

# **Critical Thinking**

Advanced GCE

Unit **F504**: Critical Reasoning

## **Mark Scheme for June 2011**

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## Analyse

1 **Name and briefly explain the function of the following elements in the structure of the reasoning:**

- (a) **“The year 2009 marked the 40th anniversary of two momentous events related to space exploration.” (Document 1, paragraph 1) [2]**

It sets the context for the rest of the article/scene setting/sets out background (1)  
AND plays no role in any reasoning (1) OR other further explanation of function (1).

Accept for second mark:  
Contextualises argument/makes it relevant to 2009.

DO NOT accept synonyms of scene setting for second mark, ie ‘scene setting, giving background information’ is only one mark.

- (b) **Space exploration has always been a capital intensive endeavour requiring vast resources and extensive research.” (Document 2, paragraph 1) [2]**

Explanation (1) of why governments have to fund space exploration (1)/setting the context of the argument (1).

‘(telling us) a reason why some people challenge space exploration’ (2)  
(This gets at explanation).

Accept:  
Reason/explanation [of ....] in a counter-argument (2).

Counter-argument/counter-assertion (1).

DO NOT ACCEPT ‘reason supporting/to IC’ but do give second mark.  
DO NOT ACCEPT supports ‘the biggest challenges to exploration are the public and politics’ – too many links missing.

- (c) **“The less obvious and most important benefit is spin-off technologies.” (Document 2, paragraph 3) [2]**

Reason (1) which gives some support to the claim that, ‘So the next time you wonder if it is a waste of time and money to explore space, remember that it is actually an investment that improves the quality of our lives.’ (1) OR supports the claim that ‘there are already direct benefits to the economy provided by NASA missions.’ (1)

‘It’s a sort of summary statement of the theme showing what the line of reasoning is but not actually functioning in the reasoning.’ (2)

- 2 To what extent is the author of Document 1 against sending humans into space and on what grounds? Justify your answer with reference to his reasoning (eg his conclusions, reasons, assumptions and/or implications). [14]

- Level 4:** (12 – 14 marks) Sound, subtle understanding of the extent to which Krauss is against sending humans into space, supported by strong, understanding of the grounds on which he holds this view, possibly including unstated grounds such as assumptions and implications.
- Level 3:** (8 – 11 marks) Clear understanding of the extent to which Krauss is against sending humans into space, partially supported by an understanding of the grounds on which he holds this view.
- Level 2:** (4 – 7 marks) Basic understanding of the extent to which Krauss is against sending humans into space, with reference to some of the grounds on which he holds this view, possibly commenting on less relevant evidence and details rather than the main grounds.
- Level 1:** (1 – 3 marks) Limited, simplistic understanding of the extent to which Krauss is against sending humans into space, possibly with some reference to some parts of the reasoning. Candidates at this level show little evidence of understanding the reasoning.

#### Main grounds

Against sending humans into space (with government funding) to gain scientific knowledge on the grounds of:

- knowledge (robots better)
- cost
- danger/risk
- physical/biological limits of humans
- problems on earth.

But not totally against sending humans into space. Would support sending humans into space:

- for adventure
- on one way missions
- if there is money to do it all.

#### Examples of levels of performance:

##### Example Level 4

*The author of document one is not against sending humans into space per se, it is the pretence that space exploration should be used as a means of scientific development that he objects to. His main conclusion is implied in the article rather than explicitly stated and is effectively that human space exploration should not be carried out for advancing science. This is backed up by a range of reasons. The first of those are associated with cost and the danger that human space flight involve. Although we are provided with evidence for the former, the latter reason is supported by the associated radiation received by astronauts on a trip to Mars. His second strand of reasoning is that of the associated difficulties attributed to space flight, suggesting that humans have too many biological and physical based limitations to compete with the knowledge that can be gained by robots, unmanned space vehicles and computers. He uses these reasons to develop a clear intermediate conclusion that funding for science should be separated from manned space stations. Therefore, whilst he is not entirely against sending humans into space (he*

*accepts that there may be money to do it all), and that it may still be done in the name of adventure, we should be honest about the extent to which it will benefit us scientifically.*

[Subtle understanding of the extent to which Krauss is against sending humans into space, with a focussed and strong understanding of the grounds on which he would support space travel, and the grounds on which he would not support it. This represents the top of L4.]

