

Final



**General Certificate of Education (A-level)  
January 2013**

**Critical Thinking**

**CRIT2**

**(Specification 2770)**

**Unit 2: Information, Inference and Explanation**

**Final**

***Mark Scheme***

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Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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## Critical Thinking Mark Scheme

### INTRODUCTION

The nationally agreed assessment objectives in the QCA Subject Criteria for Critical Thinking are:

- AO1** Analyse critically the use of different kinds of reasoning in a wide range of contexts.
- AO2** Evaluate critically the use of different kinds of reasoning in a wide range of contexts.
- AO3** Develop and communicate relevant and coherent arguments clearly and accurately in a concise and logical manner.

- Marks are allocated to the assessment objectives according to the nature of each question and what it is intended to test.
- For Section A, Examiners need only provide a total mark for each of the candidates' answers. They do not need to provide a breakdown by Assessment Objective.
- For Section B, marks should be awarded according to the generic marking grid.
- Candidates should be able to achieve the highest marks with a selection of relevant points, not necessarily the complete range.
- **Indicative content is provided as a guide for examiners. It is not intended to be exhaustive and other valid points must be credited.**

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## Unit 2 Information, Inference and Explanation

### Section A

Question 1 refers to Box 2, entitled 'Global Warming', in Document A

No.	Question	AO:	1	2	3
1(a)	What is the conclusion being argued for?	(1 mark)	1		

The conclusion is that we must check global warming.

No.	Question	AO:	1	2	3
1(b)	Would it be fair or unfair to describe this as a slippery slope argument?  Briefly explain your answer.	(3 marks)		3	

- Understands 'slippery slope' (whether as a fallacy or not) 1
- Explains why text is a slippery slope, fallacious or not 1
- Justifies judgement, whether 'fair' or 'unfair' 1

**Question 2 refers to the main text of Document A**

No.	Question	AO:	1	2	3
2(a)	<b>In the main text, the author reports an argument which she opposes.</b>  <b>Identify and analyse the argument she opposes.</b>	(5 marks)	5		

Level	Marks	Description
Good	4–5	For a clear, accurate, and thorough exposition of the structure (and/or method), and content of the argument.
Intermediate	2–3	For recognising the main conclusion and some of the main reasons or lines of reasoning/ limited to 2 for broad understanding.
Basic	1	For demonstrating some understanding of the direction of the reasoning.

R1: Nuclear emits far fewer greenhouse gases than producing power from fossil fuels like coal and oil

R2: Nuclear can generate far more power than renewables like wind and solar power

R3: Nuclear is popular with politicians

IC: (from R3): Thus nuclear is more likely to get the necessary public funding to be built

C: (Implicit) We should generate energy from nuclear power.

R1 and R2 give stronger support when employed together, since R2 undermines the use of renewables which create lower carbon emissions than nuclear.

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No.	Question	AO:	1	2	3
2(b)	Identify the main conclusion of the author's argument.  <i>(2 marks)</i>		2		

We should tackle climate change head on by switching to renewable energy and leave coal, oil, gas and nuclear to the past.

No.	Question	AO:	1	2	3
2(c)	Identify <u>one</u> implicit assumption required to infer the author's main conclusion from the reasoning.  <i>(2 marks)</i>		1	1	

E.g. Renewable energy does not produce effects which are as harmful as the effects of nuclear power and fossil fuels. [2]

Renewables are less harmful. [1]

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**Questions 3 to 10 refer to Document B and Figures 2 to 4**

No.	Question	AO:	1	2	3
3	<p>In <u>paragraph 3</u>, the author, Monbiot, claims that ‘Nuclear power is potentially dangerous, but it is much safer than its opponents think’.</p> <p>Identify <u>one</u> explanation <u>from paragraph 2 or 3</u> and briefly describe how he uses it to justify this claim.</p> <p style="text-align: right;"><b>(3 marks)</b></p>		3		

Possible explanations include:

Why the Fukushima accident occurred (it was an old nuclear power plant and had inadequate safety features). [1]

- Which justifies the claim by showing the accident to be avoidable and / or liable to be the worst that could occur *yet still not cause fatalities*. [2]

Why no-one living within 10 miles of Three Mile Island was killed (the disaster caused a radiation dose of just one 625th of the maximum yearly amount permitted to US radiation workers OR that this is half the lowest dose linked to an increased cancer risk OR that this is 1/160th of an invariably fatal dose). [1]

