



National
Qualifications
2025

2025 Environmental Science

National 5

Question Paper Finalised Marking Instructions

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General marking principles for National 5 Environmental Science

Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.

- (a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.
- (b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you should seek guidance from your team leader.
- (c) Where a candidate makes an error at an early stage in a multi-stage calculation, award marks for correct follow-on working in subsequent stages. Do not award marks if the error significantly reduces the complexity of the remaining stages. Apply the same principle in questions that require several stages of non-mathematical reasoning.
- (d) Award full marks for a correct final answer (including units if required) on its own with no working shown.
- (e) Candidates may access larger mark allocations fully, whether they respond in continuous prose, linked statements, or a series of discrete developed points.
- (f) In the detailed marking instructions, if a word is **underlined** then it is essential; if a word is **(bracketed)** then it is not essential.
- (g) In the detailed marking instructions, words separated by / are alternatives.
- (h) Do not award marks if a candidate gives two answers, where one is correct and the other is incorrect.
- (i) Where the candidate is instructed to choose one question to answer but instead answers both questions, mark both responses and award the better mark.
- (j) Award marks for a valid response, even if the response is not presented in the format expected. For example, award the mark if the response is correct but is not presented in the table as requested, or if it is circled rather than underlined as requested.
- (k) Candidates may use abbreviations (for example, SEPA or INNS) or chemical formulae (for example, CO₂ or H₂O) as acceptable alternatives to naming, unless required by the question, but these must be correct. For instance, chemical formulae with an incorrect subscript or superscript component (for example CO²), or full-size number (for example CO2) should not be awarded the mark.
- (l) Award marks, up to the maximum mark allocation for the question, for content that is outwith the course specification but used appropriately at the correct level for National 5.
- (m) If candidates are required to give a numerical answer, and units are not given in the stem of the question or the answer space, they must supply the units to gain the mark.
- (n) If incorrect **spelling** is used:
 - and the term is recognisable, then award the mark;
 - and the term can easily be confused with another scientific term, then do not award the mark, for example quadrat and quadrant, or nitrite and nitrate, or fractional distillation and frictional distillation;
 - and the term is a mixture of other terms, then do not award the mark.

(o) When presenting data:

- for marking purposes no distinction is made between bar charts (used to show discontinuous features, have descriptions on the x -axis and have separate columns) and histograms (used to show continuous features, have ranges of numbers on the x -axis and have contiguous columns)
- other than in the case of bar charts/histograms, if the question asks for a particular type of graph or chart and the wrong type is given, then do not award the plotting mark. Marks may still be awarded for other required components, as specified in the detailed marking instructions.
- do not award the relevant mark if the graph is too small to check the accuracy of plotting; or if 0 is plotted when no data for this is given (ie candidates should only plot the data given)

(p) Award marks only for a valid response to the question asked. For example, in response to questions that ask candidates to:

- **identify, name, give, or state**, they need only name or present in brief form;
- **define**, they should give a statement of the definition;
- **calculate**, they must determine a number from given facts, figures, or information;
- **compare**, they must demonstrate knowledge and understanding of the similarities and/or differences between things;
- **describe**, they must provide a statement or structure of characteristics and/or features;
- **evaluate**, they must make a judgement based on criteria;
- **explain**, they must relate cause and effect and/or make relationships between things clear;
- **justify**, they must give reasons to support their suggestions or conclusions;
- **discuss**, they must write about a topic in detail, taking into account different issues or ideas;
- **outline**, they must provide a brief sketch of content - more than naming but not a detailed description;
- **predict**, they must suggest what may happen based on available information;
- **suggest**, they must apply their knowledge and understanding of Environmental Science to a new situation. A number of responses are acceptable: marks will be awarded for any suggestions that are supported by knowledge and understanding of Environmental Science.

Note that this list is not exhaustive.

Marking instructions for each question

Section - 1

Question		Expected response	Max mark	Additional guidance
1.	(a)	An animal/organism that feeds on dead organic matter.	1	Any mention of microscopic level negates.
	(b)	(i) Pitfall trap. (1 mark) AND Place a container in the ground, level with the soil surface. (1 mark) OR Camouflage/cover the container. (1 mark) AND After a period of time, the number of woodlice is then counted. (1 mark)	3	1 mark for naming appropriate technique to sample woodlice. 1 mark for a description of the set up. 1 mark for reference to collection of data. Any other valid response.
		(ii) Top of the trap is not level with the soil surface (1 mark) therefore woodlice do not fall into container/crawl around container (1 mark) OR No alcohol placed in container (1 mark) therefore trapped organisms may eat each other. (1 mark) OR Trap not covered/camouflaged. (1 mark) therefore predators may eat trapped organisms (1 mark)	2	Any other valid response.
	(c)	(i) Choice chamber	1	
		(ii) To investigate the moisture and light conditions preferred by woodlice.	1	Candidates must refer to preference of both factors. Any other valid response.
		(iii) 80% (A)	1	$\frac{12}{15} \times 100$