#### **Example Low level 4**

*The author is against sending humans into space on the grounds of the financial implications. He says that we should separate funding for science from the diversion of a costly manned space programme. He believes that the scientific benefit from these expeditions is outweighed by the cost of them.* [Clear understanding heading towards subtle with key grounds]

*Also, he is against them on the grounds of physical risk to those involved.* [Key ground] *Paragraph 4 begins with an IC that human spaceflight has proved more dangerous than past programmes suggest. His reasoning to this is ‘During the 18 months or so that a round trip journey would take, astronauts would very likely receive a lethal dose of radiation.’ This reasoning strongly supports the IC and although it may be an assumption that the radiation exposure will be lethal, it still gives coherent support to his claim. Also, his standpoint is clearly identified.* [Apart from the identification of a key ground at the beginning, this paragraph is largely detail and wrong task, but the candidate has understood the relationship of the detail to the main ground and not merely quoted the evidence about radiation as if it were the main ground/reason.]

*However, he is not fully against them. Paragraph 3 he states a counter-assertion by saying, ‘I would still jump at the chance to go to space.’ He also gives a reason to this by saying, ‘doing so would be for adventure.’* [Clear understanding of Krauss’s main reason for sending people into space]

*He clearly explains that he is still a fan of the ability to go into space but realises the heavy implications.* [Some subtlety]

...[paragraph of evaluation]

[Overall, the candidate has understood that Krauss is against sending humans into space on the grounds of funding for science, cost benefit, physical risk, and that he is for sending humans into space on the grounds of adventure, and that the implications of this limit his support. So, amidst the detail and irrelevant tasks, the candidate has shown a clear understanding of the extent to which Krauss is against sending humans into space, with some subtlety and several of the key grounds. So Low L4.]

#### **Example Level 3**

*The author of Document 1 isn’t completely against sending humans into space.*

*Document 1 starts off quite anecdotal ... he can’t be completely against sending humans into space because he refers to his desire to go to space several times, for instance, ‘I would still jump at the chance to go into space.’ However, he recognises that for many, sending humans into space would not necessarily be to contribute to scientific development but to fulfil personal desires for knowledge and adventure.*

*The author states in paragraph 6 that he is not against sending humans into space ... this sentence demonstrates why the author is not against sending humans into space, however he also has lots of reasons against it. The author is perhaps slightly contradictory... some*

*of his reasoning for example 'space flight has proved inordinately costly and far more dangerous...'*

*He states that he believes humans should be sent into space if funding is separate from scientific development. However, that is widely thought of as the main reason to explore space, rather than for adventure as the author suggests.*

[Understanding of the extent to which Krauss is against sending humans to space emerges eventually, with some understanding of for humans going to space in some ways and against it in other ways, partially supported by some of the grounds, such as cost, danger, adventure.]

### **Example Level 2**

*The author of document 1 is against sending humans into space if there is no real scientific basis or gain to be made from it. [Understanding of extent with some idea of grounds]. Firstly in paragraph 4, he states that the 'chief obstacle to visiting Mars is cosmic radiation' and that 'we are not held back for lack of a warp drive' [neither of these points is key, but rather detail or irrelevant]. The author cleverly uses an analogy here: yes there are obstacles but one is decisively more dangerous than the other. And far less Hollywood action movie. [Irrelevant to task]*

*Also, the author states why on his personal experience, that some NASA missions are simply ridiculous: 'I would still jump at the chance to go into space. But I now recognise that doing so would be for the adventure, not for advancing science.' [Key but misunderstood]*

*The author of Document 1 is not completely against sending humans into space, only if they are being sent to Mars, where it is clearly known that 'During the 18 months or so that a round trip journey would take, astronauts would very likely receive a lethal dose of radiation.' [Some credit for 'not completely against' but the rest of this paragraph is wrong, irrelevant or detail.]*

*The author simply wants NASA to be clear about its intentions for the space missions, its true benefits for humanity and also the cost: 'We can only do that if we are honest about the costs and the possible benefits of science for humanity.' [Some understanding of the passage but not used to answer the question.]*

### **Example Level 1**

*The author of document 1 seems against sending humans into space, his opening paragraph sets the scene of the argument and provides background information, in a neutral form, within the second paragraph however the author moves his view point of space 'since then my perception of the proper role of human space exploration has changed.'*