- Which justifies the claim by showing that an infamous disaster did not come close to causing significant harm to people living nearby. [2]

No.	Question	AO:	1	2	3
4	<p>In <u>paragraph 4</u>, Monbiot writes that ‘energy is like medicine: if there are no side-effects, the chances are that it doesn’t work’.</p> <p>How effective is this analogy?</p> <p style="text-align: right;"><b>(4 marks)</b></p>			4	

Level	Marks	Description
Good	4	Analysis of the analogy and how it works is accurate. Evaluation is clearly tied to the specific case and critical points are effective and convincing.
Intermediate	2–3	Analysis of the analogy and how it works is likely to be largely correct. Responses may show general understanding of the means of assessing an analogy without being clearly tied to the specific case.
Basic	1	Responses may provide some critical comment but typically do not show understanding of what an analogy is or how to assess one.

It is effective in that it compares two things which are both essential/beneficial but carry some risks/damages/negative consequences etc. In that relevant respect the comparison is fair.

It is also effective in that it supports the argument that nuclear should be compared with other sources of energy and their negatives.

Against the analogy it could be said that a medicine is not used if it is dangerous (but it is a weak objection).

For mere differences, without critical comment, between medicine and energy, 0 marks.



**Question 5 refers to paragraphs 5 and 6**

No.	Question	AO:	1	2	3
5	<p>Give <u>one</u> plausible explanation of why ‘in places such as the UK renewables do not give year-round, 24 hour reliable supply’ of energy.</p> <p style="text-align: right;"><b>(2 marks)</b></p>		1	1	

E.g. Renewable energy such as solar power relies on the sun shining but in the UK the sun would not supply much energy on winter evenings when demand would be high.

**Question 6 refers to the table, Figure 2**

No.	Question	AO:	1	2	3
6	<p>Assume that the information in the table is accurate.</p> <p>Can the following statement be safely inferred from the information in the table?</p> <p>‘Coal-based power should be expected to cause at least 1300 times as many deaths as hydroelectric power.’</p> <p style="text-align: right;"><b>(3 marks)</b></p>		1	2	

Marks should be awarded for the justification given for the candidate’s judgement about the safety of the inference.

Coal: 161 deaths/TWh x 26 = 4186 deaths

Hydro: 1.4 deaths/TWh x 2.2 ≈ 3 deaths

$4186/3 = 1359$  which is  $> 1300$       3 marks (with or without an explicit ‘Yes’)

Correct answer + partially correct calculation [2 marks]

Incorrect answer + some sign of relevant calculation [1 (BOD)]

Yes, the statement may be inferred with some degree of safety.

(Credit any reasonable justification for why the inference may be unsafe.)

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**Question 7 refers to Figure 3**

No.	Question	AO:	1	2	3
7	<b>Describe the trend in the amount of electricity generated by fossil fuels in the UK from 1980 to 2010.</b>	<b>(2 marks)</b>	<b>2</b>		

The trend in the **total amount** of electricity generated by fossil fuels in the UK from 1980 to 2010 is a gradual increase [1], from c.225TWh to c.260TWh (+16%) [+1] OR until 1996 the trend is steady (with some fluctuation), until it rises fairly steeply between 1996 and 2008. [+1]

OR

The trend in the **proportion** of electricity generated by fossil fuels in the UK from 1980 to 2010 is for the proportion to fall steadily [1] from c.87% to c.73% [+1] OR with fossil fuels losing ground quickly until a trough in 1993 (c.65%) (OR 1997 (c.64%)) and then regaining some ground to 2008 (c.77%). [+1]

Candidates may describe the changes / trend in the composition of fossil fuels but answers should concentrate on describing the trend for fossil fuels as a group to earn 2 marks.

**Question 8 refers to Figure 2 and Figure 3**

No.	Question	AO:	1	2	3
8	<p><b>Consider the following claim:</b></p> <p><b>‘By 2010 Britain’s electricity production caused fewer deaths per year than in 1990.’</b></p> <p><b>In what ways is the support for the claim limited?</b></p> <p style="text-align: right;"><b>(4 marks)</b></p>				
			1	3	

Award marks for the effectiveness of the candidates’ justification of their judgement.

The table provides limited support for the claim.

**Support is limited because:**

E.g.