Question			Expected response	Max mark	Additional guidance
1.	(c)	(iii) (B)	Hidden from predators/avoid drying out/avoid losing too much water/ more dead organic matter in these areas/greater food availability in these areas.	1	Candidates need only refer to one factor. Any other valid response.
		(iv)	Increase the number of woodlice added/increase the sample number.	1	Any other valid response.

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	Food web	1	Do not accept: food chain.
		(ii)	Arrows pointing from squid AND crab to elephant seal AND arrow pointing from elephant seal to killer whale.	1	All 3 arrows must be correctly placed.
		(iii)	Decrease because the killer whale would lose a food source/have no leopard seal to eat and eat more elephant seal. (1 mark) OR Decrease because there would be more penguin which would eat more squid, meaning less food for elephant seal. (1 mark)	1	1 mark for explanation. Any other valid response.
	(b)	(i)	3. <u>Gentoo King</u> 4. <u>facial feathers all black</u> <u>facial feathers black and white</u>	2	1 mark awarded for each correct paired statement.
		(ii)	Similarity: both have flat facial feathers. (1 mark) OR The adult height range of both includes 50-70 cm. Difference: the Adelie has pink feet whereas the Gentoo has orange feet. OR The Adelie has a black beak whereas the Gentoo has an orange and black beak. OR The Adelie has all black facial feathers whereas the Gentoo has black and white facial feathers. OR The adult height range of the Adelie is 40-70cm whereas the Gentoo is 50-90cm. (1 mark)	2	Do not accept: characteristic alone eg “they have a different foot colour”. Candidates must describe the difference between the two species.

Question		Expected response	Max mark	Additional guidance
3.	(a)	<p>Environmental: Less greenhouse gas emissions released/lowers carbon footprint. (1 mark)</p> <p>Economic: Money spent in UK/ generates money for UK government/ more jobs will mean more paid in taxes/more goods and services bought or used generating money for businesses. (1 mark)</p>	2	<p>1 mark for environmental impact.</p> <p>1 mark for economic impact.</p> <p>Any other valid response.</p>
	(b)	(i)	1	<p>Answer must be comparative.</p> <p>Any other valid response.</p>
		(ii)	1	
		(iii)	1	
		(iv)	1	Any other valid response.
	(c)	(i)	1	<p>$400 \times \frac{85}{100}$</p> <p>Unit must be included.</p>
		(ii)	2	<p>1 mark for reference to meeting current needs.</p> <p>1 mark for reference to not comprising future needs.</p> <p>Maximum 1 mark for sustainable development definition alone.</p> <p>Any other valid response.</p>

Question			Expected response	Max mark	Additional guidance
4.	(a)	(i)	Geosphere	1	
		(ii)	Forms in shallow, tropical Seas. (1 mark) Calcium carbonate/CaCO ₃ precipitates out. (1 mark)	2	
	(b)	(i) (A)	Carbonic (acid)	1	
		(i) (B)	Chemical (weathering)	1	
		(ii)	False - photosynthesis False - crushing OR screening True	3	1 mark for each correct response.
	(c)		To neutralise/decrease soil acidity/ increase pH/provide nutrients to soil.	1	Any other valid response.
	(d)		Stores carbon/locks in carbon.	1	

Question			Expected response	Max mark	Additional guidance
5.	(a)	(i)	Nitrous oxide/methane.	1	Accept: water vapour. Any other valid response.
		(ii)	They absorb heat/radiation in the atmosphere/prevent heat/radiation from escaping into space. (1 mark) thus keeping the Earth warmer than it would otherwise be. (1 mark)	2	1 mark for reference to absorption/reflection of heat/radiation. 1 mark for reference to increase in temperature.
	(b)		The axis/axes of the graph has/have suitable scales. (1 mark) the axes of the graph have suitable labels AND units. (1 mark) accurate plotting of points and points joined by a line. (1 mark)	3	Do not accept: line of best fit.
	(c)	(i)	Fertilisers (1 mark) provide nutrients (1 mark) allowing plants to grow larger/grow faster (1 mark) Pesticides (1 mark) kill organisms (1 mark) that may eat/destroy/damage crops/may compete against crops for resources (1 mark) Use genetic modification (1 mark) alters the crops' DNA (1 mark) to ensure larger plants/pest resistance/disease resistance/tolerance to extreme conditions (1 mark)	3	1 mark for named strategy. 1 mark for effect of strategy. 1 mark for explanation of how strategy increases yield. Any other valid response.
		(ii) (A)	It will provide a greater length of stalk, allowing more linen to be produced and sold/more stalk will sell for a greater profit.	1	Response must relate increased yield to profit/sales. Any other valid response.
		(ii) (B)	Bacteria/fungi	1	Do not accept: decomposer on its own.
		(ii) (C)	Crops/plants/flax can be replanted or regrown quickly/(flax) can be re-made in a human's lifetime.	1	Any other valid response.