*The author's third paragraph opens with an opinion 'I would still jump at the chance to go into space' but then counters this with an assumption that space is for 'the adventure not for advancing science.' Because this is an assumption based on his own opinion the author weakens his arguments credibility on the basis of being un-neutral and bias. The author's fourth paragraph opens with an intermediate conclusion 'proved inordinately costly and far more dangerous than the Apollo programmes led us to believe' supported by independent reasons which again weakens the grounds of which he is against sending humans to space as his argument is not sustained by reasoning... [another half a page in this vein]*

[The candidate has not answered the question, but has paraphrased the article, making weak credibility points and weak evaluative points about the quality of the reasoning. The candidate shows little evidence of understanding either the meaning of the article or the reasoning used, and demonstrates a limited understanding of the extent to which Krauss is against sending humans into space. Any grounds mentioned are covered as part of a general paraphrase rather than selected and understood as grounds for Krauss's views.]

## Evaluate

- 3 Discuss the extent to which Document 2 counters Document 1. You should come to a reasoned judgement. [20]

Marks	Performance Descriptors
<b>Level 4</b>  <b>16 – 20 marks</b>	<p>Candidates come to a <b>reasonable judgement</b> about the extent to which Document 2 counters the reasoning of Document 1 <b>supported</b> by:</p> <ul style="list-style-type: none"> <li>• mostly well justified and perhaps occasionally insightful evaluation of <b>key</b> parts of the reasoning, and the extent to which these could counter or support each other, or may be neutral.</li> <li>• evaluation of strengths and weaknesses in the reasoning in order to consider whether, when the reasoning of Document 2 might counter that of Document 1, it is strong enough to do so effectively.</li> </ul> <p>Inappropriate forms of evaluation may occur. The language is clear and mostly precise.</p>
<b>Level 3</b>  <b>11 – 15 marks</b>	<p>Candidates come to a <b>reasonable judgement (perhaps slightly too strongly stated)</b> about the extent to which Document 2 counters the reasoning of Document 1, <b>mostly supported</b> by:</p> <ul style="list-style-type: none"> <li>• mostly relevant and mostly justified evaluative comments about parts of the reasoning which might oppose or be similar to each other.</li> <li>• mostly justified evaluative comments about strengths and weaknesses which may lack relevance to the question.</li> </ul> <p>Inappropriate forms of evaluation may occur. The language is mostly clear.</p>
<b>Level 2</b>  <b>6 – 10 marks</b>	<p>Candidates come to a <b>judgement which may be overstated</b> about the extent to which Document 2 counters the reasoning of Document 1, <b>partly supported</b> by:</p> <ul style="list-style-type: none"> <li>• some basic evaluative comments about parts of the reasoning which might oppose or be similar to each other with an attempt at justification.</li> <li>• some basic evaluative comments about strengths and weaknesses which may lack relevance to the question.</li> </ul> <p>The language is simple and may lack precision.</p>
<b>Level 1</b>  <b>1 – 5 marks</b>	<p>Candidates <b>may</b> come to a judgement which <b>does not follow from</b> their reasoning or they may have reached no judgement at all. This may be <b>accompanied</b> by:</p> <ul style="list-style-type: none"> <li>• limited comment about the reasoning with little or no explanation, possibly consisting of stock, pre-learned phrases which are not applied to this reasoning.</li> <li>• any comments about whether the reasoning of Document 2 counters that of Document 1 are assertive and unconnected to other points and may be contradictory.</li> </ul> <p>Answers may be descriptive or incoherent. The language does not always communicate candidates' thinking.</p>
<b>Level 0</b>  <b>0 marks</b>	<p>No creditworthy material.</p>

**Key Parts of the Reasoning**

Document 2 counters the reasoning in Document 1 to the extent that:

- It disagrees with points about money being wasted on space research rather than spent on earth.
- It shows benefits of spending money on space technology.

However:

- Document 2 was not intended to counter document 1.
- Document 2 does not refer specifically to manned or unmanned space flight so it is possible that the benefits gained by space research as mentioned in Document 2 could be gained from unmanned space exploration. If so, Document 2 would be in agreement with Document 1 on the benefits of funding unmanned space flight.
- Document 2 does not answer the point that advances in space will come from unmanned exploration.
- Document 2 does not show that human space flight will not be for adventure.
- Document 2 does not answer Krauss's points in document 1 about human space flight being difficult and dangerous.