- Figure 2 is about all energy production, not just electricity production, which is the topic of Figure 3. [1 or 2 marks]
- Figure 2 is not only about the UK, which can be expected to have better safety for all energy types than the worldwide average. [1 or 2 marks]
- Figure 2 shows average deaths per TWh, but these could have been very different in 1990 or based on historical data and thus out of date for 2010. [1 or 2 marks]

In case a candidate argues that the support is not limited, they could cite figures:

**It provides support because:**

From Figure 3 we see that

- Coal based electricity drops from approximately 200 TWh to 100 TWh.
- Gas based electricity increases from approximately 0 TWh to 150 TWh.

From Figure 2 we see that

- Coal causes 161 deaths per TWh.
- Gas causes 4 deaths per TWh.
- Other energy sources cause so few deaths as to not affect the outcome.

So, it is likely that deaths reduced from approximately 32 000 to approximately 16 000. (If UK stats are in line with whole world.)

i.e.  $(200 \times 161)$  vs  $(150 \times 4) + (100 \times 161)$ .

**NB.** Max 2 marks if limitations are not noted.



No.	Question	AO:	1	2	3
10	<p><b>In response to Document B, a reader comments:</b></p> <p><b>‘Monbiot’s reasoning is all wrong. After all, you could also think about how many people have been killed by nuclear weapons, and how many have been killed by non-nuclear weapons. For the last sixty-five years, ZERO people have been killed by nuclear weapons. So by this logic even knives are way more lethal than nuclear weapons, which seems to prove that the threat from nuclear weapons is just a lie. But it isn’t – they could destroy the world.’</b></p> <p><b>Assess whether the response is successful as a counter-argument to Monbiot’s article.</b></p> <p style="text-align: right;"><b>(6 marks)</b></p>			6	

Level	Marks	Description
Good	5–6	Critical comments are convincing and effective. Strengths and weaknesses are correctly identified and an appropriate judgment is reached. Candidates engage critically with the most important features of the argument and specific flaws cited are clearly explained and/or likely to be labelled accurately.
Intermediate	3–4	Evaluation is largely correct and focused on relevant flaws and strengths. Explanation is largely present but some assessment opportunities are missed.
Basic	1–2	Evaluation is likely to be limited to merely asserting agreement or disagreement with argument, or to identifying merely a minor flaw or strength, e.g. an emotive use of a term or a commonsense claim that’s obviously true, or some vague comment e.g. that the argument is stated clearly.

Credit candidates who recognise this as a *reductio ad absurdum* and an analogy.

Creditable critical points might include:

- E.g. The reader explicitly ignores deaths from nuclear weapons caused more than 65 years ago, but it is precisely those deaths which show how dangerous the weapons are and why they are now never used.
- E.g. The counter-argument implicitly assumes that the best way to compare how dangerous / harmful / lethal something is, is to examine its worst possible effects. However, it is wiser to look at its probable effects and in this way, some advocates of nuclear weapons argue that they are safer than conventional weapons (because they prevent war).

E.g. The analogy with nuclear weapons is not a good one, since their purpose is to kill when used. However, despite using some of the same technology, nuclear power is designed to be as safe as possible and Monbiot's evidence suggests that this has been fairly successful, so far.

**Section B (See Generic mark-grid Page 16)**

No.	Question	AO:	1	2	3
11	<p><b>‘The world would be a better place if all energy was produced by nuclear power.’</b></p> <p><b>Write a reasoned argument for or against the statement above.</b></p> <p><b>In presenting your case you should:</b></p> <ul style="list-style-type: none"> <li>• <b>produce a structured argument with a clearly stated conclusion or conclusions</b></li> <li>• <b>draw on relevant information and evidence found in the source documents; you may also draw on your own knowledge and experience if relevant</b></li> <li>• <b>consider any general principles that may apply</b></li> <li>• <b>consider and respond to possible counter-arguments.</b></li> </ul> <p style="text-align: right;"><b>(30 marks)</b></p>				<b>30</b>

Reward skilful critical reasoning highly.

- For example, an answer with some skilful strong reasoning and some weak reasoning may score more highly than an answer with consistent but moderately skilful reasoning.
- Concise answers may score more highly than longer ones.
- Answers with skilful reasoning may contain insight, or consider assumptions, or appreciate appropriate standards to use in a fair evaluation of the issues, or use conditional reasoning.