Question			Expected response	Max mark	Additional guidance
5.	(c)	(ii) (D)	<p>Not using machinery/fuel (1 mark) means there will be no carbon emissions. (1 mark)</p> <p>OR</p> <p>Crops/flax remove carbon dioxide from the atmosphere as they grow/by photosynthesis (1 mark) which offsets the carbon dioxide released during production/processing. (1 mark)</p>	2	<p>Accept named processes.</p> <p>Any other valid response.</p>
	(d)		<p>Sheep provides wool/cow provides leather/cotton plant provides cotton/silkworms provide silk/goats can provide cashmere.</p>	1	<p>Must provide species AND resource to be awarded mark.</p> <p>Any other valid response.</p>

Question		Expected response	Max mark	Additional guidance
6.	(a)	12:00 and 15:00/12 and 3	1	This is the time period where the solar radiation is above 500 and the temperature is above 45.
	(b)	(i) Organisms that show if an environment is affected by a particular set of environmental conditions due to their presence/absence/abundance.	1	Response must refer to environmental conditions and presence/absence/abundance to be awarded the mark.
		(ii) (A) To ensure that all bacteria levels are at 0.	1	Response must refer to elimination of all bacteria.
		(ii) (B) Fewer people becoming ill (1 mark) therefore can work and earn money/ pay taxes/contribute to economy/ less financial strain on health services. (1 mark) OR Freshwater can be used in industry/ agriculture (1 mark) to produce goods for sale. (1 mark)	2	1 mark for explanation. 1 mark for reference to economy. Any other valid response.
		(iii) Using ceramic/(bio)sand/charcoal/ membrane filtration. OR Using disinfectants/sodium hypochlorite. OR Using a Jompy boiler.	1	Any 1. Any other valid response.
	(c)	More advanced infrastructure/ technology in developed countries. OR More piped, clean water in developed countries. OR Greater regulations/legal protections/safeguarding procedures in developed countries. OR More separation of/less chance for the mixing of drinking water and wastewater in developed countries.	1	Response must be comparative. Any other valid response.

Question			Expected response	Max mark	Additional guidance
7.	(a)	(i)	Drilling	1	
		(ii) (A)	Refinery gas	1	
		(ii) (B)	Bitumen	1	
		(iii)	<p>The column is hotter at the bottom and cooler at the top. (1 mark)</p> <p>The crude oil is heated until it (mostly) becomes a gas/evaporates and passes into the column.(1 mark)</p> <p>Different fractions have different boiling points. (1 mark)</p> <p>The fraction will eventually reach the part of the tower cooler than their boiling point range, (1 mark) and will condense/turn to liquid and flow out of the column. (1 mark)</p>	3	Any 3.
	(b)		Fewer people get sick because no toxic gases/particulates released as they are driven/less noise pollution/EV charging at home is more convenient than visiting petrol stations.	1	<p>Accept: secondary social impacts as a result of climate change only if candidate has made the link between impact and the switch to electric vehicles.</p> <p>Any other valid response.</p>

Section - 2

Question			Expected response	Max mark	Additional guidance
8.	(a)	(i)	Oxygen/O ₂	1	Do not accept: O/o/o ₂ /O ₂ /O ²
		(ii)	Allows more light/greater light intensity which is required for photosynthesis.	1	Any other valid response.
	(b)	(i)	The river contains fertiliser/ sewage/organic waste run-off.	1	Any 1 Do not accept: waste on its own. Any other valid response.
		(ii)	(<i>Sargassum</i> is) carried by the water/ currents to the Gulf of Mexico. (1 mark) Land/USA/Florida traps/prevents much of the <i>Sargassum</i> from being carried back out to sea. (1 mark)	2	1 mark for reference to <i>Sargassum</i> being carried to the Gulf of Mexico. 1 mark for reference to trapping by land. Any other valid response.
	(c)	(i)	Biodiversity will decrease. (1 mark) because organisms will no longer be able to hide from predators/lose their breeding ground/be carried away more easily by the current/ lose food sources associated with the habitat. (1 mark)	2	1 mark for impact on biodiversity. 1 mark for explanation. Any other valid response.
		(ii)	Governments concerned over impact on economy/public health/pollution. OR Locals/tourists who cannot/won't visit beaches due to visual pollution/smell/health risks. OR Fishers who cannot fish close to area/have <i>Sargassum</i> choking engines.	1	Any 1. Any other valid response.
	(d)	(i)	Combustible biomass/fuels derived from biomass.	1	
		(ii)	Sugar/glucose is converted into alcohol. (1 mark) In the absence of oxygen/ anaerobically. (1 mark)	2	1 mark for reference to raw materials AND product. 1 mark for reference to anaerobic conditions.

