



National  
Qualifications  
2017

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**2017 Environmental Science**

**National 5**

**Finalised Marking Instructions**

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## General marking principles for National 5 Environmental Science

*This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.*

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) If a specific 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 must seek guidance from your Team Leader.
- (d) There are no half marks awarded.
- (e) Where a candidate makes an error at an early stage in a multi-stage calculation, credit should normally be given for correct follow-on working in subsequent stages, unless the error significantly reduces the complexity of the remaining stages. The same principle should be applied in questions which require several stages of non-mathematical reasoning.
- (f) Unless a numerical question specifically requires evidence of working to be shown, full marks should be awarded for a correct final answer (including unit) on its own.
- (g) Where a wrong answer (for which no credit has been given) is carried forward to another step, credit will be given provided the end result is used correctly.

Detailed marking instructions for each question

Question			Expected answer(s)	Max mark	Additional guidance
1.	(a)	(i)	Geosphere; Hydrosphere; Atmosphere	1	
		(ii)	Rainforest destruction; plantation agriculture; monoculture; overfishing; overhunting; urbanisation; construction; deforestation <b>OR</b> Other appropriate response	1	
	(b)	(i)	Owl; shrew	1	
		(ii)	Named example: Woodlouse (1 mark)  Role in the food web: Breaks down leaf litter releasing nutrients (1 mark)	2	Answer should imply a cycle
	(c)	(i)	Carbon dioxide + water → oxygen + glucose	1	Accept: CO <sub>2</sub> and O <sub>2</sub> (but not O) Not CO <sub>2</sub> or CO <sup>2</sup> or O <sub>2</sub> or O <sup>2</sup>
		(ii)	Sun(light)	1	
	(d)	(i)	1350	1	
		(ii)	Heat; movement; undigested waste; sound	1	

Question		Expected answer(s)	Max mark	Additional guidance
2.	(a)	Wheat/oats/barley/lamb/beef/ milk/wool/strawberries <b>OR</b> Other appropriate response	1	
	(b)	(i) Abiotic factor - soil moisture/pH/ light intensity/nitrate level <b>OR</b> Other appropriate response	1	
		(ii) Measurement - eg use a soil moisture probe, push into soil and leave for some time, Take several measurements and calculate a mean	2	1 for description of use of equipment  1 for reliability  Equipment and description to be appropriate for abiotic factor chosen
	(c)	10.6	1	
	(d)	(i) 13 <sup>th</sup> June	1	
		(ii) - Spray with fungicide/pesticide - Grow resistant varieties - GM potatoes - Crop rotation <b>OR</b> Other appropriate response	1	Any one not 'agrochemical' or 'weedkiller' or 'fertiliser'
	(e)	- Rice grown elsewhere so must be imported (1 mark) - Therefore increased carbon footprint/food miles (1 mark) <b>OR</b> Other appropriate response	2	

Question			Expected answer(s)	Max mark	Additional guidance
3.	(a)		(D);E;C;A;B	2	4 correct= 2 marks 2/3 correct = 1 mark 0/1 correct = 0 marks
	(b)	(i)	Granite	1	
		(ii)	Sandstone is <u>porous</u> . (1 mark) Description or labelled diagram of sponge-like structure. (1 mark)	2	
	(c)	(i)	General trend is that reserves are declining/decreasing	1	
		(ii)	45.6 or 46	1	
	(d)		Petrol 160 °C Kerosene 250°C Diesel 320°C Bitumen 400°C	2	4 correct = 2 marks 2 correct = 1 mark If substances are in correct order but no temps then 1 mark
	(e)		Domestic: any reasonable response (1 mark) Industrial: any reasonable response (1 mark)	2	
4.	(a)		<u>Enhanced</u> greenhouse effect or Global warming	1	
	(b)		38	1	
	(c)		379.8	1	Accept 380

Question		Expected answer(s)	Max mark	Additional guidance
5.	(a)	Introduce legislation/promote the use of renewable energies/promote the use of local authority grants to install domestic renewable energies <b>OR</b> Other appropriate response	1	.
	(b)	Housing: For example, turning house thermostats down by one degree Wash clothes at lower temperatures Insulate lofts (1 mark)  Packaging: For example, reuse carrier bags Recycle packaging Choose goods with less packaging (1 mark) <b>OR</b> Other appropriate response	2	Needs to emphasise individual action.
	(c)	(Household) 2 :(packaging) 1	1	Not 1:2
	(d)	Methane; NO <sub>2</sub> ; H <sub>2</sub> O; CFCs; O <sub>3</sub> (ozone)	1	

Question		Expected answer(s)	Max mark	Additional guidance
6.	(a)	An organism that produces its own food (by photosynthesis)	1	
	(b)	(i) (1 mark) for suitable scale and labels on y-axis (ii) (1 mark) for labels on x-axis (iii) (1 mark) for accurate plotting of bars (usual ½ box tolerance applies)	3	
	(c)	(i) <i>P. vulgaris</i> grows better the north side of trees OR Other appropriate response	1	Not: grows better on the North Not 'likes' the north side
		(ii) Predation; competition; grazing; disease	1	
	(d)	False- species/plants and animals/living things False- community True	3	

