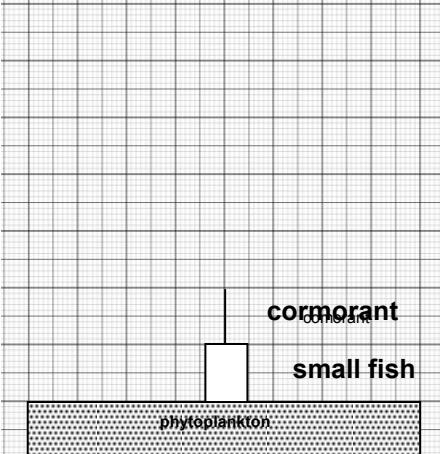


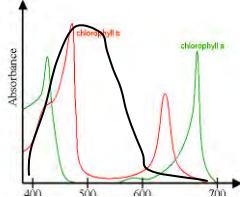
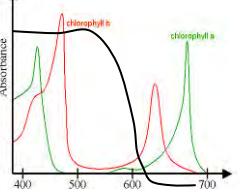
Question	Answer	Marks	Guidance
1 a i	 <p>correct size bars (1) correct labels (1)</p>	2	ignore asymmetry small fish = 8 small squares (16mm) wide by 5 small squares (10mm) high +/- ½ mm square cormorant = between a single line and max of 1 square wide (2mm) by 5 small squares (10mm) high or 4 small squares +/- ½ mm square
ii	<p>humans are involved in other food chains / more than one trophic level (1)</p> <p>taking dry mass of humans / whales would be very difficult (1)</p>	2	allow humans eat other things / have a varied diet allow can't dry out a human allow not allowed to kill whales / humans allow difficulty to catch / weigh whales
b	<p>numbers were very low (1)</p> <p>protection has allowed numbers to recover (1)</p> <p>numbers are now high enough so no longer endangered (1)</p>	3	allow between 1940 and 1980's numbers were at critical level / risk of extinction allow pre 1940 hunting/poisoned/habitats destroyed allow examples of protection e.g. banning poaching/captive breeding allowed the numbers to recover allow between 2000 and 2007 numbers no longer at critical level / risk of extinction allow disease / disaster could wipe out small population (1) allow reduced gene pool when population is low (1) ora
	Total	7	

Question	Answer	Marks	Guidance								
2 a	<table border="1"> <tr> <td><i>Lactobacillus</i> bacteria</td> <td>used in biogas production</td> </tr> <tr> <td>bacteria that rot organic material releasing methane</td> <td>used in yoghurt making</td> </tr> <tr> <td>bacteria that produce toxins</td> <td>used in production of antibiotics</td> </tr> <tr> <td><i>Penicillium</i> fungus</td> <td>cause diseases such as cholera or food poisoning</td> </tr> </table>	<i>Lactobacillus</i> bacteria	used in biogas production	bacteria that rot organic material releasing methane	used in yoghurt making	bacteria that produce toxins	used in production of antibiotics	<i>Penicillium</i> fungus	cause diseases such as cholera or food poisoning	2	<p>three or four correct = 2 marks two correct = 1 mark</p>
<i>Lactobacillus</i> bacteria	used in biogas production										
bacteria that rot organic material releasing methane	used in yoghurt making										
bacteria that produce toxins	used in production of antibiotics										
<i>Penicillium</i> fungus	cause diseases such as cholera or food poisoning										
b	<p>similarity: make their own food / are producers (1)</p> <p>difference: bacteria obtain energy from chemical reactions / bacteria do not use light / do not photosynthesise(1)</p>	2	<p>allow autotrophic / chemosynthetic / make sugar ignore they both take in gases / both take in CO₂ / both need energy ignore they both get food</p> <p>allow reverse arguments referring to plants assume unqualified answers refer to bacteria</p>								
	Total	4									

Question	Answer	Marks	Guidance
3 a	humus (1)	1	ignore detritus / compost
b i	particles of different density (1) BUT particles of greater density sink faster/further (2)	2	allow mass/weight as alternatives to density allow sand particles are heavier / clay lighter = 1 allow sand particles are heavier so sinks faster/further / ORA =2 ignore references to particle size
ii	answer in range 34-36 (%) (2) BUT in working, measurement in range 17 to 18 (mm) (1)	2	allow 1.7 – 1.8 but must say cm ignore 17 or 18 % (on answer line)
iii	loam (1)	1	If answer is sandy, then allow ecf if % in (ii) is >55
Total		6	