Question			Expected response	Max mark	Additional guidance
8.	(e)	(i)	The air bladders implode/burst. OR Air/oxygen is forced out of the air bladders.	1	Any other valid response.
		(ii)	1 354 752 (Pa)	1	$1024 \times 9.8 \times 135$
		(iii)	3.2 tonnes	1	$\left(\frac{1.2}{6}\right) \times 16$ Unit must be included.
		(iv)	More sunlight/warmer temperatures (1 mark) allow for a greater rate of photosynthesis/reproduction. (1 mark) OR Calmer waters/less adverse weather (1 mark) reduces masses of <i>Sargassum</i> breaking off. (1 mark)	2	1 mark for link to summer conditions. 1 mark for impact. Any other valid response.
	(f)		Process into biofuel <ul style="list-style-type: none"> creates a fuel source, increasing energy security Biofuel can be used to transport <i>Sargassum</i> to processing plant reducing fuel usage/emissions less risk of damaging the habitat creates a fuel source, therefore can reduce use of fossil fuels/dependence on other countries for fuel are considered carbon neutral so no contribution to climate change may limit the use of crops for fuels increasing food security/ not impact food prices Government will still receive some of the profits from biofuel sales may create more jobs than using robots 	4	Any 4. Any other valid response. Marks allocated must be in support of the candidate's decision.

Question		Expected response	Max mark	Additional guidance
8.	(f)	(continued)		
		<p>Sink using robots</p> <ul style="list-style-type: none"> • prevents <i>Sargassum</i> from reaching beaches and impacting tourism/health/economy • solar-powered therefore do not require fossil fuels to run • solar-powered therefore does not require collection cycle to be interrupted to charge/refuel • may require fewer workers, therefore reducing wages that need to be paid • solar-powered and chargeable batteries mean that it can be a continual/constant process • will prevent carbon dioxide from escaping into the atmosphere for hundreds of years by which time we may be able to deal with CO₂ better/addresses current climate crisis • does not require new plants to be built therefore may save on cost • does not require new production facilities to be built which may destroy habitats/decrease biodiversity/cause pollution • does not process/transport/burn <i>Sargassum</i> therefore less CO₂ released • for the biofuel option, it may be difficult and expensive to remove salt/sand/microplastics/heavy metals/toxic compounds from <i>Sargassum</i> for use as a biofuel 		<p>Any 4.</p> <p>Any other valid response.</p> <p>Marks allocated must be in support of the candidate's decision.</p>

Section - 3

Question			Expected response	Max mark	Additional guidance
9.	A	(a)	<p>INNS any non-native animal or plant that has the ability to spread and cause damage to the environment, the economy, our health, or the way we live. (1 mark)</p> <p>For Example: Grey squirrels (1 mark) have outcompeted the native red squirrel for shelter/habitat/food (1 mark), reducing the red squirrel population (1 mark). They have also introduced squirrel pox/disease (1 mark) which have further reduced red squirrel populations.</p> <p>OR</p> <p>Japanese Knotweed (1 mark) can form large/deep/wide/extensive root (systems) (1 mark) which can damage buildings/walls, costing money to replace (1 mark). They can also damage underground infrastructure/cables/pipes (1 mark) which can result in floods/lack of power/disruption to phone or internet services (1 mark).</p>	7	<p>Maximum 4 marks.</p> <p>1 mark for naming an INNS.</p> <p>1 mark for each developed impact.</p> <p>Marks can only be awarded for one INNS.</p> <p>Any other valid response.</p>

