20. Human influences on ecosystems

20.3 Pollution

Paper 3 and 4

Marking Scheme

Q1.

(b)	methane / AVP ;	1	
(c)	*any one from:* plant (more) trees / plants ; AVP ;	1	

Q2.

(c)	*any three from:* fish / other aquatic life, die ; decreased biodiversity ; food chains / webs, are affected / described ; (source of) pollution / toxins / named pollutants, enter water ; Idea of occurrence / spread, of disease ; habitat destruction ; AVP ;	3	**A** eutrophication e.g. less oxygen in the water / algal blooms

Q3.

(a)(i)	*any three from:* at the start / initially, concentration of (dissolved) oxygen is, high / stable / constant ; sewage causes the concentration of oxygen to decreases ; from / after, the minimum / X, the concentration of (dissolved) oxygen increases ; decreases, quickly / over a short distance **OR** increases, slowly / gradually / over a long distance ; (eventually) reaches / exceeds, the initial level again ;	3	
(a)(ii)	*prediction:* (organisms / they) die **/** destroyed / decrease in number **/** do not survive ; *explanation:* no / lack of / AW, oxygen for respiration ;	2	

Q4.

(b)	*any two from:* recycling (used plastics) ; (named example of) reuse of (existing plastics) ; AVP ; e.g. reducing the amount of plastics manufactured / avoid single use plastics / use alternatives e.g. paper straws	2	
(c)	*any three from:* habitat destruction ; (increase in) predation / AW ; (increase in) hunting (by humans) / poaching ; introduction of a new (competitive) species ; disease ; climate change **/** global warming / enhanced greenhouse effect ; tourism ; lack of food ; less reproduction / infertility ; **AVP** ; e.g. raiding or disturbing nest sites / entanglement in fishing gear	3	

Q5.

(b)(i)	(location) 3 ;	1	
(b)(ii)	*species:* mayfly / nymph ; *reasons – maximum of two from:* there are no mayfly nymphs, after location 3 / in locations 3, 4 and 5 ; sewage / polluted water, enters the river, after location 2 / before location 3 ; sewage is a source of pollution ;	3	
(b)(iii)	bloodworm / sludge worm ;	1	
(b)(iv)	87.7(%) ;;;	3	MP1 correct readings from table (73 & 9) MP2 correct calculation MP3 correct rounding to one decimal place ecf MP2 and MP3 from incorrect readings / calculation

Q6.

(b)	carbon dioxide ; methane ; water (vapour) ; AVP ;; e.g. CFC's / oxides of nitrogen / AW	2	

Q7.

(c)	plastic ; insecticide / pesticide / herbicide / fertiliser ;	2

Q8.

(a) *one mark per row:* **4**

process	aeration	removal of large solids	separates liquid waste from solid waste	uses microorganisms
production of methane				✓
screening		✓		
settlement			✓	
sludge treatment				✓
trickle filters OR activated sludge	✓			✓

;;;;

(b) *any two from:* **2**
prevent spread of disease ;
make safe for humans to use ;
prevent damage to the environment ;
ref. to pollution ;

Q9.

(a)(i) *any three from:* **3**
paper, has highest mass / is the most recycled material, in 2012 ;
cardboard, has highest mass / is the most recycled material, in 2017 ;
the mass of, paper / metal / plastic, have all decreased (from 2012 to 2017) ;
cardboard has increased (from 2012 to 2017) ;
higher total mass of materials recycled in 2012 than 2017 ;

(a)(ii) 46.9 (%) ;; **2**

(b)(i) *any two from:* **2**
insecticides / pesticides ;
herbicides ;
AVP ;

(b)(ii) *any two from:* **2**
methane ;
carbon dioxide ;
AVP ;

Q10.

(d) enhanced greenhouse effect ; **2**
global warming / climate change / rise in temperatures ;
named effect of global warming ;

e.g. rising sea levels / species extinction / loss of biodiversity / soil erosion / flooding / desertification / loss of habitats

Q11.