**Examples of part answer levels of performance:****Example Level 4**

*Although source 1 and 2 don't agree with each other, they don't counter each other either.*

*Source 1 says that we shouldn't send people to space in the name of science as it's incredibly costly... Whereas source 2 sees the costly programmes as an overall economic advantage... [some irrelevant information about the multiplier effect]...*

*Source 1 doesn't mention the benefits of this in its article but source 2 isn't saying space programme for more knowledge on space, it sees other benefits... [detail about Boeing and economic benefit]... This source shows the benefits of the excessive spending that source 1 criticised so on the surface you'd assume that they didn't agree.*

*However, source 2 never mentions the benefit of actually sending someone to space. Merely the advantages of the extra money and research in the economy. Source 1 says that scientific advances can be made without sending people to space which source 2 is proving – another state funded programme could have the same level of technological and knowledgeable advances without mentioning space. So although they don't entirely agree, I'd say they were basically matched in opinion.*

[The candidate has come to a reasonable – even strong – judgement about the extent to which document 2 counters document 1. There is some sophisticated thinking on the big picture, which supports the judgement, but the candidate uses too much irrelevant detail to support the judgement. Mid Level 4]

**Example Level 3**

*Document 2 is an argument based mainly on examples which can be found throughout paragraph 2, 4 and 5. The document is very bias in its viewpoint and strongly opposes the rhetorical device, 'why waste money on space when we can use it down here?'*

*Document 1 on the other hand contains many moves in the authors view point and makes objections of space on appeals of medical implications, cost and not advancing science.*

*Therefore document 2s short argument can never fully counter document 1 as it is only countering science and cost.*

*Document 1 makes a statement, 'I now recognise that doing so would be for the adventure not for advancing science.' This is an assumption [incorrect] the author has made to counter his opinion and can easily be countered by the endless examples within document 2.*

*The scientific technology in which space has created is portrayed in paragraph 4 document 2, contained in repetition of examples 'the artificial heart... hand-held jaws of life... insulation' all of which were based on scientific advances made from space shuttle experiments. Document 2 provides other examples of this to, which weakens document 1's assumption due to the amount of evidence provided against it in document 2. [Here the candidate has understood that the examples of benefits from space shuttle programmes counter the view that going into space would only be for adventure not for advancing science – a reasonable point, although the examiner has to work hard here.] Document 2 however over-draws an intermediate conclusion 'it is actually an investment that improves the quality of our lives.' Therefore this weakens the evidence that were already provided countering document 1 and so the extent of which document 2 can counter document 1 is lessened. [Some basic evaluation of document 2, BUT it is used in order to consider how well document 2 counters document 1 on a relevant point] ...*

*...[description, paraphrase and some basic evaluation of reasoning]...*

*However, document 2 can only counter document 1 to an extent due to its narrow viewpoint of only countering view points based on minimal reasoning but lots of examples which weakens the overall feel of the argument. It also cannot account for all of document 1's criticisms, however, it wasn't written intending to do so, so its hard to compare the two documents fully...*

[This response comes to a reasonable judgement and is occasionally insightful, but is also often basic, overstated or irrelevant. Overall, the judgement is partly supported by mostly relevant, sometimes justified and sometimes basic evaluative comments. Mid Level 3.]

### **Example Level 2**

*Document 2 is a direct counter to document 1. The MC to document 1 is 'remember that it [space exploration and NASA missions] is actually an investment that improves the quality of our lives.' His claim is that these NASA missions, rather than being costly, are in fact beneficial to the economy and the population. This is the direct opposite of the view of the author of document 1 who was against them, partly due to the high cost of the missions.*

*The author of document 2 does this well by for one, providing an examples of how NASA missions benefit the economy...The link between this IC and the MC is strong, and so does well to support the argument, thus fittingly opposing the view of the author of document 1.*

*However, the author of document 2 does acknowledge that the initial costs are high in paragraph 1, which acts as an introduction, but also as a counter-argument to his main argument. In this respect he is not disagreeing that the costs of the missions are high and so is not countering 1 of the views of the author of document 1.*

*In conclusion the author of document 2 does well in presenting his argument and makes good use of examples, reasons and ICs to support his conclusion well. Thus providing a clear contrast to the viewpoint of the author of document 1 who also made use of reasons and ICs to support his claim.*

[Overstated, basic and sometimes wrong. Judgement is partly supported by some basic evaluative comment about parts of the reasoning which might oppose or be similar to each other. Even where the candidate wanders off task, there is an attempt to refocus and bring it back to answering the question.]