Question			Expected response	Max mark	Additional guidance
9.	A	(b)	<p>NatureScot/NS (1 mark) Responsible for education relating to INNS (1 mark) Advisory role to government/local authorities/other organisations/ publishes guidance (1 mark) Manages protected areas/designates SSSIs (1 mark) Publishes reports/research on INNS (1 mark) Provide funding to those tackling/removing INNS (1 mark) Issues notifications and consent (1 mark)</p> <p>OR</p> <p>SEPA (1 mark) Environmental regulator (1 mark) Responsible for education relating to INNS (1 mark) Advisory role to government/local authorities/other organisations/ publishes guidance (1 mark) Publishes reports/research on INNS (1 mark) Provide funding to those tackling/removing INNS (1 mark) Enforcement powers/issue fines for incorrect disposal of INNS (1 mark)</p>		<p>Maximum 4 marks</p> <p>Any other valid response.</p>

Question			Expected response	Max mark	Additional guidance
9.	B	(a)	<p>Over-fishing/over-hunting reduces populations/eliminates Species. (1 mark)</p> <p>Deforestation can destroy habitat/ breeding grounds/shelter/food for organisms. (1 mark)</p> <p>Climate change can result in extreme temperatures/adverse weather which kills organisms. (1 mark)</p> <p>Use of pesticides can kill non target species. (1 mark)</p> <p>Chemicals can leach from landfill, poisoning organisms. (1 mark)</p>	7	<p>Maximum 4 marks</p> <p>1 mark for named human activity AND description.</p> <p>Do not accept: pollution on its own.</p> <p>Any other valid response.</p>
		(b)	<p>Species reintroductions can boost biodiversity by controlling species/ acting as a food source/creating habitats. (1 mark)</p> <p>Establishing protected areas/ SSSIs/marine conservation areas prevents habitats/food sources/organisms from being damaged/disturbed. (1 mark)</p> <p>Breeding programmes/artificial insemination ensures that offspring are being born. (1 mark)</p> <p>Reforestation can provide habitat/ breeding grounds/shelter/ food for organisms. (1 mark)</p> <p>Establishing habitat corridors allows organisms to move between habitat fragments. (1 mark)</p>		<p>Maximum 4 marks.</p> <p>1 mark for named human activity AND description.</p> <p>Any other valid response.</p>

Question		Expected response	Max mark	Additional guidance
10.	A	<p>Stages - Evaporation, condensation, precipitation, transpiration, run-off, infiltration, percolation, throughflow, groundwater flow.</p> <ul style="list-style-type: none"> • evaporation (1 mark) is the process of turning a liquid into vapour/gas (1 mark) • condensation (1 mark) is the process of a vapour or gas turning into a liquid (1 mark) • precipitation (1 mark) is moisture that falls from the air to the ground (rain, snow, sleet, hail, drizzle, fog, mist) (1 mark) • transpiration (1 mark) is the evaporation of water from plants' leaves, stems or flowers (1 mark) • run-off (1 mark) is the precipitation that flows across the surface of the ground (1 mark) • infiltration (1 mark) is the physical movement of water through soil (relative to the soil's porosity and permeability) (1 mark) • percolation (1 mark) is the movement of water through soil by gravity and capillary forces (1 mark) • throughflow (1 mark) is the horizontal flow of water within soil (1 mark) • groundwater flow (1 mark) is the movement of groundwater horizontally (1 mark) 	7	<p>1 mark for each named process, up to a maximum of 3.</p> <p>1 mark for each correct description.</p> <p>Maximum of 3 marks for a correctly labelled diagram with no further annotations.</p>

Question		Expected response	Max mark	Additional guidance
10.	B	<p>Industrial</p> <ul style="list-style-type: none"> • cooling equipment • washing equipment • ingredients • adjust pH • dissolve substances • dilute substances • changing colours/shades • sterilisation/steam treatment • transport materials (downstream) <p>Domestic</p> <ul style="list-style-type: none"> • washing clothes/dishes • personal hygiene -bathing/showering/brushing teeth • cooking/drinking • recreation -swimming pools/hot tubs/ponds/water features • watering plants/lawn • temperature systems/heating system/radiators/heat pumps/air conditioning <p>Agricultural</p> <ul style="list-style-type: none"> • irrigation of crops • drinking water for livestock • washing equipment • mixed with agrochemicals • make slurry • make biofuels • food preservation/crop cooling 	7	<p>A maximum of 4 marks can be awarded for each sector.</p> <p>For full marks, all three sectors must be discussed.</p> <p>If the candidate simply gives a list of uses, award a maximum of three marks.</p> <p>Give credit for examples with appropriate supporting discussion, eg irrigation of crops to increase yield.</p> <p>Candidates cannot gain multiple marks for describing the same uses in different sectors.</p> <p>Any other valid response.</p>

[END OF MARKING INSTRUCTIONS]