Reward answers that use information from the documents skilfully.

- For example candidates who draw careful inferences from data, compare and contrast information, consider the credibility of sources, how representative evidence may be, or carefully decide how much support evidence gives, should be credited under both Use of Information and Reasoning criteria on the marking grid.

Reward answers that pay careful attention to the wording of the question.

- For example, candidates should pay close attention to the statement that a policy of **‘all** energy produced by nuclear power’ is being suggested. This must be addressed. Similarly, good answers will consider whether the world ‘would be a better place’, perhaps by giving some initial definition and, after due consideration, making a concluding judgement.

Some use of principles in arguments will be implicit but may still be rewarded.

When marking answers to this question, award marks for the quality of the reasoning, rather than knowledge about the various means of generating power; environmental and nuclear science.

**Possible lines of argument**

An all nuclear policy makes for a better world because:

- Clean, reliable, huge potential
- Best way to deal with global warming
- Alternatives pollute, endanger, add to greenhouse gas, impractical, unreliable
- Will benefit from technological advance, improved construction and location, monitoring.

An all nuclear policy does not make for a better world because:

- Potential dangers unacceptable: radiation leaks, meltdown, worldwide catastrophe.
- Problems with nuclear waste
- Long-term viability: uranium supplies
- International divisiveness: impact on poorer countries that cannot afford it.
- Associated threat of nuclear weapons.
- A balanced policy which employs all available (or renewable/nuclear) sources of power is more realistic.



**Generic mark-grid for Section B:**

Criteria	Award level		
	Level 3: Good response	Level 2: Reasonable response	Level 1: Basic response
<b>Conclusion</b>	4	2 – 3	1
	A conclusion is clearly stated that is supported by all the reasoning, and directly responds to the question.	A conclusion is clearly stated that is supported by most of the reasoning, and responds to the question.	A conclusion is stated that is supported by some reasoning, and responds to the question in part.
<b>Reasoning</b>	9 – 12	5 – 8	1 – 4
	The conclusion is strongly supported with reasons, contributory arguments, examples, clarification of terms, etc. which are precise and detailed.	The conclusion is supported with reasons, contributory arguments, examples, clarification of terms, etc.	The conclusion is weakly supported with reasons, contributory arguments, examples, clarification of terms, etc. which may be imprecise.
<b>Use of information</b> From Source Documents and/or to other relevant information or experience.*	5 – 6	3 – 4	1 – 2
	Information ( <i>must</i> include Source Documents) supports reasoning strongly. Information is interpreted carefully and inferences drawn from it are evaluated in detail.	Information supports reasoning. Information is interpreted and inferences drawn may not be evaluated.	Information supports reasoning weakly. Information is not interpreted. Inferences drawn may be implicit and are not evaluated.
<b>Reference to principle</b>	4	2 – 3	1
	One or more general principles are introduced and play a significant role in the argument. Justification of the principle may be given.	One or more general principles are introduced and play a role in the argument.	One general principle is introduced and plays a minor or unclear role in the argument.
<b>Counter-argument</b>	4	2 – 3	1
	One or more challenges and objections are anticipated and answered effectively.	One or more challenges and objections are anticipated and answered.	One or more challenges and objections are anticipated and partially answered.

	<b>Good response</b>	<b>Reasonable response</b>	<b>Basic response</b>
<b>QWC</b> <b>Quality of Written Communication</b>	Consistently communicates clearly and appropriately	Generally communicates clearly and appropriately	Communication may impede understanding.

\* NB Candidates are not rewarded for exhibiting additional knowledge per se, but for the use they put it to in their reasoning if they choose to introduce it. Conversely, there is no penalty for not exhibiting additional knowledge: use of the documents alone is sufficient for awarding Level 3 'Good response' (5–6).

**Distribution of marks across the questions and assessment objectives for Unit 2**

<b>AO Balance</b>	<b>AO1</b>	<b>AO2</b>	<b>AO3</b>
<b>Total Section A</b>	<b>17</b>	<b>23</b>	<b>–</b>
<b>Total Section B</b>	<b>–</b>	<b>–</b>	<b>30</b>
<b>Paper Total: [70] Marks</b>	<b>17</b>	<b>23</b>	<b>30</b>
<b>Paper Total: [70] Percentage</b>	<b>24%</b>	<b>33%</b>	<b>43%</b>