01. 0610_p20_MS_40 Q: 1

(a) animals written in the correct boxes in the food web

vultures;

cheetahs;

mice / mouse; [3]

(b) (primary) producer;

primary consumer; [2]

(c) **(i)** Sun; [1]

(ii) (lost) to the atmosphere / (lost as) infra-red (radiation) / heat / owtte; [1]

(d) Any three from:

idea that small percentage of energy from Sun is 'fixed' by photosynthesis /

most energy from Sun not available / reference to wrong wavelength;

energy is lost between and within trophic levels;

ref. to 10% energy transfer / ora (per trophic level);

note: if magnitude given, e.g. '90% lost between trophic levels', award 2 marks

ref. to material that is inedible or indigestible;

ref. to (small) total percentage reaching fourth trophic level (cumulative idea);

not enough energy in fourth trophic level to support another level;

avp; [max 3]

(e) Any three from:

feed is expensive;

more energy efficient to feed humans on crops or producers or animals that are used to make the (fish) food;

waste feed causes eutrophication of water supplies;

diseases or parasites spread easily (in captivity);

diseases spread to other organisms in the wild;

chemicals used to control disease are also pollutants (e.g. antibiotics);

avp; e.g. animal welfare concerns [max 3]

02. 0610_w19_MS_43 Q: 1

	Answer	Mark	Partial Marks
(a)(i)	(level) 3 / tertiary / secondary consumer ;	1	
(a)(ii)	*Myrmarachne* ;	1	
(a)(iii)	dichotomous (key) ;	1	
(b)(i)	exoskeleton ; jointed / segmented, legs / AW ; (at least) 1 (or more up to 6) / (at least 1) (or more up to 3) pair, of legs / AW ; segmented (body) ; bilateral body symmetry ;	2	
(b)(ii)	two body parts ; eight legs / four pairs of legs ; AVP ;	2	
(b)(iii)	**B C D E** (in any order) ;;	2	
(c)	anatomy ; DNA (sequences) / genes ; sequences of amino acids (in proteins) ; AVP ; e.g. behaviour	1	

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03. 0610_s18_MS_41 Q: 2

	Answer	Mark	Partial Marks
(a)	(the probability that an organism will) survive and, reproduce / AW ;	1	
(b)(i)	(during the day they) remain in a burrow / stay in the shade / stay inactive / sleep / AW ; light colour / pale / yellow / white (fur / hair) / AW ; thin / long, tail / legs ; thin / short / little, fur ; no fur on legs ; fur on feet ; large, ears / pinna(e) ; little / no, fat ; large surface area: volume ratio ; produces, little / concentrated, urine ; AVP ;	2	**A** nocturnal (habit) **A** ref. to long kidney tubules / AW
(b)(ii)	big eyes / large pupils / good eyesight ; whiskers ; lots of rods (in the retina / fovea) ; large ears / good sense of hearing / sensitive ears ; good sense of smell ;	2	**A** eye has no cones
(c)(i)	block added to the top of the pyramid that is 4 small squares wide ; labelled carnivores ;	2	
(c)(ii)	(detritivores) eat (mainly), plants / producers ; (detritivores) feed, at second trophic level / as primary consumers ; detritivores are eaten by, third trophic level / secondary consumers ;	1	
(c)(iii)	little energy is transferred from one trophic level to the next ; **ora** not all of the organisms are, eaten / digested / absorbed ; named example of energy loss ; *idea that* not enough energy to support higher trophic levels ;	2	
(c)(iv)	*idea that* in a pyramid of numbers one large individual is shown in the same way as one very tiny individual ; **ora** biomass indicates how much food there is, available / left ; biomass is an indicator of the energy available ; pyramid of biomass is pyramid shaped whereas a pyramid of numbers is not always ; **ora** AVP ;	3	

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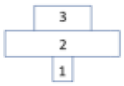
04. 0610_s18_MS_42 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	the probability of an organism will surviving and reproducing (in the environment in which it is found) / AW ;	1	
(a)(ii)	*aerial roots* for anchorage / stability (in flowing water) / (aerobic) respiration / gas exchange / oxygen absorption ; *floating seeds* for (seed) dispersal (carried on water) / reduce competition (from parent) / access to oxygen (to germinate / respire) ;	2	
(b)(i)	1.1 (g) ;;	2	one mark for correct working if answer wrong (8000 / 7 500000) □ 1000
(b)(ii)	bottom bar is narrowest ; middle bar is widest ; correct numbering of trophic levels ;	3	
(b)(iii)	pyramid of biomass is pyramid-shaped (and pyramid of numbers is not) ; **ora** mangrove trees have a larger biomass (than crabs) ; **ora** so one tree provides food for many crabs / AW ; (one) crab has a smaller biomass than (one) seagull ; **ora** each seagull needs to eat many crabs / AW ; (total) crab biomass is greater than (total) seagull biomass ; **ora** comparative data to support an argument with units ;	4	

