

Cambridge O Level

ENVIRONMENTAL MANAGEMENT**5014/22**

Paper 2 Management in Context

May/June 2026

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme contains the instructions and marking guidance that our examiners used to mark candidate responses for this component.

Before they start marking, examiners complete a standardisation process. They review a range of candidate responses and discuss the mark scheme in detail to agree which answers can and cannot be accepted. Examiners award marks where it is clear that candidate responses have met the requirements of the mark scheme. These requirements may vary between different components or different versions of the same component, depending on the exact requirements of the question and the candidate responses seen during the standardisation process.

Sometimes, our mark schemes may allow marks to be awarded to responses which contain elements that are factually incorrect or for content not covered by the syllabus. We do this in response to the demands of a specific question to support candidates and make sure that our assessments are fair. However, these allowances should not be used as a guide for teaching and learning.

We cannot discuss the mark scheme with schools, and we recommend that schools read the mark scheme together with the assessment material and the Principal Examiner Report for Teachers.

This document consists of **24** printed pages.

General marking principles

All examiners must apply these marking principles when marking candidate responses.

1	Examiners must award marks for each response in line with: - the specific content defined in the mark scheme - the specific skills defined in the mark scheme or in the level descriptions - the standard of response required as exemplified by the standardisation scripts.
2	Examiners must award whole marks (not half marks, or other fractions).
3	Examiners must award marks positively . This means that: - marks are not deducted for errors or omissions - marks are awarded for correct/valid answers as defined in the mark scheme and also for other valid answers which go beyond the scope of the syllabus and mark scheme referring to your team leader as appropriate - the quality of spelling, punctuation and grammar are judged only when the mark scheme indicates that these features are specifically assessed in the question. However, the meaning of all responses must be unambiguous.
4	Examiners must consistently apply the requirements of the mark scheme and any rules for what to do when candidates have not followed instructions correctly.
5	Examiners must use the full range of marks defined in the mark scheme, unless limited by the quality of the candidate responses seen.
6	Examiners must award marks according to the mark scheme and must not award marks with grade thresholds or grade descriptions in mind.

Science-Specific Marking Principles

1	Examiners should consider the context and scientific use of any keywords when awarding marks. Although keywords may be present, marks should not be awarded if the keywords are used incorrectly.
2	The examiner should not choose between contradictory statements given in the same question part, and credit should not be awarded for any correct statement that is contradicted within the same question part. Wrong science that is irrelevant to the question should be ignored.
3	Although spellings do not have to be correct, spellings of syllabus terms must allow for clear and unambiguous separation from other syllabus terms with which they may be confused (e.g. ethane / ethene, glucagon / glycogen, refraction / reflection).
4	The error carried forward (ecf) principle should be applied, where appropriate. If an incorrect answer is subsequently used in a scientifically correct way, the candidate should be awarded these subsequent marking points. Further guidance will be included in the mark scheme where necessary and any exceptions to this general principle will be noted.
5	<u>'List rule' guidance</u> For questions that require <i>n</i> responses (e.g. State two reasons ...): • The response should be read as continuous prose, even when numbered answer spaces are provided. • Any response marked <i>ignore</i> in the mark scheme should not count towards <i>n</i>. • Incorrect responses should not be awarded credit but will still count towards <i>n</i>. • Read the entire response to check for any responses that contradict those that would otherwise be credited. Credit should not be awarded for any responses that are contradicted within the rest of the response. Where two responses contradict one another, this should be treated as a single incorrect response. • Non-contradictory responses after the first <i>n</i> responses may be ignored even if they include incorrect science.

6 Calculation specific guidance

Correct answers to calculations should be given full credit even if there is no working or incorrect working, **unless** the question states 'show your working'.

For questions in which the number of significant figures required is not stated, credit should be awarded for correct answers when rounded by the examiner to the number of significant figures given in the mark scheme. This may not apply to measured values.

For answers given in standard form (e.g. $a \times 10^n$) in which the convention of restricting the value of the coefficient (a) to a value between 1 and 10 is not followed, credit may still be awarded if the answer can be converted to the answer given in the mark scheme.

