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## **Commentary on Candidate Evidence**

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## **Higher Environmental Science Question Paper**

# Commentary on Candidate 1

## Question Paper

The evidence for this candidate has achieved the following marks for each question in this Course Assessment component.

### Question 1

The candidate was awarded **7 out of 8 marks** because he/she showed a good understanding of the hydrological cycle and river discharges, including reading hydrographs.

One mark was lost from this question. The candidate provided 3 responses for part 1(b) (i) but one response was incorrect: both tributaries return to base flow (normal conditions) after approx. 8 hours, not 10 hours.

### Question 2

The candidate was awarded **8 out of 10 marks** because he/she showed a good understanding of conservation measures, validity and improvements of sampling methods, and ratio calculations.

One mark was lost from part 2(a) as SNH is not responsible for protecting areas "*by providing responsible routes for tourism*".

One mark was lost from part 2(c)(iii) as the candidate should have started with the data for year 0 on the y-axis, and has also plotted data for year 2 which doesn't appear in the table. When marking graphs, >90% of processing should be correct ie plotted points.

### Question 3

The candidate was awarded **4 out of 8 marks** because he/she did not show a good understanding of the formation of baryte deposits.

One mark was lost from part 3(b)(ii) as the candidate thought that new baryte would form and be mined within a single year.

Both marks were lost for part 3(c) as the candidate did not make the link between weathering of baryte-rich parent rock and the accumulation of deposits at the interface. This question links with the Earth's Resources biosphere: soils component.

One mark was lost from part 3(d)(ii) while barium sulfate does absorb x-rays (hence why it is used in biomedical imaging), it does not protect against radiation.

#### **Question 4**

The candidate was awarded **7 out of 9 marks** because he/she dealt well with this topic, which mostly required candidates to apply knowledge and understanding to new situations.

One mark was lost from part 4(a) as time is not a factor usually considered in life cycle analysis.

One mark was lost from part 4(b), a calculation.

#### **Question 5**

The candidate was awarded **10 out of 11 marks** because he/she showed a good understanding of problems associated with persistent pesticides.

One mark was lost from part 5(b) because the candidate did not understand about energy transfer & losses in food chains.

#### **Question 6**

The candidate was awarded **7 out of 8 marks** because he/she showed a good understanding of cause and effect of greenhouse gas emissions.

One mark was lost from part 6(a)(i) because the candidate was not sufficiently specific when describing the trend shown in the emissions graph.

#### **Question 7**

The candidate was awarded **4 out of 8 marks**, all from part 7(b), because he/she did not show an understanding of the link between changes in climate having an effect on the atmosphere, or a natural factor that could contribute to such changes in climate.

#### **Question 8**

The candidate was awarded **7 out of 9 marks** because he/she demonstrated a good understanding of the Common Agricultural Policy (CAP). The CAP has undergone two major phases of reform and candidates were given credit for responses related to any phase of CAP.

One mark was lost from part 8(a) as the 'old' CAP (post-1992) had decoupled farm subsidies from the production of most crops.

One mark was lost from part 8(b) because it was felt that the candidate did not adequately discuss sustainability aims in relation to their example of a growing population.

### **Question 9**

The candidate was awarded **7 out of 9 marks** because he/she showed a good understanding of issues associated with shale extraction.

One mark was lost from part 9(a)(i) as the description of the formation of shale gas was lacked depth.

One mark was lost from part 9(b)(i) because the candidate comments on use of oil, not shale gas.

### **Question 10**

The candidate was awarded **9 out of 10 marks** because he/she showed exceptional understanding of arguments for and against re-introduction of nationally extinct species.

### **Question 11**

The candidate was awarded **10 out of 10 marks** because he/she showed exceptional understanding of the benefits and challenges of a piece of waste management legislation he/she had studied, in this case the Landfill Directive.

# Commentary on Candidate 2

## Question Paper

The evidence for this candidate has achieved the following marks for each question in this Course Assessment component.

### Question 1

The candidate was awarded **5 out of 8 marks** because he/she demonstrated a fairly good understanding of the hydrological cycle.