	Answer	Mark	Partial Marks
(a)(i)	(species) **M** ;	1	
(a)(ii)	(species **L**) because most stable ;	1	
(a)(iii)	300(%) ;;	2	*If no answer or wrong answer award one mark for working:* (2000–500) / 500 □ 100
(b)	increased, predation ; disease ; lack of food ; migration ; (named) relevant pollution ;; (named) relevant environmental change ;; introduction of new species ;	2	**I** competition unqualified **A** new predators **A** competition for food e.g. eutrophication / rubbish / acid rain e.g. habitat loss / el Niño / global warming / climate change / hurricane / tsunami
(c)(i)	(larger holes) allow, more / small / immature, fish through ; **ora** nets more specific to target species / prevents by-catch ;	1	
(c)(ii)	**1** education / awareness ; **Accept** commercials / advertising / tax consumer **2** reduced demand (to eat from unsustainable fish stocks) / public pressure / campaigning ; **3** steps taken by fisherman voluntarily / AW ; **4** (legal) quotas / treaties / licenses / laws / restricted catch weight ; **5** ensuring sustainable population size / recovery of, endangered / specific, species ; **6** no-catch zones / nursery zones / protected areas / MPAs ; **ora** **7** overflow of target species / increase in population outside zone / breeding recovery ; **8** limited fishing season ; **9** stock recovery / optimises breeding seasons ; **10** fines; **11** discourage / punish, poor practice ; **12** restocking / captive breeding and release ; **13** increases gene pool / number of young / reproductively-viable, fish ; **14** fish farming ; **15** alternative source of fish ;	4	*max 3 for methods only* *explanations must be linked to correct method* e.g. use of better fishing methods MPA = marine protected areas **A** patrols / policing
(d)	**1** guillemots / gulls / squid / seals, reduce in numbers ; **2** guillemots / gulls, become extinct ; **Accept** ref to alternative food sources for any other named species **3** because their food / energy, source has reduced / (intraspecific) competition for their food increases ; **4** zooplankton, might increase / stay same / decrease and valid explanation ; **5** phytoplankton decrease because zooplankton increase ; **6**	4	mp4 *examples of valid explanations:* increase leads to less cod predation decrease leads to more squid predation stay same leads to balance squid and cod predation
(e)	development providing the needs of increasing human population ; without harming the, environment ;	2	

06. 0610_p16_MS_40 Q: 1

(a) animals written in the correct boxes in the food web

vultures;

cheetahs;

mice / mouse; [3]

(b) (primary) producer;

primary consumer; [2]

(c) **(i)** Sun; [1]

(ii) (lost) to the atmosphere / (lost as) infra-red (radiation) / heat / owtte; [1]

(d) Any three from:

idea that small percentage of energy from Sun is 'fixed' by photosynthesis /

most energy from Sun not available / reference to wrong wavelength;

energy is lost between and within trophic levels;

ref. to 10% energy transfer / ora (per trophic level);

note: if magnitude given, e.g. '90% lost between trophic levels', award 2 marks

ref. to material that is inedible or indigestible;

ref. to (small) total percentage reaching fourth trophic level (cumulative idea);

not enough energy in fourth trophic level to support another level;

avp; [max 3]

(e) Any three from:

feed is expensive;

more energy efficient to feed humans on crops or producers or animals that are used to make the (fish) food;

waste feed causes eutrophication of water supplies;

diseases or parasites spread easily (in captivity);

diseases spread to other organisms in the wild;

chemicals used to control disease are also pollutants (e.g. antibiotics);

avp; e.g. animal welfare concerns [max 3]

07. 0610_w19_MS_41 Q: 7

	Answer	Mark	Partial Marks
(a)(i)	(named) bacteria ; lightning ; AVP ;	2	
(a)(ii)	*process* ***A*** denitrification ; *process* ***B*** nitrification ;	2	
(a)(iii)	ammonia / ammonium (ions) ;	1	**A** nitrite (ions)
(a)(iv)	removal of nitrogen containing part of amino acids ; to form urea ;	2	
(b)	ribosome / rough endoplasmic reticulum ;	1	
(c)	protease / pepsin / trypsin ;	1	

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08. 0610_w18_MS_41 Q: 1

	Answer	Mark	Partial Marks
(a)(i)	sun / light ;	1	
(a)(ii)	**C** ;	1	
(a)(iii)	ingestion / feeding / AW ;	1	
(a)(iv)	energy is lost (from the food chain as it is transferred from one trophic level to the next) / energy decreases up the trophic levels ; only 10% energy transferred ; ora energy is lost as heat / in respiration / in (named) metabolic processes / movement ; not all organisms (in one trophic level) are eaten / not all parts of the organisms are eaten ; not all nutrients in the organisms are, eaten / digested / absorbed some energy is lost in, excretion / urine / faeces ; some energy is transferred to decomposers ;	3	**A** energy transfer is inefficient **A** egestion
(b)(i)	organisms that get energy from dead / waste, (organic) material ;	1	
(b)(ii)	respiration ;	1	
(c)	combustion / burning ; (more / less) fossil fuel is used ; concentration of (atmospheric) carbon dioxide is increasing ; deforestation described ; trees not replanted / fewer trees ; ora described effect on photosynthesis ; carbon dioxide released (into the atmosphere), as the trees are burnt / decay ; causing, global warming / enhanced greenhouse effect ; *ref. to* tundra thaw and methane ; rate of fossilisation is slower than rate of combustion / fossil fuels are non-renewable ; positive human activities / carbon capture technology ; (idea of) loss of equilibrium / balance ;	5	