Unless a separate mark is given for a unit, a missing or incorrect unit will normally mean that the final calculation mark is not awarded. Exceptions to this general principle will be noted in the mark scheme.

7 Guidance for chemical equations

Multiples / fractions of coefficients used in chemical equations are acceptable unless stated otherwise in the mark scheme.

State symbols given in an equation should be ignored unless asked for in the question or stated otherwise in the mark scheme.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	correct point or mark awarded
	incorrect point or mark not awarded
	information missing or insufficient for credit
	incorrect or insufficient point ignored while marking the rest of the response
	contradiction in response, mark not awarded
	benefit of the doubt given
	error carried forward applied
	First answer
	response has not answered question
	power of ten error

Annotation	Meaning
	point has been noted, but no credit has been given or blank page seen
	response is too vague or there is insufficient detail in response
	repetition in response
	to show a correct point but where the number of points does not relate to the number of marks i.e. 3 correct= 2 marks
	correct awarding one mark from marking point or marking group 1. similar numbered ticks are used for marking point or marking groups 2, 3, 4 etc.
Highlighter	Highlight

Mark Scheme Abbreviations

Abbreviation	Meaning
;	separates marking points
/	alternative responses for the same marking point
R	reject the response
A	accept the response
I	ignore the response
ecf	error carried forward
AVP	any valid point
ora	or reverse argument
AW	alternative wording
<u>underline</u>	actual word given must be used by candidate (grammatical variants excepted)
()	the word / phrase in brackets is not required but sets the context
max	indicates the maximum number of marks that can be given
M1, M2....	marking point reference

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Question	Answer	Marks	Guidance
1(a)(i)	<i>any three from:</i> M1 overall increase; M2 fluctuates or description e.g. goes up and down; M3 peaks at 1990; M4 relevant comparative dates that demonstrates a stated increase e.g. increase 1844 to 1990 or before 1990; M5 relevant comparative dates that demonstrates a stated decrease e.g. 1990 to 2020 or after 1990;	3	ignore population data e.g. 20 million M1 accept (from) 1844 to 2020 increase (note this does not get M4 as M1 is about the OVERALL increase) M3 allow range of 1990 – 1994 M4 M5 ignore data quotes that are not comparisons
1(a)(ii)	<i>any one from:</i> M1 misleading or example described e.g. population increase look larger or smaller ; M2 equal values are not shown by equal distances / intervals are not the same ; M3 difficult to interpret / difficult to identify trends ;	1	M1 ignore inaccurate or bias unqualified M1 accept idea of leading to inaccurate conclusions or interpretations / unlikely to match real data / distortion of data / skews data/ mistake in analysing M3 ignore difficult to read / difficult to understand M3 ignore does not show a trend
1(b)(i)	M1 $1.768 \div 19 \times 100$ or 9.3 ; M2 9 ;	2	M1 accept 9.305263158 / 9.30 / 9.31 M2 accept 9.0 for [2] M2 ecf on their correctly rounded whole number percentage provided their M1 seen M2 correct answer gets [2]

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Question	Answer	Marks	Guidance
1(b)(ii)	<i>any two from:</i> M1 <u>(overall)</u> increase / constant / stable, urban population ; M2 fluctuates / decreases then increases ; M3 (approximately) half of people live in urban areas ; M4 manipulated data e.g. 2012 to 2020 change of 0.52% / 2012 to 2015 a change or decrease of 0.08%	2	ignore data unqualified without description or without manipulation ignore explanations e.g. death rate / birth rate / natural replacement / migration M1 ignore unstable M1M3 accept 2012 to 2020 population increased by 0.52% M3 ignore less than half live in rural areas (as question about urban) M3 accept close to half live in urban areas M4 ignore years unqualified M4 guidance: % needed for data quote
1(c)(i)	M1 population density: 79.7 / 79.70 / 79.7009 / 80 ; M2 unit: people / km² people / square km people / square kilometre ;	2	M1 reject 79.8 / 79 M2 accept population or persons for people M2 accept p or popn or pp for people M2 accept per for the solidus / e.g. people per km² M2 reject million per km² / people M2 accept capitals for KM M2 accept people km⁻²