(c)	(named) factory waste / chemicals ; pesticides ; acid rain ; oil / petrol ; (named) rubbish / litter /AW ; (named component of) sewage ; nuclear waste ; AVP ;	**2**	

Q12.

(b)	methane ;	**1**	**A** water vapour / nitrous oxides/ CFCs / ozone

Q13.

(a)	*any four from:* quantity of plastic waste always higher **inside** GPGP than outside it ; **ora** quantity inside GPGP constant (from 1965) to, any year 1975 to 1994 ; quantity increases in GPGP, steeply ; smaller (overall) increase **outside** the GPGP ; **ora** quantity of plastic waste outside the GPGP, fluctuates / AW ; comparative data quote with years and unit ;	**4**	
(b)(i)	*any one from:* leathery / hard / scaly, skin ; hard(er) / rubbery / leathery / AW, eggs ; lay eggs on land (not in water) ; internal fertilisation ;	**1**	

(b)(ii)	*any four from:* *direct effects* (non-biodegradable plastic) does not break down ; *idea that* ability to breathe affected ; *idea that* ability to move affected ; *idea that* ability to gain nutrition affected ; damage / injury / infection / death ; toxic / poisonous ; *indirect effects* blocks (sun)light, so algae / plants / producers, cannot photosynthesise ; (so) less, food / energy, enters, food chains / food webs ; loss of (named), habitat / feeding / breeding area ; more likely to be predated ; *idea that* (plastic) accumulates up the food chain / bioaccumulation ; AVP ;	**4**	

Q14.

(c)	*any six from:* **1** eutrophication ; **2** increased growth of, plants / producers / algae ; **3** plants / producers, compete with each other for light / AW , **4** plants / producers, die ***or*** plants / producers, are decomposed ; **5** increase in, decomposers / bacteria ; **6** bacteria / decomposers, use / absorb, (dissolved) oxygen in water ; **7** decrease in concentration of (dissolved) oxygen ; *reasons for reduction in biodiversity:* **8** death of, (named) animals / fish / invertebrates (due to lack of dissolved oxygen) ; **9** decrease in, food / energy, available in, ecosystem / AW ; **10** ref to, pathogens / disease / toxins / poisons ; **11** ref to aerobic respiration (*in either section*) **12** AVP ;	**6**	**MP2 A** algal bloom **MP3 A** no photosynthesis as no light **MP8 A** if linked to MP7 **MP9 A** disruption of food, chains / webs

Q15.

(b)(ii)	kills, water plants / algae ; lack of, producers / food for herbivores ; bioaccumulation / described ; reduced biodiversity ; (lack of roots causes) erosion / silting / flooding ; AVP ;;	**4**

Q16.

(a)	burning / use, (named) fuels ; deforestation / AW ; increased human population ; example of named relevant human activity ; AVP ;	**3**	

Q17.

(d)	visual pollution ; chokes / strangles / traps / blocks digestive systems / AW (of animals) ; *reference to*, chemical exposure / fumes / toxins ; (plastic) accumulates in an organism / is passed down a food chain ; (described) habitat destruction ; e.g. plastic covers the habitats (plastic) blocks (light / water for) photosynthesis (for land plants) ; (plastic) block roots / prevents root growth ; remain in the ecosystem (for a very long time) ; AVP ;	**5**	

Q18.

6(b)	*gap 1:* heat OR long-wave / infra-red, radiation ; *gaps 2 and 3, any two from:* ;; paddy fields / rice farming (named) animals / livestock decay / decomposition (by bacteria) rubbish tips / landfill sewage / dung / faeces (natural) gas extraction / fracking melting tundra waterlogged soil / swamp / marsh biomass burning / forest fires / peat fires *gap 4:* enhanced ; *gap 5:* sulfur dioxide / sulfur trioxide / nitrogen oxide(s) ; *gap 6:* non-biodegradable / micro- / non-recyclable / single-use ;	**6**	

Q19.

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**	

Q20.

5(a)(i)	*any one from:* respiration ; decomposition ; volcanic eruptions ; release of carbon dioxide from oceans (ocean-atmosphere exchange) ;	**1**	
5(a)(ii)	methane / AVP ;	**1**	