Question		Expected answer(s)	Max mark	Additional guidance
7.	(a)	The production of crops/animals without the use of artificial fertilisers/herbicides/pesticides/drugs	1	
	(b)	Gets more money because organic produce has a higher value/lower production costs because doesn't need to buy chemicals/better for farmer's health because they don't need to use chemicals/grant aid from government to set up organic farm <b>OR</b> Other appropriate response	2	1 mark for description 1 mark for the 'because'
	(c)	Biodiversity action plans/ Environmentally Sensitive Areas/the National parks Act/ Marine Scotland Act/ Wildlife and Countryside Act/ including SSSI/ Environmental Protection Act <b>OR</b> Other appropriate response	1	Any 1
	(d)	(i) Consumers know it is a reliable/ reputable/trustworthy <b>OR</b> Other appropriate response	1	
		(ii) Would choose - healthier/better for the environment (or specific example)/less residues/better taste  Would not choose - Too expensive/quality poorer/ blemished/logos only apply to pre-packaged food and not loose foods, logos difficult to locate on packaging/difficult to understand/other logos may not be trustworthy, not so widely available <b>OR</b> Other appropriate response	1	



Question			Expected answer(s)	Max mark	Additional guidance
8.	(a)	(i)	Narrow, deep valley for storing water reservoir Narrow valley reduces quantity of concrete required to build the dam Flat stable ground to allow the construction of the power station <b>OR</b> Other appropriate response	3	3 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark
		(ii)	No access road May be too cold in winter at high altitude dam water will freeze Habitat loss Displacement of people/wildlife Noise pollution during construction Visual impact <b>OR</b> Other appropriate response	1	Any 1 reason for 1 mark
	(b)		Kinetic to electrical (+heat and sound)	1	Not electricity or movement
	(c)	(i)	Source of energy that won't run out/is infinite	1	
		(ii)	Wind; Geothermal; Biomass; Wave; Tidal; solar;	1	

Question		Expected answer(s)	Max mark	Additional guidance
9.	(a)	SEPA OR Other appropriate response	1	
	(b)	Recycle plastic/avoid buying plastic packaged goods/participate in beach litter picks/collection of litter from the sea OR Other appropriate response	1	
	(c)	494	1	Must be rounded to nearest whole number
	(d)	(i) The further south the greater the percentage of birds affected (with 0.1 g of plastic in their stomachs) OR The further north, the less the percentage of birds affected	1	
		(ii) <ul style="list-style-type: none"> <li>• More debris in areas of high shipping/(coastal)population</li> <li>• Water currents cause plastic to float to these areas</li> <li>• Higher population of Northern fulmars so greater competition for food</li> </ul> OR Other appropriate response	1	Any 1
	(e)	Mayfly larvae - presence indicates high oxygen content in water, bloodworm - presence indicates low oxygen content in water, crusty lichen - high atmospheric pollution, shrubby lichen - low atmospheric pollution OR Other appropriate response	2	1 for species 1 for correct conditions  Not accepted: 'lichen'

Question		Expected answer(s)	Max mark	Additional guidance
10.	(a)	Imposed days in port Fishing quotas GPS monitoring/policing of fishing fleet Larger fishing net mesh to allow young fish to escape On-going scientific research to predict what can be caught to maintain sustainable levels Replace demand for some fish species with farmed fish	7	Max of 5 marks for description only
	(b)	<b>Named example</b> eg grey squirrel Impact - Competes with native species Replaces native species No natural predators - creates population explosion and further disrupts native food web	7	Max 1 mark  Max of 6 marks

Question		Expected answer(s)	Max mark	Additional guidance
11.	(a)	Evaporation Condensation Cloud formation Precipitation Groundwater storage Throughflow/surface flow  <b>'Short circuits'</b> - evaporation from lochs transpiration from plants  Low-flush toilets Grey water Drip irrigation Mend leaks Appliances that use less water <b>OR</b> Other appropriate responses	7	Max of 4 marks for description of water cycle
	(b)	<b>Nitrogen in the atmosphere-</b> Electrical storms/ $N_2O$ + rain $N_2ONH_4$ ->added to soil Human activity car exhausts/coal fired power stations release $N_2O$ <b>Nitrogen in the soil-</b> Input -> decomposition of organic matter Animal dung/manure Output -> Escapes as gas from soil surface Nitrogen fixating plants such as clovers Infiltrates into pore spaces in soil and groundwater -> uptake by plants and microbes  Food production: nitrates contribute to the production of plant protein Plant proteins contribute to the synthesis of animal protein	7	Max of 5 marks for description only

[END OF MARKING INSTRUCTIONS]