## Develop Your Own Reasoning

## 4 There are limits to what humans should attempt to do.

Write your own argument in response to this claim.

You should use your own ideas and you may use ideas/evidence from the resource booklet to help you. [20]

Marks	Performance Descriptors
<p><b>Level 4</b></p> <p><b>16 – 20 marks</b></p>	<p>Answers <b>must</b>:</p> <ul style="list-style-type: none"> <li>• answer the question which was asked with some precision and subtlety.</li> <li>• give generally strong support to this answer (their conclusion) using reasons and intermediate conclusions (although there may be some weaker parts to the argument).</li> </ul> <p>In doing so, answers <b>may</b> include some of the following characteristics:</p> <ul style="list-style-type: none"> <li>• accomplished argument structure using strands of reasoning.</li> <li>• questioning of key terms, which, if present, informs the argument, possibly qualifying the conclusion.</li> <li>• subtle thinking about the issue/relevant own ideas or examples about the issue/thoughtful use of ideas from resource booklet.</li> <li>• anticipation of key counter-arguments and effective response to these.</li> </ul> <p>The argument is written in clear, precise prose in language capable of dealing with complexity.</p>
<p><b>Level 3</b></p> <p><b>11 – 15 marks</b></p>	<p>Answers <b>must</b>:</p> <ul style="list-style-type: none"> <li>• answer the question which was asked.</li> <li>• give support to this answer (their conclusion) using reasons and intermediate conclusions (although there may be some irrelevance or reliance on dubious assumptions).</li> </ul> <p>In doing so, answers <b>may</b> include some of the following characteristics:</p> <ul style="list-style-type: none"> <li>• clear argument structure, which may be simple and precise or attempt complexity with only some success.</li> <li>• an attempt to question or define terms and possibly an attempt to use this questioning or definition in the argument.</li> <li>• clear (if perhaps one dimensional) thinking about the issue/own ideas or examples about the issue/reasonable use of ideas from the resource booklet.</li> <li>• anticipation of relevant counter-arguments and some response to these.</li> </ul> <p>The argument is written in prose in language which is clear and developing complexity.</p>

<p><b>Level 2</b></p> <p><b>6 – 10 marks</b></p>	<p>Answers <b>must</b>:</p> <ul style="list-style-type: none"> <li>• answer the general thrust of the question which was asked, possibly in an overstated or vague way.</li> <li>• give some support to this answer (their conclusion) using examples and reasons (although there may be considerable irrelevance and/or reliance on dubious assumptions).</li> </ul> <p>In doing so, answers <b>may</b> include some of the following characteristics:</p> <ul style="list-style-type: none"> <li>• either clear, straightforward, possibly simplistic arguments, or a discourse at length with a focus on the ideas and content but only basic structure of reasoning.</li> <li>• an attempt to define some terms, but this definition is used ineffectively if at all.</li> <li>• some thinking/own ideas about the issue/inclusion of ideas from the resource booklet.</li> <li>• inclusion of a counter-argument or counter-reason but any response to this is ineffective, possibly merely dismissive.</li> </ul> <p>The argument may be written as annotated bullet points rather than in coherent prose. The language may be either simple and clear or overly flowing, with little attention to meaning and precision.</p>
<p><b>Level 1</b></p> <p><b>1 – 5 marks</b></p>	<p>Answers <b>must</b>:</p> <ul style="list-style-type: none"> <li>• attempt to answer the general thrust of the question, although there may be no stated conclusion.</li> <li>• attempt to support this answer, possibly using examples in place of reasoning (and there is likely to be considerable overstatement and reliance on very dubious assumptions).</li> </ul> <p>In doing so, answers <b>may</b> include some of the following characteristics:</p> <ul style="list-style-type: none"> <li>• disjointed, incoherent reasoning with little structure, possibly a discourse or rant on the theme.</li> <li>• rhetorical questions and emotive language.</li> <li>• ‘reasons’ and ‘intermediate conclusions’ presented with no logical connection.</li> <li>• ideas which tend to be contradictory, asserted or derived largely from the stimulus material.</li> </ul> <p>The argument may be written as annotated bullet points rather than in coherent prose. Language is used in a vague, imprecise way.</p>
<p><b>Level 0</b></p> <p><b>0 marks</b></p>	<p>No creditworthy material.</p>