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Question	Answer	Marks	Guidance
1(c)(ii)	greater demand / more extracted / more used ;	1	ignore uses other than for drinking water ignore water pollution ignore more people unqualified ignore resources unqualified ignore less water or less water sources accept exceeds carrying capacity accept water is used up quicker than replenished / supply of water stays the same or hasn't increased accept lack of infrastructure (to supply water)
1(d)	<i>any two from:</i> M1 high unemployment rate / lack of available jobs / not enough jobs ; M2 lack of qualifications or skills or education (for jobs) ; M3 fewer women in workforce / people raising families / taking care of children / lack of childcare / looking after elderly relatives ; M4 disabilities / ill-health; M5 students / working age people, in education ;	2	ignore description of trend ignore migration as question is about the difference ignore less developed economy M1 accept (lots of) people without a job M1 accept people choose not to work / not everyone has a job M4 ignore lack of healthcare unqualified M5 accept people or children or age 15+ in education M6 allow people work in informal economy / people work for 'cash in hand' / people are not registered as working
1(e)	<i>any two from:</i> M1 increased knowledge of, family planning / contraception ; M2 increases job prospects / people focus on careers / more (economic) opportunities available ; M3 less likely to have larger families / choosing to have fewer children / delay in having children ; M4 stated reason for choosing to have fewer children e.g. concern over resource depletion / climate change / cost of having children ;	2	ignore education unqualified ignore birth rate / death rate / life expectancy / migration M2 accept more likely to get a (good) job M3 accept people marry later / change in cultural values or traditions

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Question	Answer		Marks	Guidance
1(f)(i)	strategy	order	2	marking guidance: consider highlighting correct answers – avoid ticking in box annotated vertically
	create a national park	4		
	grow more cash crops	5		
	monitor air quality	2		
	plant trees	1		
	reduce extraction of minerals	3		
	M1 2–4 correct M2 all 5 correct			

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Question	Answer	Marks	Guidance
1(f)(ii)	<i>any four from disaster plan AND different linked explanation for each disaster plan:</i> <i>disaster plan:</i> M1 rescue plan / evacuation plan / (evacuation) shelter M2 emergency food M3 provision of clean water / emergency water M4 provision of medical assistance / first aid / healthcare M5 communication from authorities or stated example e.g. updates on areas flooded or updates on road closures M6 clean-up or stated example e.g. clearing (debris from) roads / clearing fallen trees M7 rebuilding of damaged area or infrastructure or stated example e.g. restoring electricity / repairing homes or businesses / repairing roads M8 (international) aid / emergency funds AND explanations: M9 (evacuated to an) area that will not be impacted by flooding ; M10 reduce injuries / treatment of injuries (of people / livestock) / reduce casualties / reduce trauma ; M11 reduce people being trapped ; M12 loss of crops / replace lost food / prevent starvation / prevent hunger / prevent famine ; M13 reduce risk of, drinking contaminated water / disease / named water borne disease or stated disease e.g. cholera ; M14 people need to communicate to families or outside of country; M15 return to work / return to normal life ; M16 economic recovery ; M17 people need protection / somewhere to live / safe place ;	4	marking guidance: we are looking for detail of plan AND linked explanation consider using dots to identify the disaster plan and then tick when a matched explanation is given linked explanation can be inter-changeable between making points but credit an explanation only once if repeated. ignore list of impacts of flood ignore BEFORE a flood e.g. monitoring / warning systems / land use zoning / hard and soft engineering strategies ignore help people unqualified ignore drills / education / disaster preparation ignore danger unqualified ignore malaria further guidance: for a list of 4 disaster plans whether linked or not to explanations = only 1 mark for a list of 4 explanations whether linked or not to disaster plan = only 1 mark list of 1 disaster plans and 4 linked explanations = [4] marks list of 2 disaster plans and 3 linked explanations = [3] marks list of 3 disaster plans and 3 linked explanations = [3] marks list of 4 disaster plans and 3 linked explanations = [4] marks