One mark was lost in part 1(a)(ii) because the marker felt that the description of transpiration was not sufficient in depth.

Two marks were lost in part 1(b)(ii) because the candidate did not give a change in land use or explain how that change would affect river discharge.

### Question 2

The candidate was awarded **7 out of 10 marks** because he/she showed a good understanding of conservation measures, validity and improvements of sampling methods, and ratio calculations.

One mark was lost from part 2(a) because only one response related to countryside management.

Two marks were lost from part 2(b) because the responses were either incorrect or lacked depth.

### Question 3

The candidate was awarded **2 out of 8 marks** because he/she showed a poor understanding of the formation of baryte deposits.

One mark was awarded in part 3(a) because the response was mostly correct.

One mark was awarded in part 3(d) (ii) because the marker felt that there was sufficient correct in the response to warrant a partial mark.

### Question 4

The candidate was awarded **5 out of 9 marks** because he/she dealt fairly well with this topic, which mostly required candidates to apply knowledge and understanding to new situations.

Two marks were lost from part 4(a) because the responses about life cycle analysis lacked depth.

One mark was lost from part 4(b) because the calculation was incorrect.

One mark was lost from part 4(c) because the question was seeking comparisons between the two processes and the responses given lacked appropriate depth.

### **Question 5**

The candidate was awarded **8 out of 11 marks** because he/she showed a good understanding of problems associated with persistent pesticides.

One mark was lost from part 5(a) (i) because the marker felt that the response was only partially correct.

One mark was lost from part 5(a) (ii) because the response was not sufficiently complete to be able to award both marks.

One mark was lost from part 5(b) because the candidate did not demonstrate understanding of energy transfer & loss in a food chain.

### **Question 6**

The candidate was awarded **8 out of 8 marks** because he/she showed a very good understanding of cause and effect of greenhouse gas emissions.

### **Question 7**

The candidate was awarded **6 out of 8 marks** because he/she demonstrated a good understanding of factors affecting both weather and climate.

One mark was lost from part 7(b)(i) because the marker felt that the candidate had touched on only some of the expected response.

One mark was lost from part 7(c) because the first part of the response was incorrect.

### **Question 8**

The candidate was awarded **5 out of 9 marks** because he/she showed a fairly good understanding of the CAP, but there is room for improvement.

Marks were lost from parts 8(b) and 8(c) because the marker felt that the responses were only partially correct.

One mark was lost from part 8(d) because the candidate commented on use of biofuels, he/she did not specifically name a crop that could be used to produce a biofuel.

### **Question 9**

The candidate was awarded **8 out of 9 marks** because he/she showed a very good understanding of issues associated with shale extraction.

One mark was lost from part 9(b) (i) because the response was not specific enough.

### **Question 10**

The candidate was awarded **10 out of 10 marks** because he/she showed exceptional understanding of arguments for and against re-introduction of nationally extinct species.

### **Question 11**

The candidate was awarded **7 out of 10 marks** because he/she showed a fairly good understanding of the benefits and challenges of national policy or legislation relating to climate change or renewable energy.

# Commentary on Candidate 3

## Question Paper

The evidence for this candidate has achieved the following marks for each question in this Course Assessment component.

### Question 1

The candidate was awarded **5 out of 8 marks** because he/she demonstrated a fairly good understanding of the hydrological cycle.

One mark was lost in part 1(a)(ii) because the candidate did not name the process, in this case transpiration.

Both marks were lost in part 1(b)(ii) because the response was not appropriate.

### Question 2

The candidate was awarded **6 out of 10 marks** because he/she showed a good understanding of conservation measures, validity and improvements of sampling methods, and ratio calculations.

One mark was lost from part 2(a) because only the second part of the response was appropriate.

Two marks were lost from part 2(c)(ii) because although both responses start off well, they each then veer off in the wrong direction eg the inference that grey squirrels eat red squirrels.

One mark was lost from part 2(c)(iii) because the x-axis scale is incorrect.

