



National
Qualifications
2014

2014 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) There are no half marks awarded.
- (d) 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 nonmathematical reasoning.
- (e) 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.
- (f) 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)	Mates/territory/water/space	1	Any other acceptable answer Not habitat/nests/land								
	(b)	Zoos/ captive breeding programmes/ monitoring populations numbers	1	Any other acceptable answer								
	(c)	<table border="1"> <thead> <tr> <th>Term</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td>Biodiversity</td> <td>The range of different species in an ecosystem</td> </tr> <tr> <td>Habitat</td> <td>The place where an organism lives</td> </tr> <tr> <td>Community</td> <td>All the organisms/species (plants and animals) in an ecosystem</td> </tr> </tbody> </table>	Term	Definition	Biodiversity	The range of different species in an ecosystem	Habitat	The place where an organism lives	Community	All the organisms/species (plants and animals) in an ecosystem	3	
Term	Definition											
Biodiversity	The range of different species in an ecosystem											
Habitat	The place where an organism lives											
Community	All the organisms/species (plants and animals) in an ecosystem											
	(d)	Recycling of nutrients / reduce competition for space / nutrients	1									

Question		Expected Answer(s)	Max Mark	Additional Guidance
2.	(a) (i)	<ol style="list-style-type: none"> adding a scale and label to the horizontal (x) axis adding a scale and label to the vertical (y) axis completing the line graph to show the change in pH over time 	3	1 mark for each Connecting lines should be drawn as one single line. Ruler acceptable. y-axis plot can start at 4
	(ii)	Repeat the testing	1	
	(iii)	Temperature, (soil) moisture, nutrient availability.	1	
	(iv)	Error - Dirty/moist probe/probe not far enough into soil Minimisation - wipe clean/dry probe/ensure probe fully into soil	2	One mark for error One mark for minimisation
	(b)	Purple flowers Untoothed leaves	2	

Question			Expected Answer(s)	Max Mark	Additional Guidance
3.	(a)	(i)	An animal that eats both plants and other animals	1	
		(ii)	They both eat the same food/insects	1	Do not accept 'food'/'insects' on its own.
		(iii)	Increase - more <u>insects</u> available for bats to feed on/more insects for spiders to feed on, therefore more spiders for bats to feed on.	1	Any other correct explanation. Not 'less competition for insects'
	(b)	(i)	Heat/movement/sound	1	Any one correct answer Not 'warmth'
		(ii)	Decomposer/bacteria/fungi	1	
	(c)		<p>Agree - habitat destroyed/nesting site for Barn owl unavailable/noise disturbance may make animals move away/ground works may damage plant life/animals will have to be moved</p> <p>Disagree - new habitat created/landscaping of site creates habitats/conservation arrangements agreed for development, eg erection of nest boxes, etc</p>	1	Any other appropriate answer

Question			Expected Answer(s)	Max Mark	Additional Guidance
4.	(a)	(i)	Certain types of lichen can only grow in areas where there is a good air quality.	1	Any other acceptable answer
		(ii)	Producer	1	Do not accept photosynthesis
	(b)		4:3:1	1	
	(c)		<p>Human Activity - Conservation Impact Humans have conservation areas for animals and plants which are threatened or reduced in numbers to ensure they are protected and for survival of the species. This ensures there is a variety of plants and animals in an ecosystem.</p> <p>Human Activity - Overfishing Impact Humans can fish for certain species of fish as they will sell for the most money or are easiest to catch. This reduces and in some cases endangers species and reduces the biodiversity of the ecosystem.</p> <p>Human Activity - Building development Impact - destroys habitat</p>	2	<p>1 mark for named activity</p> <p>1 mark for impact/explanation</p> <p>Any other acceptable answer</p>

Question		Expected Answer(s)	Max Mark	Additional Guidance
5.	(a)	A = Transpiration C = Evaporation	2	1 mark each
	(b) (i)	Water shortages Flooding Drought	1	Any appropriate answer
	(ii)	F - irrigation T F - permeable	3	Must have correction for false statement
	(c)	Creating energy from a renewable resource/creates habitat/reduces flooding	1	
	(d)	Only boil enough water Use grey water in garden Hippo in cistern Shower instead of bath	1	Any acceptable answer