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Question	Answer	Marks	Guidance
1(f)(iii)	M1 deposition of silt ; M2 (deposited material is) high in or adds, nutrients / mineral content ;	2	ignore allows crops to grow better / produces higher yields / improves soil / improves crop production / irrigates soil / deposits mud or dirt ignore land / improves soil structure / salinity M1 accept alluvium / clay / sand / sediment M2 accept increases fertility of soil / fertilises soil M3 ignore storing or collecting water / reservoirs / irrigation M3 allow replenishes or recharges, groundwater or soil water store;
1(f)(iv)	<i>any one from:</i> M1 (increase in,) / disposal of waste / landfill sites / stated increase in method of waste disposal e.g. incineration ; M2 increase <u>plastic</u> pollution M3 more waste / increase visual pollution ; M4 stated harm to animals e.g. suffocate on plastics ; M5 stated impact of producing packaging e.g. air pollution / use of energy / resource depletion e.g. wood needed for paper packaging	1	ignore disrupts food chain / decrease in biodiversity ignore pollution ignore takes up space M2 ignore water or soil or land pollution unqualified M2 accept microplastics / nurdles / forever chemicals M3 accept littering / stated impact of waste in the wrong place M4 accept bioaccumulation / biomagnification M5 ignore deforestation unqualified
1(f)(v)	<i>any two from:</i> M1 number of people / sample size / number of respondents ; M2 age / gender ; M3 how people were selected / random or systematic sampling ; M4 time of year survey carried out ; M5 location / area, (of Romania) ;	2	ignore do it the same / online questionnaire ignore same questions / how information displayed M1 ignore percentage of people M2 ignore who were the people surveyed / use same people M2 accept demographic profile M5 accept where people live

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Question	Answer	Marks	Guidance
2(a)	<i>any three from:</i> M1 uneven / scattered / dispersed spread out (across the country) ; M2 next to / close to / near to / around / follows / on, (international) border / along border with Serbia or Ukraine or Hungary or Moldova ; M3 (found in) west / north-west ; M4 (found in) south / south-east, of country / south or south-west of capital or Bucharest ; M5 (found in) north-east / east, of country / north-east of capital or Bucharest ; M6 (found along) Black Sea / coast / sea ; M7 no salinisation in centre / none in the north / northern area / south-west, of country / north of Bucharest ;	3	ignore non-compass points descriptors e.g. above / below / left / right / top / bottom / upper / lower / edge ignore not near capital city / around capital city M1 CON random distribution M4 M7 accept north has less salinisation than south = 2 marks M7 accept centre / interior / middle to mean central
2(b)	<i>any three from:</i> M1 species or type of plant ; M2 size of plant ; M3 soil type; M4 mass or volume of soil / size of pot ; M5 watering frequency / volume of water used ; M6 temperature ; M7 pH ; M8 light intensity / (amount of sun) light	3	List rule applies reject concentration of salt water ignore time to water M2 accept height of plant M3 ignore same soil unqualified M4 accept amount of soil M5 accept amount of water / humidity / volume of salt water
2(c)(i)	control / for comparison ;	1	ignore to find out results of not using a treatment / to see chlorophyll concentration if no treatment was added / to test plant growth without salt water / to see a difference / see effect of different treatments / baseline / normal or natural

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Question	Answer	Marks	Guidance
2(c)(ii)	<i>any one from:</i> M1 enables anomalies or outliers to be identified / reduces impact of anomalies ; M2 enables a trend or pattern to be identified ; M3 increases, reliability or validity (of results) ;	1	ignore similar ignore comparison unqualified M2 ignore to find a mean or average M2 accept check result is not a one-time result / repeatability of results / checks that result is the same every time / confirm results / obtain concordant results / consistency of results M3 ignore increases accuracy / mistakes / errors / bias / representative / reproducible M3 accept reduces effect of <u>random error</u>
2(c)(iii)	increased salt (concentration) gives decreased chlorophyll (concentration) ;	1	accept ORA decreased salt concentration gives increased chlorophyll concentration; ignore inversely proportional / negative correlation reject it is directly proportional
2(c)(iv)	chlorophyll or it, absorbs light (in photosynthesis) ;	1	ignore chlorophyll is needed for photosynthesis ignore green pigment accept chlorophyll traps light