### Question 3

The candidate was awarded **0 out of 8 marks** because he/she showed a very poor understanding of this key area on baryte.

### Question 4

The candidate was awarded **6 out of 9 marks** because he/she dealt fairly well with this topic, which mostly required candidates to apply knowledge and understanding to new situations.

One mark was lost from part 4(a) because the responses about life cycle analysis lacked depth.

One mark was lost from part 4(b) because the calculation was incorrect.

One mark was lost from part 4(d)(ii) because one response was largely incorrect and the other lacked appropriate depth.

### **Question 5**

The candidate was awarded **5 out of 11 marks** because he/she showed a basic understanding of problems associated with persistent pesticides.

One mark was lost from part 5(a)(i) because the marker felt that the response was only partially correct.

One mark was lost from part 5(a)(ii) because the response was not sufficiently complete to be able to award both marks.

One mark was lost from part 5(a)(iii) because the candidate did not appear to understand how biodegradable pesticides operate. One mark was awarded for the conversion to organic farming because, although the candidate's use of 'not' muddled the response and it should have been marked down, the marker felt that the candidate did demonstrate an understanding of the actual process.

Both marks were lost from part 5(c)(ii) because the response was incorrect.

### **Question 6**

The candidate was awarded **5 out of 8 marks** because he/she showed a basic understanding of cause and effect of greenhouse gas emissions.

One mark was lost from part 6(a)(ii) because the second part of the response was muddled.

The mark for part 6(b) was lost because he/she mentions only methane production (by animals) and the issue is much larger than that.

One mark was awarded in part 6(d) because he/she had touched on some of the response.

### **Question 7**

The candidate was awarded **3 out of 8 marks** because he/she demonstrated a basic understanding of factors affecting both weather and climate.

One mark was lost from part 7(a) because the response was inaccurate eg what is 'normal'? It's not part of the key.

One mark was lost from part 7(b)(i) as it was a partial response, not quite hitting the target.

Both marks were lost from part 7(b)(ii) because he/she did not name a natural factor or explain its contribution. Does increased condensation always mean that the air will be colder?

One mark was lost from part 7(c) because although the candidate had captured the gist, he/she did not provide sufficient detail about the impact.

### **Question 8**

The candidate was awarded **6 out of 9 marks** because he/she showed a fairly good understanding of the CAP.

One mark was lost from part 8(a) because the first part of the response was incorrect.

Both marks were lost from part 8(b) because the first part would be a strategy to improve sustainability but not an aim, and factory emissions are linked to air quality rather than specifically to sustainability of food production.

### **Question 9**

The candidate was awarded **4 out of 9 marks** because he/she showed a fairly basic understanding of issues associated with shale extraction.

Both marks were lost from part 9(a)(i) because the response did not relate to the formation of shale gas.

One mark was lost from part 9(a)(ii) because the response was too basic ie no mention of fracking or acidizing.

Both marks were lost from part 9(c) because he/she did not attempt it.

### **Question 10**

The candidate was awarded **5 out of 10 marks** because the response was fairly brief and he/she showed only a basic understanding of arguments for and against re-introduction of nationally extinct species.

### **Question 11**

The candidate was awarded **5 out of 10 marks** because he/she showed only a basic understanding of the benefits and challenges of national policy or legislation relating to climate change or renewable energy. Additionally, no specific policy or legislation was mentioned.

# Commentary on Candidate 4

## Question Paper

The evidence for this candidate has achieved the following marks for each question in this Course Assessment component.

### Question 1

The candidate was awarded **7 out of 8 marks** because he/she demonstrated an excellent understanding of the hydrological cycle.

No mark was awarded for part 1(a)(i) because the response was incorrect.

### Question 2

The candidate was awarded **7 out of 10 marks** because he/she showed a good understanding of conservation measures, validity and improvements of sampling methods, and ratio calculations.

One mark was awarded for part 2(a) for discussing reforestation.

One mark was lost from part 2(b) because of a lack of discussion of validity. Being backed by research would make the data robust rather than valid or reliable.