### Example part answers of levels of performance

#### Example Level 4

*In this argument I shall argue that there are limits to what humans should attempt to do, looking at the implications otherwise based on moral viewings, scientific implications and even consequences of the uses of these developments.*

*As science has progressed the human race has grown ever thirsty of knowledge and particularly after the 1950s: with huge achievements in science there has been a great optimism to the problems people believed science could do.*

*Yet it can be argued that there are many human developments that could end up having detrimental effects. An example that can be looked at is that of genetic engineering developments and weapons developments. Scientists have created the possibility of genetic screening and could even be able to look at characteristics of unborn babies by seeing things like what eye colour babies will have later in life. But many would argue that these would mean the birth of designer babies and thus treating of babies as commodities that can be selected as desired could erode the intrinsic value many place on human life. While this is not obviously wrong to fear it can also be argued that it is not the actual technology itself that allows this but the uses that humans apply it to afterwards. Perhaps there should be a limit to what uses the developments should serve and humans should not attempt things like this that would cause moral controversy... [example re weapons]*

*It can also be argued that humans should limit what they attempt to do based on the wider consequences. Many people are against the genetic engineering of crops. Though these can also provide benefits, it must be remembered that it is consequences such as genetic contamination that should be considered ... [example] ... perhaps these developments should be limited instead to only being carried out when more is known about them to avoid unintended consequences, such as the use of DDT on wildlife.*

*Overall then, I conclude that there should be limits on what humans attempt to do, not based on the technology developed but the uses that they are put to and being limited to only practising things when knowledge is known more about and consequences.*

[Answers the question posed with some precision and subtlety about limits, and gives generally strong support to the conclusion. There are strands of reasoning with structure, the key term 'limits' is questioned and discussed, there is some subtle thinking and own ideas. High L4]

#### Example Level 3

*Humans are intelligent species with the ability to discover new technologies on a regular basis. Humans have discovered a wide variety of things from entire countries to the latest iPad and because of this ever increasing intelligence, I believe that there should be no limits to what humans should attempt to do.*

*If there were limits present, it may be seen that many inventions that have been created would not be present to this day. Rosalind Franklin discovered major scientific findings, in particular knowledge about DNA. Without this knowledge today, we would not be able to provide the treatments and opportunities that are now given to people every day.*

*We now live in a very deterministic culture, where life is extremely planned and where people are thought to do things in a certain way. However, for human advances to occur, people must remember the act of free will so that the world can develop even further.*

*If there were too many limits on what people should attempt to do, then the world may just stay stood stuck still. Poor developing countries, in particular sub Saharan Africa are in desperate need of new medicines and if these are not developed, than an entire population may be wiped out.*

*The word 'should' must be considered in this argument. There may be things that many humans 'could' try, however they maybe shouldn't as they may be chasing a lost cause or it may be an unnecessary issue. For example, trying to get a man on Mars may be a great achievement for humans and also an exploratory oracle, however it will not benefit the majority of humans.*

*Therefore, overall I believe that there should not be limits to what humans should attempt to do but some limits on what humans could do. The main basis of this thought is based around the potential benefits to humans. If the attempt to be made is one that benefits the wider population, there should be no limits that hinder the chance of it being successfully completed. However, on the other hand, it must be considered that humans should not attempt to do unnecessary things and in this case, I feel there should be some limits in place.*

[Answers the question which was asked and gives support to this answer, although there is some irrelevance and there are some weak logical links. There is a structure, there is an attempt to question and discuss limits and there is some clear thinking about the issue and own ideas. Mid L3]

### **Example Level 2**

*There are limits to what humans should attempt to do. In 1969 the first man landed on the moon and since then, great efforts have been taken to propel humans exploration of our world at any cost.*

*Going to places such as Mars can have serious repercussions for those involved in the missions. Exposition to those levels of radiation can have long term effects on health and can even cause death.*