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Question	Answer	Marks	Guidance
2(c)(v)	carbon dioxide + water → oxygen + glucose M1 reactants; carbon dioxide + water M2 products; oxygen + glucose	2	ignore above/below arrow light / ATP / energy / chlorophyll M1 accept reactants in either order M1 CON additional reactants M2 accept products in either order M2 CON additional products accept fully correct symbol equation = (2) but must have the '6 s' before the formulae shown and no other numbers or formulae e.g.: $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ accept fully correct but unbalanced formula = (1) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ guidance on mix of formulae and words carbon dioxide + water → $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ not M2, gets M1 $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow$ glucose + oxygen gets M2, not M1 carbon dioxide + $6\text{H}_2\text{O} \rightarrow$ glucose + 6O_2 not M1 and not M2 Max [1] if no → or = sign
2(c)(vi)	subjective / qualitative / difficult to define categories / not quantitative ;	1	ignore not accurate / not clear enough / time consuming / difficult to repeat / long time / precise ignore doesn't show numbers unqualified accept depends on the person / personal opinion / judgemental / subject to human error / biased/ difficult to define the scale accept difficult if colour blind
2(d)	4 ;	1	guidance: a 4 can look like a 9 – in this context, assume it is '4' accept V and W and X and Z

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Question	Answer	Marks	Guidance
2(e)	M1 salt <u>dissolves</u> in, water / snow / meltwater / rain / runoff ; M2 washes or goes into, soil / rivers / groundwater ; M3 builds up / accumulates in, <u>soil</u> (as water evaporates) ;	2	M1 ignore salt melts / action of wind M1 ignore salt reacts M1 accept mixes for dissolves M1 accept salt dissolves in ice / salt forms a solution with water M2 accept absorbed into soil M2 accept leaches or runs-off or infiltrates into soil or rivers or groundwater
2(f)(i)	<i>any one from:</i> distillation ; <u>reverse</u> osmosis ;	1	ignore heating / evaporation / boiling / condensation / filtration / chlorination / osmosis accept distill / simple distillation / fractional distillation
2(f)(ii)	21 600 ;	1	accept 2.16×10^4
2(f)(iii)	<i>any two from:</i> M1 increases ocean salinity / water becomes too salty ; M2 waste is toxic ; M3 organisms can't adapt (to new conditions) / breeding patterns change ; M4 producers die / less food available / disrupt the food chain M5 fish migrate / changes distribution of fish ; M6 (risk to marine organisms from) water intake pipes ;	2	ignore kills or harms marine life or death unqualified ignore fish die / plants die ignore habitat / food chains unqualified ignore water / air, pollution / temperature changes / energy use M1 ignore salt concentration increases M2 accept brine lowers oxygen content of water M4 accept reduces photosynthesis (in ocean plants)

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Question	Answer	Marks	Guidance
2(f)(iv)	<i>any two from:</i> M1 uses renewable / infinite resources / not dependent on fossil fuels / do not use fossil fuels / uses less stated example of a fossil fuel e.g. oil, natural gas, coal ; M2 stated advantage of not using fossil fuels e.g. no acid rain / no greenhouse gas emissions / less cost as no fuel needed M3 does not take up space on land / does not destroy land-based habitats / small size ; M4 floating plants are portable / can be located where needed / reduced need to pump water from ocean to land ; M5 less visual or noise pollution ;	2	ignore labour / cost unqualified / doesn't need a lot of energy / sustainable / waste products M1 accept ORA does not use non-renewable resources / not finite M2 ignore no harmful gases / air pollution M2 accept less carbon dioxide emitted / less carbon or GHG emitted; M6 allow produces larger volume (than land-based plant) (guidance – must be comparative e.g. larger, rather than 'a lot')
2(g)	<i>any two from:</i> M1 climate change / global warming / increase temperatures / increased evaporation ; M2 drought / less precipitation / lack of rainfall / less snowmelt / reduced river inflow ; M3 (water) over-extraction / increase in consumption / stated use e.g. irrigation or drinking or industry or agriculture or HEP ; M4 construction of dam upstream (reduces inflow) ;	2	ignore reasons for rising water levels / flooding ignore porosity of rocks ignore change in weather or climate ignore increasing population M1 ignore high temperature – we are looking for an idea of increasing temperature M3 accept increasing demand / increasing industrialisation M5 accept dam leak / dam failure

