rat-tail maggots can survive very high pollution / low oxygen content • **allow** there are mayfly in unpolluted areas so downstream of factory must be polluted • **allow** higher level responses to Biochemical Oxygen Demand (BOD) being very high in polluted water • **ignore** factory poisons the stream. **Indicative scientific points at level 1 may include:** **example** rat-tail maggot found at factory site because of high level of pollution **Use L1, L2, L3 annotations in scoris; do not use ticks.**
			Total	**10**	

Question			Answer	Marks	Guidance
4	(a)		**(Level 3)** Answer includes more than one correct assumption **and** a correct calculation **and** a sensible interpretation of the result. Quality of written communication does not impede communication of the science at this level. **(5–6 marks)** **(Level 2)** Answer includes a correct assumption **and** a correct calculation OR Answer includes a correct calculation **and** a sensible interpretation of the result. Quality of written communication partly impedes communication of the science at this level. (**3–4 marks)** **(Level 1)** Answer includes either a correct assumption **or** a correct calculation **or** a sensible interpretation. Quality of written communication impedes communication of the science at this level. **(1–2 marks)** **(Level 0)** Insufficient or irrelevant science. Answer not worthy of credit. **(0 marks)**	6	**This question is targeted from grades D to A** **Indicative scientific points may include:** assumptions: • no immigration / emigration between release and recapture • no death / reproduction between release and recapture • identical sampling methods • the marking does not affect the survival rate • marked slugs have mixed with non-marked slugs • marks don't get removed calculations: ▪ calculation is $\frac{50 \times 45}{5} = 450$ ▪ estimate of population is 450 ▪ the population is halved interpretations: ▪ method of control is working / is successful as population has gone down/halved ▪ an appreciation that these are only estimates. If mostly matches level 3 but only has one assumption, give 5 marks If give formula only i.e. 50x45/5 then award 1 mark if level 1, 3 marks if level 2, 5 marks if level 3 If incorrect calculation, then can give sensible interpretation ecf for L1 **Use L1, L2, L3 annotations in scoris. Do not use ticks**

Question			Answer	Marks	Guidance
	(b)	**(i)**	C (1)	1	
		(ii)	(cells with) **most** chloroplasts / palisade layer is near the top of the leaf (1)	1	**allow** upper epidermis is transparent / one cell thick **ignore** cuticle **ignore** large surface area / thin
		(iii)	they (carotene / xanthophyll) absorb different **wavelengths** (to chlorophyll) (1) a wider range of **wavelengths** can be absorbed / more of the spectrum is absorbed (1)	2	**allow** absorb different colours (of light) **allow** correct reference to just one pigment **ignore** absorb wrong wavelengths **ignore** just 'absorb more light'
			Total	**10**	