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09. 0610_w18_MS_42 Q: 1

<table>
<tr><th></th><th>Answer</th><th>Mark</th><th>Partial Marks</th></tr>
<tr><td>(a)</td><td><table><tr><th></th><th>name of an organism from Fig.1.1</th></tr><tr><td>producer</td><td>algae / (phyto)plankton / clover / grass ;</td></tr><tr><td>secondary consumer</td><td>marsh rice rat / (stone) crab / mycid shrimp / blenny / (bald) eagle ;</td></tr><tr><td>an animal that feeds at two trophic levels</td><td>(bald) eagle / blenny / (spotted) sandpiper ;</td></tr></table></td><td>3</td><td></td></tr>
<tr><td>(b)</td><td>nitrification ;
(nitrifying) bacterium / bacteria ;</td><td>2</td><td>A oxidation</td></tr>
<tr><td>(c)</td><td>root hairs ;
(by) active, transport / uptake ;
across (cell) membranes ;
against a concentration gradient / low to high concentration / AW ;
by proteins (molecules / pumps / carriers) ;
use of, energy / ATP ;
(also by) diffusion ;</td><td>3</td><td></td></tr>
<tr><td>(d)</td><td>ribosome / (rough) endoplasmic reticulum ;</td><td>1</td><td></td></tr>
<tr><td>(e)</td><td>nitrogen fixation ;</td><td>1</td><td></td></tr>
<tr><td>(f)</td><td>little energy is transferred from one trophic level to the next /AW ;
not enough energy, at the top of the pyramid / at higher trophic levels, to support a large number of organisms ;
named example of energy loss ;
heat / in respiration / in (named) metabolic processes / movement / excretion / urine / faeces
not all organisms / parts of organisms (in one trophic level), are, eaten / digested ;
AVP ;</td><td>3</td><td></td></tr>
</table>

10. 0610_m20_MS_42 Q: 6

	Answer	Mark	Partial Marks
(a)(i)	1994 / 1995 / 1996 / 1997 / 2007 ;	1	
(a)(ii)	at least a 5 year period between 1975 and 1983 ;	1	
(a)(iii)	increased predation ; introduced species / new predators ; reduction in food supply ; overfishing / increase in fishing ; parasites / disease ; named examples of pollution / eutrophication ; global warming / climate change / ocean acidification ; AVP ;	3	
(a)(iv)	(captive) breeding programmes ; release them (into the wild / into protected areas) ; protected areas; monitoring of numbers ; limited fishing (so that wild stocks can recover) ; using farmed fish / sustainable fish (so wild stocks can recover) ; AVP ;	3	
(b)(i)	sharp / large teeth ; lots of teeth ; big jaws ; streamlined ; camouflaged ; AVP ;	2	apply list rule
(b)(ii)	1 variation (in eyesight) ; 2 ref. to mutation ; 3 new alleles arise that increases fitness ; 4 (organisms with better eyesight) are better competitors ; 5 organisms with the good eyesight / feature, are more likely to survive and reproduce ; ora 6 passing on their alleles (for good eyesight) ; 7 eventually all the organisms (in the population) will have the feature / good eyesight ; 8 ref to natural selection / evolution ;	5	

11. 0610_s18_MS_43 Q: 2

	Answer	Mark	Partial Marks
(a)(i)	(external) ears / pinna(e) ; fur / hair ; whiskers ;	2	
(a)(ii)	inherited / genetic, feature ; result of natural selection ; increases fitness ; increases chances of survival / AW ; increases chances of, reproducing / AW ;	3	
(b)	temperature ; light (intensity) ; water (supply) / *idea that* water is not available (as frozen) ; (named) soil feature ; (named) mineral ion ; carbon dioxide ; grazing / predation ; (competition for) space ; disease ; (named) pollutant ;	3	**A** humidity
(c)	little energy available from, herbivores / primary consumers / lower trophic level(s) ; few producers / low population of producers / AW ; energy is lost, between / within, trophic levels / along food chain ; **ora** ref to 10 % energy transfer / 90% energy loss (between trophic levels) ; **ora** energy lost, in named process ;;; low numbers of, prey / (primary) consumers / food ; wolves not very successful at catching prey ; reason why ; e.g. prey are widely dispersed / larger animals lower reproductive rate / higher mortality of wolves ; hunting / killed by people ; reason why ; e.g. for fur / compete with humans for food habitat destruction (by humans) ; reason why ; e.g. road building / oil exploration / melting of snow disruption of food web (described) ; disease ; inbreeding / reduced genetic diversity ; climate change / global warming ;	6	