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Question	Answer	Marks	Guidance
2(h)	<i>any two from:</i> M1 water polluted by a toxic substance or named source or substance e.g. industry / road run-off / sewage/ bacteria ; M2 (water-borne) diseases / named diseases e.g. cholera ; M3 visual pollution / bad odours ; M4 reduced fish population / food chain disrupted in river ;	2	ignore nutrient enrichment ignore impacts of eutrophication e.g. algal bloom / fish suffocate / reduced oxygen content ignore cost ignore marine ecosystem ignore makes the water dirty / water pollution / contamination of water / reduces water quality, unqualified M1 accept polluted with micro-plastics / carry toxic substances M2 ignore malaria / makes people sick M4 accept loss of aquatic life / loss of biodiversity / bio-accumulation / bio-magnification
2(h)(i)	2.0 circled ;	1	CON right + wrong answer accept point at 9 mg / dm³ circled accept other methods of indicating right answer but circle takes precedent

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Question	Answer	Marks	Guidance																
2(h)(ii)	M1 y-axis labelled AND with unit: (algal) biomass in mg / dm ³ M2 sensible linear scales such that the plotted points cover at least half the grid ; M3 6–7 data points plotted correctly ; M4 curve of best fit drawn which does not include their anomalous point ;	4	annotate vertically M2 accept y-axis missing zero and not starting at zero M3 plotting <table><thead><tr><th>nitrate ion concentration in mg/dm³</th><th>algal biomass in mg/dm³</th></tr></thead><tbody><tr><td>4</td><td>1.0</td></tr><tr><td>5</td><td>1.4</td></tr><tr><td>6</td><td>2.6</td></tr><tr><td>7</td><td>4.0</td></tr><tr><td>8</td><td>4.8</td></tr><tr><td>9</td><td>2.0</td></tr><tr><td>10</td><td>9.6</td></tr></tbody></table> M3 accept ± half a small square M3 reject if non-linear scale used M4 reject if bar chart or if joining each point to point M4 reject if straight best fit line drawn using correct plots M4 reject if best fit line goes beyond plotted points M4 note: curve must be smooth M4 ecf for candidates plotted points	nitrate ion concentration in mg/dm ³	algal biomass in mg/dm ³	4	1.0	5	1.4	6	2.6	7	4.0	8	4.8	9	2.0	10	9.6
nitrate ion concentration in mg/dm ³	algal biomass in mg/dm ³																		
4	1.0																		
5	1.4																		
6	2.6																		
7	4.0																		
8	4.8																		
9	2.0																		
10	9.6																		
2(h)(iii)	M1 (sun)light ; M2 photosynthesise ; M3 decompose / break down ; M4 oxygen / O ₂ ;	4	M3 ignore feed on / consume / eat M4 accept O																

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Question	Answer	Marks	Guidance
3(a)(i)	<i>any two from:</i> M1 air / noise / water / visual pollution ; M2 animals disturbed / breeding behaviour disturbed / forced to relocate or migrate ; M3 litter / waste (which animals may ingest) ; M4 traffic accidents (on animals) ; M5 increased demand for stated resource e.g. water M6 idea of money from tourism used in conservation ; M7 AVP ;	2	ignore loss of habitat or biodiversity ignore deforestation / plants trampled on ignore flooding ignore pollution unqualified ignore more development / infrastructure ignore global warming / more carbon dioxide released M1 accept stated pollution e.g. emissions of, carbon dioxide / NOx / particulates / VOCs M4 ignore traffic congestion M7 AVP accept description of fragmentation of habitat / fragmentation of habitat M7 AVP accept increased soil erosion M7 AVP accept poaching / hunting
3(a)(ii)	<i>any three from:</i> M1 soil erosion / no roots to hold soil in place / soil washes away ; M2 increase in surface runoff / flooding ; M3 genetic depletion ; M4 loss of carbon sinks / carbon stores ; M5 loss of livelihood e.g. for fuel / timber ;	3	ignore loss of, biodiversity / habitat / animal migration / loss of vegetation / loss of food ignore water storage ignore less respiration / oxygen production / air pollution / drought / carbon dioxide ignore extinction of species / visual pollution ignore climate change / global warming ignore loss of wind break M1 accept desertification / landslide / soil loses fertility / loss of soil structure M2 accept water logging / less interception / less infiltration