Question		Expected Answer(s)	Max Mark	Additional Guidance
6.	(a)	Physical resource	1	
	(b)	Limestone is a <u>sedimentary</u> rock. 1 It is formed in shallow, calm, warm marine waters. When these animals die their shell and skeletal debris accumulate as sediment which over time, and under pressure is gradually turned into limestone. 1	2	1 mark for stating that limestone is formed into sedimentary rock 1 mark for describing the conditions in which this type of rock is formed
	(c)	1 mark for correct pie sections 1 1 mark for correct labelling of each section. 1	2	Lines to be drawn with a ruler. Lines to meet in the middle and be accurate at the edge of the pie chart. Labels to be clearly identified
	(d)	66.67% or 67%	1	
	(e)	By promotion of recycling, reducing and re-using materials which may be sent to landfill. Landfill tax	1	

Question			Expected Answer(s)	Max Mark	Additional Guidance
7.	(a)	(i)	coal	1	Only accept coal on its own
		(ii)	15,200 32.8% or 33%	2	1 mark for totalling energy generated 1 mark for correct percentage (accept 33%)
		(iii)	Solar, wave, tidal, biofuel	1	Any other acceptable answer that is not stated in the graph

Question			Expected Answer(s)	Max Mark	Additional Guidance
8.	(a)		Tourism / water supply / electricity production / irrigation/ recreation	2	Any other suitable.
	(b)		In order for resource to be used now and also be available in the future	1	Answer must provide statement of use now and in the future
	(c)		Control fishing methods Control number of fish removed/quotas Catch and return Limit Fisherman numbers Permits Monitor disease Monitor populations Tagging schemes Monitor non-native spread Monitor genetic variation within populations Fish ladders to monitor numbers Designated fishing areas Closed season/time restrictions	2	
	(d)		Trout	1	
	(e)		Perch, roach and tench	1	Must have all three named species
	(f)		SEPA	1	Any acceptable. SNH, RSPB

Question			Expected Answer(s)	Max Mark	Additional Guidance
9.	(a)		Economic - B or G Sustainable development - D	2	One mark for each correct letter
	(b)		Is aware of the wider world and has a sense of their own role as a world citizen Respects and values diversity Has an understanding of their obligations to the environment Is willing to act to make the world a more sustainable place Takes responsibility for their actions Identifies personal contribution to becoming a global citizen	2	Any answer which illustrates an understanding of these examples. 1 mark for each, eg recycle, car-share, switch off lights when not in use, etc

Question			Expected Answer(s)	Max Mark	Additional Guidance
10.	(a)	(i)	Carbon dioxide / Methane	1	
		(ii)	Park and ride/ congestion charges to reduce number of cars on the road and therefore the volume of CO ₂ produced Growing your own food to save on food miles Electric cars - no exhaust fumes which lead to global warming Use coal burning fires less because burning coal releases CO ₂	2	One mark for sustainable approach, one mark for justification Any other acceptable answer
	(b)		Social - water and food shortages Economic - increased cost of living eg food and fuel prices Environmental - habitat loss, reduce biodiversity/changes temperature and affects which crops can be grown.	1	Any other acceptable answer

Question		Expected Answer(s)	Max Mark	Additional Guidance
11.	(a)	It must be transported further to reach the supermarket from the original source	1	Not where the food comes from. Must have a suggestion of distance travelled
	(b)	28	1	
	(c)	<u>Abiotic</u> CO ₂ / nutrients / light intensity / water 1 <u>Biotic</u> Pests / diseases / competition 1	2	Term 'amount' is acceptable for a volume quantity (eg water) but not for a number quantity.
	(d)	Source food from local producers/grow own veg/buy fruit/veg in appropriate season.	1	