One mark was lost from part 2(c)(ii) because the response is muddled eg suggestion that grey squirrels prey on red squirrels.

### Question 3

The candidate was awarded **2 out of 8 marks** because he/she showed a very poor understanding of this key area on baryte.

No mark was awarded for part 3(a) because the response was incomplete.

No mark was awarded for part 3(b)(i) because the response was only partially complete. Although the calculation was correct, the response should either have been expressed as 505% or expressed to two significant figures (505.15%) instead of being rounded up. NB advice was received from SQA on this matter.

No marks were awarded for part 3(c) because the candidate did not know how soil formation could contribute to baryte deposits.

No marks were awarded for part 3(d)(ii) because the response was incorrect.

#### **Question 4**

The candidate was awarded **5 out of 9 marks** because he/she dealt fairly well with this topic, which mostly required candidates to apply knowledge and understanding to new situations.

No marks were awarded for part 4(a) as factors specifically considered in life cycle analysis are energy, materials and transport (in relation to making, using, or disposal of a product).

One mark was lost in part 4(c) because in the second part of the response the candidate moves away from disadvantages of energy recovery.

One mark was lost in part 4(d)(i) as the second part of the response is not an environmental benefit.

#### **Question 5**

The candidate was awarded **3 out of 11 marks** because he/she showed a poor understanding of problems associated with persistent pesticides.

One mark was awarded in part 5(a)(i) for the movement of pesticides from farm to sea, but there was no mention made about how the pesticides were applied on the farm. No mark awarded for fish intaking pesticides through consumption of prey since this was not asked for.

No marks were awarded for part 5(a)(ii) because the candidate does not demonstrate good understanding of bioaccumulation ie storage within the body/fatty tissues, non-excretion, and build up in concentration over time within the individual organism.

One mark was lost from part 5(a)(iii) because the candidate misses the important point that organic farmers don't use synthetic pesticides, which bioaccumulate. They can use natural/organic pesticides, which biodegrade.

No mark was awarded in part 5(b) because the response was incorrect.

One mark was lost from part 5(c)(i) as the marker did not feel that the response was sufficiently specific to be awarded 2 marks.

No marks were awarded for 5(c)(ii) as the candidate does not show an understanding of the difference between an ectotherm and endotherm.

#### **Question 6**

The candidate was awarded **6 out of 8 marks** because he/she showed a good understanding of cause and effect of greenhouse gas emissions. The two marks were lost from part 6(d)(ii) because the response does not say how litter or oil

impacts on the environment ie they are examples of pollution but what impact do they actually have on the environment?

### **Question 7**

The candidate was awarded **4 out of 8 marks** because he/she demonstrated a basic understanding of factors affecting both weather and climate.

No marks were awarded for part 7(b)(i) because he/she discussed weather events rather than climate.

One mark was awarded in part 7(b)(ii) for naming El Nino/La Nina but the candidate does not describe how either contributes to climate variability.

One mark was awarded in part 7(c) for discussion of leaching. Although the candidate does comment on biota and their role in decomposition, the second mark was not awarded as he/she missed the point about flooding being likely to remove/kill soil biota.

### **Question 8**

The candidate was awarded **2 out of 9 marks** because he/she showed a poor understanding of the CAP.

No marks were awarded for part 8(a) because the candidate uses market support information provided in the stem.

No marks were awarded for part 8(b) because the candidate does not adequately discuss what is meant by sustainability in relation to food production.

One mark was awarded for part 8(c) because of discussion of fertilisers and algal blooms but the candidate does not then comment on the actual environmental impact of these blooms.

One mark was awarded in part 8(d) for naming a non-food crop, but the candidate does not then comment on what cotton is used for.

The mark was lost for part 8(e) due an incomplete response eg afforestation to provide timber.

### **Question 9**

The candidate was awarded **5 out of 9 marks** because he/she showed a fairly basic understanding of issues associated with shale extraction.

No response was provided for part 9(a)(i).

One mark was lost in part 9(a)(ii) because, although fracking is stated, the marker felt the rest of the response lacked sufficient depth.

