

1	(a) (i)	autotrophic (organism) ; organism that makes its own organic nutrients / food ; (usually) using energy from the Sun / by photosynthesis ;	[2]	
	(ii)	1 all arrows point from food to feeder ; 2 elephant grass added (at the producer level) ; 3 phytoplankton and elephant grass arrows go to fish ; 4 mulberry trees arrow goes to silkworms ; 5 vegetables and fish arrows go to humans ;	[5]	
	(b)	1 not all of the plants are edible / some not digested ; 2 faeces / egestion ; 3 eaten by, pests / AW ; 4 dead leaves / AW, to decomposers ; 5 plants lose energy as a result of respiration ; AVP ; e.g. some energy not used for growth	[max 3]	
	(c)	1 (another) source of income ; 2 provides source of, protein / vitamins ; 3 feed on waste materials / elephant grass cuttings / phytoplankton (from the dykes) ; 4 so do not need feed bought in / no waste removal required ; 5 makes use of large quantities of available (delta) water ; 6 AVP ; e.g. constant source of water (for irrigation) / reduced risk of eutrophication / biological control / less need for dredging	[max 3]	
		<b>Total:</b>	<b>[13]</b>	

Question	Answers	Marks	Additional Guidance
2 (a) (i)	award two marks if the answer is correct – 49 if there is no answer or it is incorrect, award one mark for correct working (207+65+4+410+38+527=1251) (1251 / 2558) x 100 ; 49 (%) ;;	[2]	ignore 48.9 %
(ii)	(awareness / education) to use less paper ; alternatives to using paper ;	max [1]	
(iii)	green kitchen waste ; glass ;	max [1]	
(b)	paper collection / sorting / sent to recycling centre ; shredding ; pulping ; requires water / soaking ; deinking / described ; requires bleach ; rolling / pressing / flattened ; AVP ;	max [4]	process must be in the correct sequence  <b>A</b> 'made thin'
(c)	global warming ; increase in rate of photosynthesis ; causes increase in plant growth / crop yield / vegetation ;  any two qualified examples of environment effects of global warming e.g. flooding, extreme weather conditions, qualified habitat change, reduced biodiversity ;; AVP ; e.g. disruption to migration routes	max [4]	<b>R</b> holes in ozone, acid rain, polar ice caps melting.
		<b>[Total:12]</b>	

Question		Mark	Additional Guidance
3 (a) (i)	rat-tailed maggot, tubifex (worms), (water) louse (and mayfly nymph) ;	[1]	<b>R</b> stonefly (nymph)
	(ii) stonefly (nymph) ;	[1]	<b>R</b> if stonefly (nymph) and mayfly (nymph)
(b)	high/very high/highest, concentration of nitrate ; <u>nitrate</u> needed by plants for, growth/making proteins/AW ; ref to nitrate not being a limiting factor ; AVP ;	max [2]	<b>ignore</b> eutrophication unqualified <b>ignore</b> nitrogen
(c)	invertebrates are present all the time ; pollutant, kills them/reduces their numbers/prevents them breeding ; so presence/absence, is a good indicator ; pollutant accumulates (in animal's body) ; pollutant, detectable when concentrations are low/no longer present ; do not need to know what the pollutant is (as would be the case for a chemical test) ; no need for lab facilities/no need for equipment/can be done in the field ; AVP ;	max [2]	<b>A</b> bioaccumulation

Question		Mark	Additional Guidance
3 (d)	<p>remove solids / pass through a grid / filter / screening ;  allow to sediment / (primary) sedimentation / settling tank ;  use, microorganisms / bacteria / fungi ;  in aerobic conditions / oxygen supplied / aerobic digestion / aeration tank ;  microbes, digest / decompose, complex compounds to, simple / soluble, compounds ;  any example ; e.g. proteins → amino acids, starch → glucose, fat to fatty acids (and glycerol)  water is, disinfected / chlorinated / treated with ozone / treated with UV ;  AVP ; e.g. ref to respiration / recycling bacteria into aeration tank / flocculation described or explained</p>	max [4]	<p><b>A</b> activated sludge / trickle filter</p> <p><b>A</b> 'chemicals to kill bacteria'</p>
(e)	<p>plastic remains / persists / lasts a long time / not decomposed ;  swallowed / ingested / eaten / cannot be digested / blocks gut ;  caught, around / strangle / trapped / entangled / smother / suffocate / injure / cut / trap / stuck in, organism AW ;  plastic blocks light for, <u>photosynthesis</u> ;  may, contain / release, (oil-soluble) toxins / poisons / harmful chemicals ;  blocks the flow of water in streams or rivers ;  so less aeration of water / reduces concentration of (dissolved) oxygen ;  destruction of, habitat / ecosystem / food chain ;  <i>idea of</i> bioaccumulation / biomagnification ;  trapped / stationary water acts as a breeding site for mosquitoes ;  AVP ; e.g. visual pollution / releases hormone-like chemicals / less oxygen from <u>photosynthesis</u></p>	max [3]	<p><b>ignore</b> cannot degrade</p> <p>choke can be <b>mp2</b> or <b>mp3</b> but not both  <b>ignore</b> kills / dies unqualified</p> <p><b>R</b> 'plastics are toxic'</p>
		<b>[Total: 13]</b>	

4 (a)	<p>increases, landfill / rubbish heaps / AW ;  swallowed / ingested / eaten / cannot be digested ;  trapped / entangled / suffocate / injure / cut / strangle / AW ;  plastic blocks light for photosynthesis ;  release, toxins / poisons ;  large pieces of plastic may block flow of water (in a river) ;  reducing (concentration of) dissolved oxygen ;  habitat / ecosystem, destruction / creation ;  persistent / cannot decompose ;  AVP ; e.g. bioaccumulation / production of plastic pollutes  the environment / eyesore</p>	max [3]	<p><b>ignore</b> dies unqualified</p> <p>mp6 and 7 are linked</p>
(b) (i)	<p>more waterborne and airborne (chemical) waste to make paper bags ;  plastic needs oil (extraction) ; <b>ora</b> for paper bags  paper bags require trees (to be felled) ;  more energy needed to make paper bags ; <b>ora</b> for plastic bags  appropriate comparative use of data with units ;</p>	max [3]	<p><b>A</b> deforestation / <b>ora</b> for plastic bags</p>
(ii)	<p>(heavy metals / acid) are toxic / harmful to organisms ;  bioaccumulation / biomagnification (of heavy metal) / description ;  decreases <u>pH</u> ;  (acid) burns, shells / skin / plants ;  aquatic, habitat / ecosystem, destruction ;  AVP ; any qualified consequence of a named heavy metal</p>	max [2]	<p><b>ignore</b> acid rain throughout</p> <p><b>ignore</b> 'polluted' unqualified  e.g. Minimata disease caused by mercu</p>

4 (c) (i)	more energy used to make than recycle (plastic bags) ; 594 <u>kJ</u> to make and 17 <u>kJ</u> (per bag) to recycle (plastic bags) ;;	max [2]	577 <u>kJ</u> (per bag) difference
(ii)	deforestation/ description ; two examples of the effects of deforestation e.g. soil erosion / habitat loss / so / reduced biodiversity ;; increase in carbon dioxide (from deforestation/ coal/ oil, power stations) ; carbon dioxide is a greenhouse gas ; causes global warming/ enhanced greenhouse effect ; two examples of the effects of global warming e.g. rising sea levels / climate change / des / increased yield ;; AVP ; e.g. increased use of fossil fuels ref to power stations, affecting breathing/ asthma / causes acid rain	max [4]	
		<b>[Total: 14]</b>	