Question		Expected Answer(s)	Max Mark	Additional Guidance
12.	(a)	<p>Requirements for siting a wind farm</p> <ul style="list-style-type: none"> • Area should be subject to consistent wind/have suitable meteorological/weather conditions • Accessible for construction and maintenance • Accessible to the national grid • In an area that won't result in visual pollution/unsightly • Not disrupt animal migration patterns • Planning permission needs to be sought • Opportunity for people to raise objections • Destroying species/habitat <p>Energy production from wind power</p> <ul style="list-style-type: none"> • Movement energy from the wind makes the rotors/blades move/spin • Movement from the rotors/blades gives power to the generator • Which is converted to electrical energy • Electrical energy can be stored in batteries/enter the national grid 	7	<p>Any other appropriate information</p> <p>Max 4 marks for siting of windfarm.</p> <p>Any other appropriate answer</p> <p>Max 4 marks for issues relating to energy production from wind power.</p>

Question		Expected Answer(s)	Max Mark	Additional Guidance
12.	(b)	<p>Formation</p> <ul style="list-style-type: none"> • Found in sedimentary rocks • Formed from chemical reactions that combined iron and oxygen • In marine and fresh waters • (when iron ores were formed) oceans contained abundant dissolved iron and almost no dissolved oxygen • When the first photosynthetic organisms began releasing oxygen into the waters it combined with dissolved iron • To form iron oxide <p>Extraction of iron from its ore</p> <ul style="list-style-type: none"> • Iron extracted from iron ore • In a blast furnace • Oxygen removed from the iron oxide to leave iron/is reduced • Coke/source of carbon needed to burn to produce carbon monoxide • Which is needed to remove oxygen from iron oxide/reduce iron oxide • Air/oxygen needed to allow coke to burn • Limestone/calcium carbonate added to help remove acidic impurities 	7	<p>Max 3 marks for formation of iron ore</p> <p>Max 4 points for extraction of iron from its ore</p>

Question		Expected Answer(s)	Max Mark	Additional Guidance
13.	(a)	<p>A definition of sustainability being the use of a resource now and it being available for use by future generations.</p> <p>Candidates should make reference to reduce, reuse and recycle.</p> <p>Individuals could reduce their waste by methods such as only buying what they need from the shops to save on food waste. This will allow sustainable food production to take place in order to feed the growing human population.</p> <p>Individuals could reuse packing and other materials for other purposes. This saves waste and processing of raw materials, making raw materials last longer.</p> <p>Individuals could use recycle bins for materials such as glass, paper, etc. This saves wasting raw materials that could be used to make new products, making raw materials last longer.</p>	7	<p>Max 2 marks</p> <p>1 mark for each appropriate description and 1 mark for link to sustainability</p> <p>2 marks for this response</p> <p>2 marks for this response</p> <p>2 marks for this response</p> <p>Any other appropriate answer</p>

Question		Expected Answer(s)	Max Mark	Additional Guidance
13.	(b)	<p>Organic farming is the production of plant or animal crops using management practices which aim to avoid the use of agro-chemical inputs and which minimise damage to the environment and wildlife.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Insect/weed pests are not killed... • ...so biodiversity maintained • Fertilisers not used which may leach into waterways (and cause eutrophication) • Farmers may save costs by avoiding costs of purchasing agro-chemicals • Fewer resources used in the production/delivery of agro-chemicals • Less fossil fuels used because application of agro-chemicals is reduced • Product may have increased value • Some people regard organic produce to be more flavoursome/healthy • More employment opportunities if weed control for example needs to be done manually <p>Disadvantages</p> <ul style="list-style-type: none"> • Lower yield... •so additional land needs to be brought into production to make up shortfall • Pest species may get out of control resulting in crop failure • Quality of product may be lower because of lack of nutrients and/or pest damage • Product may be of inconsistent quality • - Increased production costs if additional labour for manual control of weeds, etc is employed 	7	<p>1 mark for correct definition Any other correct definition.</p> <p>Max. 3 marks for advantages Max. 3 marks for disadvantages</p> <p>Any other correct advantage</p> <p>Any other correct disadvantage</p>

Question			Expected Answer(s)	Max Mark	Additional Guidance
			<ul style="list-style-type: none"> • May only be a small/niche market for organic produce • People may not want to pay premium for organic produce • Product may not have as a long a shelf life as conventionally produced product • can't support world food security 		

[END OF MARKING INSTRUCTIONS]