National
Qualifications
2016

2016 Environmental Science

National 5

Finalised Marking Instructions

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)		Habitat	**1**	
	(b)		Organisms which can breed to produce fertile offspring Biodiversity	**2**	
	(c)	(i)	Adding labels to axes Drawing a suitable scale (1) Plotting points accurately and drawing line (1)	**2**	Allow ±½ box tolerance in plotting points
		(ii)	35 500 – 36 000 Must include thousand	**1**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
2.	(a)		Use a larger number of quadrats, share results as a class Establish a basic rule and stick to it eg if plant is more than half in the quadrat then it is counted. Place quadrat randomly	**1**	
	(b)		Soil moisture Wipe probe, insert into soil, allow reading to stabilise, take reading from correct scale. **OR** Description of weighing/drying until constant weight then calculate % moisture.	**2**	Both marks for description Any full description covering at least three steps = 2 marks Any full description covering at least two steps = 1 mark

Question			Expected Answer(s)	Max Mark	Additional Guidance
3	(a)	(i)	Arrow going from carbohydrates in plants to carbohydrates in animals.	**1**	Also accept curly arrow from animals back to animals
		(ii)	Combustion/burning	**1**	
	(b)		Water + oxygen (Both required)	**1**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
	(c)	(i)	50 units	**2**	1 mark for correct reading of the four values from graph (66, 38, 40, 56)
		(ii)	The temperatures are lower so rate of reactions/ decomposition is slower	**2**	Or most of the leaves have already decomposed, so less co_2 produced.

Question			Expected Answer(s)	Max Mark	Additional Guidance
4.	(a)		A species that can only thrive under certain environmental conditions and whose absence or presence indicate those conditions are there/prevalent.	**1**	
	(b)	(i)	*Ramalina fraxinea*	**1**	
		(ii)	*Lepraria incana* and *Hypogymnia physodes* Both required	**1**	Spelling should not be penalised unless it is unintelligible.
	(c)	(i)	*Pannaria rubiginosa*	**1**	
		(ii)	Similarity -both are bushy or hair-like lichens or can be removed without damaging tree bark. Difference -*Teloschistes flavicans* is orange, *Usnea articulate* is green or grey.	**2**	Must have a comparison for difference.
		(iii)	Time of day when surveyed/age or maturity of lichen/seasonal variability/perception of colour/ health of lichen	**1**	Any other acceptable answer

Question			Expected Answer(s)	Max Mark	Additional Guidance
5.	(a)		X = core = 1 Y= mantle = 1	**2**	
	(b)	(i)	False correction cooling/ solidifying False correction geosphere True	**3**	
		(ii)	Weathering is the natural wearing down of rocks by elements in the environment. Erosion is the process of transporting weathered material	**2**	Any other appropriate responses eg biological, mechanical, chemical Any other appropriate responses eg hydraulic action, abrasion, attrition, corrosion, corrasion
	(c)		Any suitable answer, eg • Bauxite ($Al(OH)_3$ for production of aluminium)	**1**	• Brackets below • Argentite: Ag_2S for production of silver • Chalcocite: Cu_2S for production of copper • Chromite: $(Fe, Mg)Cr_2O_4$ for production of chromium • Cinnabar: HgS for production of mercury • Cobaltite: (Co, Fe)AsS • Columbite-Tantalite or Coltan: $(Fe, Mn)(Nb, Ta)_2O_6$ • Dolomite: $CaMg(CO_3)_2$ • Galena: PbS • Gold: Au, typically associated with quartz or as placer deposits • Hematite: Fe_2O_3 • Magnetite: Fe_3O_4 • Malachite: $Cu_2CO_3(OH)_2$

Question			Expected Answer(s)	Max Mark	Additional Guidance
6.	(a)		Can produce as much energy as a nuclear power station Produces 10 times the annual electricity usage for Scotland Produce Renewable energy	**2**	Energy security
	(b)		Strong tidal streams/powerful Atlantic waves/narrow sea channels	**1**	
	(c)		6 GW	**1**	Unit is required for the mark
	(d)		propellers attached to a column (mid water) –turbine on seabed (1) -wave power on surface -tidal power under surface (1)	**2**	Propellers and turbine Seabed and mid water