*The attentions of our government should not be spread so thin in order to accommodate non-necessities such as space exploration. This is because as a country, we face many problems such as a decreasing economy, terrorism, crime etc. The governments efforts should be focused on these matters in order to make the country a better place for its inhabitants. In 2009, the UK economy fell 2% and unemployment rose by 1%. This is an example of why we can't afford to do such expeditions to space and should focus on bettering ourselves in our everyday life.*

*Some may argue that we should push our bodies and our horizons to its limit. This is because we only have one life and one chance to fulfil our goals and ambitions. Also, that we may look back on our lives with regret and an unsatisfactory feeling.*

*However, although we should feel free to explore and push ourselves, there is a limit as to what our bodies can do and what our world should be subject to, for the sake of money and the wellbeing of our population and our planet.*

[This does answer the question and give some support to this answer, but the reasoning is overstated and vague; much of it is simply lifted from the stimulus rather than made use of. There are some own ideas, but little deep thought and the reasoning is basic. There is an attempt at counter-argument and a basic response – this is the area of the argument that lifted it into L2; there are some good ideas and some basic reasoning that could have been developed into a reasonable argument.]

**Appendix 1****Principal Examiner's suggestion of possible ideas/approaches to Question 2**

(NB This is **not** the expected level of candidate responses, for which see 'Examples of levels of performance' in the mark scheme.)

Krauss is not fully against sending humans into space, and would even encourage it in some circumstances; he thinks that going into space would be for 'adventure, not for advancing science,' and says, 'I am not against sending humans into space for *that* reason' (adventure, travel and colonisation). So he is clearly in favour of some space travel. However, 'for *that* reason' clearly implies that he would oppose sending humans into space for some reasons. He states 'not for advancing science.' There is some question whether this is his main reason, supported by various other reasons, or whether he has a number of roughly equal reasons. He says that 'the most scientifically exciting knowledge we can gain ... will involve unmanned space vehicles.' This reason clearly relates to 'not for advancing science.'

Krauss also refers to the 'inordinate' cost, the dangers and difficulties, the limits of physics and our biology and the many challenges we face, 'from climate change to energy independence, which we need to tackle while we juggle our hunger for space travel.' It is not quite clear whether these are all supporting his view that we shouldn't send humans into space for the advancement of science, or whether they relate to an unstated but implied view that governments should not fund manned space exploration (with money that could be better spent on earthly problems).

**Appendix 2****Principal Examiner's suggestion of possible ideas/approaches to Question 3**

(NB This is **not** the expected level of candidate responses, for which see 'Examples of part answer levels of performance' in the mark scheme.)

Document 2 answers Document 1 to the extent that it answers concerns about wasting money in space rather than spending it on earth – and this is one of the points that Krauss raises in Document 1. How far Document 2 answers Document 1 depends on how seriously we take his implications that governments should not fund manned space exploration.

If we think that Krauss is using all the other points he makes to support a conclusion about not sending humans into space for the advancement of science, then Document 2 only partly answers his argument. Document 2's argument that there are benefits in terms of spin-offs does not really answer the points that scientific advances in space will come from unmanned exploration, or that we shouldn't send humans into space for the advancement of science because of the costs, the dangers, the difficulties. Document 2 does, to some extent, answer the point that we need to tackle challenges such as climate change; but could be said to fall into the trap of pretending that space exploration 'is a simple solution for any of our significant problems back home.' Furthermore, Document 2 does not even address the point about space exploration being mainly for adventure – and this point is not without merit. It is highly plausible that people are attracted by the adventure of going into space and need to find some other reason (such as science) to justify (and fund?) the adventure.

However, if we think that Krauss's implication that governments shouldn't fund human space exploration (because of problems on earth, the cost, the difficulties etc) are as important in the argument as his stated claims about science not benefiting from human space exploration, Document 2 answers the points much better, because it is focussed on whether governments should fund space research. However, it still doesn't address the question of manned space research, so although Document 2 seems to oppose (or be on a different 'side' to Document 1) it doesn't really counter the specific claims made by Document 1.

To some extent we also need to consider the effectiveness of each argument in the areas where countering is possible. For example, Document 2 doesn't make a very strong case for governments funding space research. It shows only that there are some benefits on earth to this funding, not that it can't be provided privately, or that it is more beneficial than other ways of spending the money. So, even to the extent that Krauss is saying that governments shouldn't fund (manned) space research, this argument doesn't really counter his reasoning, because it doesn't support its own claims very well.

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