

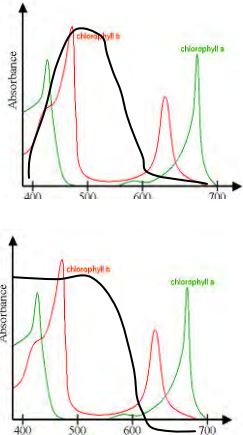
Question	Answer	Marks	Guidance
1 a i	<p>correct size bars (1) correct labels (1)</p>	2	<p><b>ignore</b> asymmetry small fish = 8 small squares (16mm) wide by 5 small squares (10mm) high +/- ½ mm square</p> <p>cormorant = between a single line and max of 1 square wide (2mm) by 5 small squares (10mm) high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

Question	Answer	Marks	Guidance
2 a	<p><i>Lactobacillus</i> bacteria</p> <p>bacteria that rot organic material releasing methane</p> <p>bacteria that produce toxins</p> <p><i>Penicillium</i> fungus</p> <p>used in biogas production</p> <p>used in yoghurt making</p> <p>used in production of antibiotics</p> <p>cause diseases such as cholera or food poisoning</p>	2	three or four correct = 2 marks two correct = 1 mark
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><b>allow</b> autotrophic / chemosynthetic / make sugar  <b>ignore</b> they both take in gases / both take in CO<sub>2</sub> / both need energy  <b>ignore</b> they both get food</p> <p><b>allow</b> reverse arguments referring to plants  assume unqualified answers refer to bacteria</p>
<b>Total</b>		<b>4</b>	

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

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

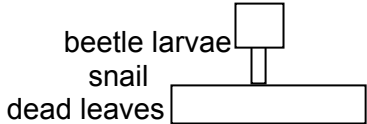
Question	Answer	Marks	Guidance
	not enough genetic variation in captivity / idea of disease wiping them out (1)  less likely to survive in the ocean if released (1)  will affect the food chains in the wild (1)		
	<b>Total</b>	<b>8</b>	

Question	Answer	Marks	Guidance
5 a	outside cells (1)	1	<b>allow</b> on the surface / on the leaf / on the outside <b>allow</b> secrete enzymes
b	low rate of (aerobic) respiration / need oxygen for (aerobic) respiration / OR (1)  low rate of growth/reproduction OR need oxygen for growth/reproduction (1)	2	<b>allow</b> no respiration <b>allow</b> need oxygen for metabolism/energy  <b>allow</b> no growth / no reproduction
c	water <b>moves</b> into cells on outside / water <b>moves</b> 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	<b>allow</b> 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)  	1	
<b>Total</b>		<b>7</b>	

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	<b>allow</b> more lacewings, fewer aphids <b>ignore</b> aphids dying out (but allow lacewings increase, aphids die)  <b>allow</b> fewer aphids followed by fewer lacewings  <b>ignore</b> actual data  <b>allow</b> 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	<b>ignore</b> buckwheat attracts lacewings (in question) <b>allow</b> reverse arguments for no buckwheat  <b>allow</b> no evidence about crop damage  <b>allow for additional marking point</b> 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	<b>ignore</b> more evidence / improves accuracy (in question) <b>ignore</b> simply improves reliability <b>allow</b> idea that small sample may not be representative / ORA
	<b>Total</b>	<b>6</b>	

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  <b>allow</b> DNA or RNA <b>allow</b> genes <b>ignore</b> chromosomes
b i	<b>any two from</b>  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	<b>ignore</b> simply food not cooked properly / stored at incorrect temperature (in question)
<b>Total</b>		<b>7</b>	



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><b>allow</b> energy between snail and beetle larvae decreases but numbers would increase  <b>not</b> yes  <b>allow</b> correct drawings of pyramid of number</p>  <p><b>allow</b> correct description of bar lengths</p>
		(ii)	<b>any two from:</b> heat / from respiration (1) excretion (1) egestion (1)	2	<p><b>allow</b> some lost by decay or decomposition  <b>not</b> growth  <b>allow</b> named excretory product e.g. urine / sweat  <b>allow</b> faeces  <b>allow</b> uneaten parts  <b>ignore</b> movement / digestion / reproduction  <b>ignore</b> 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><b>allow</b> ecf on calculation  <b>allow</b> 7.2 – 8.3 / ORA   <b>allow</b> between 3.6 and 4.3</p>
<b>Total</b>				<b>6</b>	