Question			Expected Answer(s)	Max Mark	Additional Guidance
7.	(a)		Scotland's zero waste plan	**1**	Other appropriate responses, eg Landfill Tax (Scotland) Finalise during standardisation
	(b)	(i)	22·6(%)	**2**	1 mark for $\frac{5{\cdot}00}{(5{\cdot}00+14{\cdot}89+2{\cdot}28)}$ Accept 23, 22·55, 22·553
		(ii)	Metal/plastic **OR** A named example	**1**	
	(c)		Construction company – save cost due to reduction in fuel use/ employee time/ Environment – reduction in carbon dioxide in the atmosphere/less road traffic/less noise	**2**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
8.	(a)		21:17	**1**	
	(b)		Identifying a reason eg packaging (1) Description (1) Any sensible suggestion eg reuse carrier bags, legislation to reduce packaging	**2**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
9.	(a)		Decrease biodiversity/destruction of habitat/creation of habitat/ spread of plants/less co_2 emissions because fewer cars on road	**1**	
	(b)		B and C Must have both	**1**	
	(c)	(i)	Blast furnace	**1**	
		(ii)	Carbon dioxide/carbon monoxide/ sulfur dioxide	**1**	
		(iii)	Helps remove impurities from the iron (to form slag)	**1**	
	(d)		Buildings/bridges/tools/structured support for buildings	**1**	
	(e)		Agree – rail link means fewer cars on the road so less greenhouse gases Disagree – so much greenhouse gas produced during construction Neither agree nor disagree -answer as appropriate	**1**	

Question			Expected Answer(s)	Max Mark	Additional Guidance
10	(a)		**Advantages** No pesticides/less eutrophication/ increased biodiversity/healthier product **Disadvantages** Large land areas (extensive)/ higher cost/labour intensive/lower yields/more pest/decrease damage	**2**	
	(b)		eg lamb/mutton/wool/milk/beef/ potatoes/trees/timber biofuels/ oilseed rape	**1**	
	(c)		eg cereal farming and conservation – use of agro-chemicals kills insects wind farms and conservation - protecting areas for conservation may halt development of wind farms needed to produce renewable energy	**2**	1 mark for the activity (eg use of agro-chemicals) and 1 mark for consequence (eg kills insects)

Question					Max Mark	Additional Guidance
11.	(a)	(i)	Water stored in permeable rocks under the ground (aquifer)		**1**	
		(ii)	Bore a hole (well) and pump out water from ground/dig a well and lower a bucket		**1**	
	(b)		More water will be extracted (1) Water is extracted at a greater rate than it is replenished/water table will fall (1)		**2**	Pollution from industry, agriculture etc
	(c)	(i)	1 mark for correctly sized segments 1 mark for correct labels + quantities		**2**	Allow ±2° tolerance
		(ii)	A	1 mark for appropriate difference eg %water used for other will be greater -less % for washing machines and dish washer/bath/shower -greater % for drinking	**1**	

Question			Expected Answer(s)		Max Mark	Additional Guidance
			B	1 mark for correct reason eg larger proportion used for irrigation in small gardens/ vegetable plots -because less used for some things, % of the others will go up (even if actual volume doesn't)	1	

Question			Expected Answer(s)	Max Mark	Additional Guidance
12.	A		Landscape - disturbance during construction - unsightly - needs large areas of land - may cause erosion Wildlife - construction may drive animal life away - plants may be trampled/ destroyed during construction - birds may be injured by blades - noise/blade movement may disturb nesting birds/other animals - interference with migration routes - may be beneficial to wildlife if shooting no longer possible in the area.	7	Any other appropriate information. Maximum of 6 marks awarded for Landscape Maximum of 6 marks awarded for wildlife Any other appropriate answer

Question			Expected Answer(s)	Max Mark	Additional Guidance
	B		Formation Limestone is a sedimentary rock meaning it is made of sediments such as shell, coral or fecal debris. Most limestone forms in shallow, calm, warm water where organisms with carbonate shells thrive, when they die their remains accumulate which may form limestone. Discovery and extraction Limestone can be quarried. It can also be mined underground. Uses Limestone is commonly used in the construction of monuments/ concrete. Limestone can also be crushed and used as aggregate to surface roads. Limestone can also be crushed finely to be used in household products such as sealants. Paint, construction, manufacturing of iron, glass, quicklime or lime mortar	**7**	Maximum four marks from any section but must address all three sections to access full marks.

Question			Expected Answer(s)	Max Mark	Additional Guidance
13	A		Organisations may include SEPA, SNH, FCS, Forest Enterprise, Police Examples of policies and legislation to include Biodiversity actions plans Environmentally Sensitive areas National Parks Act Marine Scotland Act Wildlife and Country Side Act Designated SSSI	**7**	Any suitable appropriate answer Website containing relevant legislation which would be acceptable. http://www.netregs.org.uk/legislation/scotland/current/air_legislation.aspx

Question			Expected Answer(s)	Max Mark	Additional Guidance
	B		Activity/impact • Pollution from industries (chemicals, paper or any named) • Pollution from agriculture • Pollution from transport (boats) • Anglers removing fish • Habitat disturbance by draining, road building, transport • disturbance in pursuit of recreation fewer species or numbers • or any other correct change Conservation Measures • Legal protection • Designated area eg SSSI • SEPA to monitor pollution • Ranger service • Create conservation areas, involve SWT • Education centres for locals • Fishing permits • Polluter pays principle	**7**	Max 3 marks for named activities Max 3 marks for impact Max 3 marks for conservation method

[END OF MARKING INSTRUCTIONS]