No mark was awarded in part 9(b)(i) because the response is largely incorrect.

### **Question 10**

The candidate was awarded **7 out of 10 marks** because the candidate gave a good account of arguments for and against reintroduction of nationally extinct species.

### **Question 11**

The candidate was awarded **0 out of 10 marks** because he/she did not provide a response.

# Commentary on Candidate 5

## Question Paper

The evidence for this candidate has achieved the following marks for each question in this Course Assessment component.

### Question 1

The candidate was awarded **7 out of 8 marks** because he/she demonstrated an excellent understanding of the hydrological cycle.

No mark was awarded for part 1(a)(i) because the response was incorrect.

### Question 2

The candidate was awarded **9 out of 10 marks** because he/she showed an excellent understanding of conservation measures, validity and improvements of sampling methods, and ratio calculations.

One mark was awarded in part 2(c)(ii) because the candidate correctly identified that most interaction would be between the pine marten and grey squirrel.

### Question 3

The candidate was awarded **1 out of 8 marks** because he/she showed a very poor understanding of this key area on baryte. The single mark awarded was for part 3(b)(ii).

### Question 4

The candidate was awarded **6 out of 9 marks** because he/she dealt fairly well with this topic, which mostly required candidates to apply knowledge and understanding to new situations.

One mark was lost from part 4(a) because the first part of the response was incorrect.

One mark was lost from part 4(b) because the calculation was incorrect.

One mark was lost from part 4(c) because, while energy is initially needed to breakdown the materials, this would be self-sustaining once the process was underway. In addition, energy input is also required for recycling.

### **Question 5**

The candidate was awarded **8 out of 11 marks** because he/she showed a poor understanding of problems associated with persistent pesticides.

One mark was awarded in part 5(a)(ii) because the candidate mentioned the build-up of a harmful chemical. The rest of the response related to biomagnification.

One mark was lost from part 5(b) because the candidate did not demonstrate an understanding of energy transfer/loss.

### **Question 6**

The candidate was awarded **6 out of 8 marks** because he/she showed a good understanding of cause and effect of greenhouse gas emissions.

One mark was lost from part 6(a)(ii) because, while there has indeed been a major increase in population in the period under discussion, it is the actions of that population that are resulting in increased greenhouse gas emissions.

No mark was awarded for part 6(c)(i) because he/she fails to explain why slow steaming might have a negative impact on company profits.

### **Question 7**

The candidate was awarded **3 out of 8 marks** because he/she demonstrated a fairly poor understanding of factors affecting both weather and climate.

One mark was lost in part 7(a) because it was felt that the second part of the response lacked a comparison between the two diagrams.

No marks were awarded for part 7(b)(i) because the candidate focuses on rainfall rather than climate.

No marks were awarded for part 7(b)(ii) because wind movement is a consequence of a natural event, or even of climate variability, not a cause.

### **Question 8**

The candidate was awarded **6 out of 9 marks** because he/she showed a fairly good understanding of the CAP.

One mark was lost from part 8(b) because the response lacked depth.

One mark was lost from part 8(c) because the candidate doesn't give sufficient detail about how removing hedgerows results in loss of ecosystems and organisms.

One mark was lost from part 8(e) because planting of hedgerows is good environmentally but does not bring in an economic return for farmers, which is the point of diversification.

### **Question 9**

The candidate was awarded **7 out of 9 marks** because he/she showed a good understanding of issues associated with shale extraction.

One mark was lost from part 9(a)(i) because the response lacked detail.

One mark was awarded in part 9(c) because the candidate named SSSI as a land designation for preserving geological heritage but should then have stated the legal aspect behind a SSSI for the second mark.

### **Question 10**

The candidate was awarded **7 out of 10 marks** because the candidate gave a good account of arguments for and against reintroduction of nationally extinct species.

### **Question 11**

The candidate was awarded **3 out of 10 marks** because although he/she made some good points about benefits and challenges of climate change/renewable energy legislation, the response was far too brief.