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Question	Answer	Marks	Guidance
3(b)	<i>any two from:</i> M1 hunting / not protected ; M2 road injuries ; M3 disease ; M4 habitat loss / deforestation / forests cleared ; M5 lack of food / less prey ; M6 no established wildlife corridors / unable to migrate ; M7 stated climate or weather reason e.g. too warm / too cold ; M8 noise disturbance ;	2	ignore they are endangered / have a small population M1 accept more predators / lack of conservation efforts / they are preyed upon M4 accept urbanisation / large areas developed M6 accept idea of fragmentation of population / unable to recolonise; M6 accept idea of migration
3(c)	<i>any three from:</i> M1 conserves habitat ; M2 maintains genetic diversity / prevents genetic depletion ; M3 raises awareness / education / research / monitoring ; M4 promotes sustainability / sustainable management ; M5 limits tourists / no tourism / only ecotourism ; M6 limits hunting ; M7 limits farming ; M8 limits mining/ mineral extraction ; M9 limits industry / industrial activity / construction ; M10 legislation / fines / charge an entry fee ; M11 core and no human activities / only monitoring or research or science / no settlements ; M12 buffer and controlled or limited access for humans e.g. education / some settlements ; M13 transition and controlled human activities e.g. settlements / recreation / sustainable farming ;	3	ignore conserves biodiversity / prevents extinction / zoo / captive breeding accept limits human activity if M5 to M9 not awarded M1 accept prevents deforestation / removal of plants and animals / undisturbed, habitats / animals / breeding or ecosystem protected; M11 M12 M13 no credit for stated three zones without explanation M11 M12 M13 accept idea of science or research allowed in all three zones (credit once) M5 M11 M12 M13 accept tourism/ ecotourism once M11 M12 M13 need zone and activity = [1] mark

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Question	Answer	Marks	Guidance
3(d)(i)	<i>any four from:</i> M1 arrows show <u>energy</u> flow / transfer of <u>energy</u> ; M2 feeding relationship or stated example e.g. brown bear eats caterpillar ; M3 4 trophic levels ; M4 apple (tree) is <u>producer</u> or first trophic level ; M5 ant is <u>primary consumer</u> or second trophic level ; M6 caterpillar is <u>secondary consumer</u> / third trophic level ; M7 bear is <u>tertiary consumer</u> / fourth trophic level ;	4	ignore shows who eats whom unqualified ignore herbivore / carnivore / apex predator M1 accept how <u>energy</u> is transferred between organisms / <u>energy</u> moves through a food chain / 10% of energy passed through / 90% of energy lost; M2 accept shows feeding level M7 ignore brown bear at top of food chain
3(d)(ii)	<i>any three from:</i> M1 temperature ; M2 humidity ; M3 water / precipitation ; M4 oxygen / O₂ ; M5 salinity ; M6 (sun) light (intensity) ; M7 pH ; M8 minerals / mineral ions ; M9 carbon dioxide / CO₂ ; M10 wind (speed) ;	3	apply list rule – irrelevant responses are ignored and do not count towards the list rule ignore weather / climate CON biotic components e.g. plants / animals M4 ignore air / gases M4 accept O M6 accept sun / solar M8 ignore rock / dirt / nutrients / soil M8 accept named minerals e.g. nitrate ions

Question	Answer	Marks	Guidance
3(d)(iii)	description <u>term</u> M1 1–2 correct [1] M2 3 lines only, correct [2]	2	guidance each additional line incorrect line CONS a correct one e.g. 3 correct and 1 incorrect = [1] marks