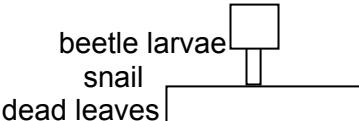
Question	Answer	Marks	Guidance
4 a	<p>[Level 3] Calculation of energy efficiency and idea that energy is lost between each trophic level and idea that insufficient energy left (due to energy transfers). Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>[Level 2] Calculation of energy efficiency and idea that energy is lost between each trophic level or idea that insufficient energy left due to energy transfers. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>[Level 1] Idea of whales being top predator or idea that insufficient energy left due to energy transfers. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>[Level 0] Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to C.</p> <p>Indicative scientific points at level 2 and 3 may include:</p> <p>calculation $\frac{22.5}{225} \times 100 = 10\%$ or just 10%</p> <ul style="list-style-type: none"> • 10% of energy of herring is going into salmon • much of the energy is transferred to less useful forms e.g. heat through respiration/excretion/egestion • a similar reduction from salmon to seal would mean that the amount of energy getting to next trophic level is insufficient to sustain another trophic level <p>Indicative scientific points at level 1 may include</p> <p>No calculation/ incorrect calculation limit to level 1</p> <p>Use the L1, L2, L3 annotations in Scoris. Do not use ticks.</p>
b	any two from: idea of it's cruel / unethical / immoral (1) whales are an intelligent mammal (1) lack of freedom / large animal confined in small area / shorter lifespan in captivity(1)	2	allow shouldn't make money from trapping wild animals allow whales become distressed allow they should be allowed to live in the oceans

Question	Answer	Marks	Guidance
	<p>not enough genetic variation in captivity / idea of disease wiping them out (1)</p> <p>less likely to survive in the ocean if released (1)</p> <p>will affect the food chains in the wild (1)</p>		
	Total	8	

Question	Answer	Marks	Guidance
5 a	outside cells (1)	1	allow on the surface / on the leaf / on the outside allow secrete enzymes
b	low rate of (aerobic) respiration / need oxygen for (aerobic) respiration / ORA (1) low rate of growth/reproduction OR need oxygen for growth/reproduction (1)	2	allow no respiration allow need oxygen for metabolism/energy allow no growth / no reproduction
c	water moves into cells on outside / water moves out of cells on inside (1) (because) solute moves into cells on outside / solute moves out of cells on inside (1) solute moved by active transport (1)	3	allow valid example of solute e.g. sugar / ions
d	a line that falls to (or almost to) zero in the red part of the spectrum (1)  or 	1	
	Total	7	

Question	Answer	Marks	Guidance
6 a i	lacewings increase, aphids decrease or lacewings decrease, aphids increase or aphids decrease followed by lacewings decrease (1) idea that lacewings eat/ kill aphids (1)	2	allow more lacewings, fewer aphids ignore aphids dying out (but allow lacewings increase, aphids die) allow fewer aphids followed by fewer lacewings ignore actual data allow lacewings are predators of aphids OR aphids are prey/food of lacewings
ii	(growing buckwheat / graph B) increases the number of lacewings (overall) (1) (growing buckwheat / graph B) decreases the number of aphids (overall) (1) but no evidence about crop yield (1)	3	ignore buckwheat attracts lacewings (in question) allow reverse arguments for no buckwheat allow no evidence about crop damage allow for additional marking point if fewer aphids then (can assume) more crop yield / less crop damage (1)
b	idea that anomalous results have less impact / anomalous results can be identified or discounted (1)	1	ignore more evidence / improves accuracy (in question) ignore simply improves reliability allow idea that small sample may not be representative / ORA
	Total	6	

Question	Answer	Marks	Guidance
7 a	protein coat / protein outer layer / AW (1) (containing) genetic material (1)	2	protein cell wall = 0, but protein wall =1 allow DNA or RNA allow genes ignore chromosomes
b i	any two from idea that only estimates / not completely accurate as some sufferers might not go and see a doctor / not everyone is tested (for salmonella) (1) (flu estimate less reliable as) flu-like symptoms may not be flu (1) (salmonella more likely to be accurate as) positive tests for salmonella (bacteria) (1)	2	
ii	idea that flu more common in winter / salmonella more common in summer / ORA (1) (flu more common in winter) because more likely to be indoors/on buses or trains so flu more likely to be passed on / ORA (1) (salmonella more common in summer) because of BBQs / food may not be kept cold enough / ORA (1)	3	 ignore simply food not cooked properly / stored at incorrect temperature (in question)
	Total	7	

Question			Answer	Marks	Guidance
8	(a)	(i)	(no) because larger number of beetle larvae would feed on a smaller number of snails / snails would have more biomass than beetle larvae (1)	1	<p>allow energy between snail and beetle larvae decreases but numbers would increase not yes allow correct drawings of pyramid of number</p>  <p>allow correct description of bar lengths</p>
		(ii)	any two from: heat / from respiration (1) excretion (1) egestion (1)	2	<p>allow some lost by decay or decomposition not growth allow named excretory product e.g. urine / sweat allow faeces allow uneaten parts ignore movement / digestion / reproduction ignore waste products unless qualified</p>
	(b)	(i)	8.3 (1)	1	
		(ii)	only transferring around 8% so not enough energy to support a fifth level (1) (8% of 50kJ) is approx. 4 kJ (1)	2	<p>allow ecf on calculation allow $7.2 - 8.3$ / ORA allow between 3.6 and 4.3</p>
			Total	6	