Cambridge Assessment International Education

# Cambridge International AS & A Level

**THINKING SKILLS** **9694/04**

Paper 4 Applied Reasoning **For examination from 2020**

MARK SCHEME

Maximum Mark: 50

**Specimen**

This document has **10** pages. Blank pages are indicated.

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**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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| Question | Answer | Marks |
|---|---|---|
| 1(a) | It [space exploration] should be curtailed. | **1** |
| 1(b) | *Award one mark for each of the following [max 4]:*<br><br>• Identification and/or description of the first sentence as a counter-argument.<br>• Identification and/or description of second sentence as the conclusion of the paragraph.<br>• Description of the third sentence as supporting the conclusion of the paragraph.<br>• Description of the final sentence as supporting or illustrating the third sentence.<br>• Identification of the unstated assumption that mankind has a desire for mystery.<br><br>*Reference to start and end of argument elements must be unambiguous.*<br><br>*Sample 4-mark answer*<br><br>'Supporters of ... mankind' is a counter-argument **[1]**. 'There is ... challenges' is the conclusion **[1]** of the paragraph, which is supported by the reason 'There is ... here' **[1]**, which is itself illustrated by a list of examples in the final sentence **[1]**. | **4** |
| 1(c) | *3 marks for all four correctly identified intermediate conclusions with nothing extra*<br>*2 marks for three correctly identified intermediate conclusions*<br>*1 mark for one or two correctly identified intermediate conclusions*<br><br>All of these projects amount to nothing more than a huge waste of money.<br><br>This money would be much better spent funding organisations that improve life on Earth.<br><br>The various space programmes represent a significant cost in human life.<br><br>Space exploration serves no useful purpose. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 2(a) | *2 marks for a developed version of any of the following points*<br>*1 mark for a weak or incomplete version of any of the following points [max 6]*<br><br>*Paragraph 1*<br>• *Straw man* – 'Supporters of space exploration tell us that the Earth is no longer a mystery' is an easily discreditable misrepresentation of the basis of the counter-position.<br><br>*Paragraph 2*<br>• *Straw man* – Nobody is suggesting that a visit to Mars is necessary to produce artificial satellites.<br>• The author implies that the various figures quoted represent significantly large sums, but without comparisons we do not know the significance of these numbers.<br>• *Question-begging* – To describe these projects as 'a huge waste of money' simply reasserts the author's view that they are of no real benefit.<br>• *Straw man* – Selective example in which the purpose of the Voyager space probe is portrayed in a way that is easy to criticise.<br><br>*Paragraph 3*<br>• The phrase 'does nothing but gaze at stars' implies that gazing at stars is not a sufficient purpose for a telescope.<br>• *Equivocation* – 'Advanced' is used here to also mean 'reliable'.<br>• *Straw man* – The author parodies the purpose of SETI.<br>• *Contradiction* – Having earlier stated that artificial satellites 'bring obvious benefits', the author here implies that the Hubble Space Telescope, an artificial satellite, is useless.<br><br>*Paragraph 4*<br>• *Unreasonable assumption* – That 120 is a significantly larger number of deaths than would be expected in other comparable endeavours. | **6** |
| 2(b) | *Award marks from any one of the following lines of explanation. [max 3]*<br><br>• The author's argument relies on the reader accepting that the costs of space exploration outweigh the benefits **[1]**. As the potential benefits have not been addressed **[1]** there are insufficient grounds for accepting this comparison **[1]**.<br><br>• The argument contains many examples of the cost of various aspects of the space programme **[1]** (and other statistics). However, without any comparable figures for other fields of human endeavour we do not know the significance of these numbers **[1]**. This significantly weakens the author's argument because large parts of it are merely lists of numerical examples **[1]**.<br><br>• The reasoning relies heavily on the dismissal of opponents' views **[1]**, but many of those are straw men **[1]**. It remains possible that stronger versions of opponents' views would severely challenge the main conclusion **[1]**. | **3** |

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| Question | Answer | Marks |
|---|---|---|
| 3(a) | *2 marks for a developed version of any of the following points*<br>*1 mark for a weak or incomplete version of any of the following points [max 4]*<br><br>• People with access to email or telephone might not be representative of people in general.<br>• Of those who do have access to telephone or email, those who respond might not be typical of people in general.<br>• 'Do you agree …' is a loaded question as undecided people are more likely to say 'yes'.<br>• *(Allow)* If the data for respondents' ages was self-reported then it may be unreliable. | **4** |
| 3(b) | *2 marks for a developed version of any of the following points*<br>*1 mark for a weak or incomplete version of any of the following points*<br><br>• The broad age categories are not sensitive enough to reveal changes across the age spectrum so the claim is not well supported.<br><br>• The data represent the number of respondents who support space exploration. There is no indication of the extent of their support so a claim that one group supports space exploration 'more strongly' cannot be inferred.<br><br>• The data is about support for *humans* exploring space; the responses might be different if respondents were asked about e.g. robotic exploration. | **2** |

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**Marking criteria for question 4**

| Level | Structure<br>9 marks | Quality of argument<br>9 marks | Use of documents<br>9 marks |
|---|---|---|---|
| 4 | Precise conclusion and accomplished argument structure with consistent use of intermediate conclusions.<br>Includes at least two of the following:<br>• strands of reasoning<br>• hypothetical reasoning<br>• analogy<br>• evidence<br>• examples.<br>Argument is structured so the thought process is made clear.<br>Uses vocabulary of reasoning appropriately and effectively to support argument.<br>**8–9** | Cogent and convincing reasoning which answers the question which was asked.<br>Subtle thinking about the issue.<br>Use of relevant own ideas and ideas from documents.<br>Consideration of and effective response to key counter-arguments.<br>Very few significant gaps or flaws.<br>Effective use of appropriate terminology.<br>**8–9** | Perceptive, relevant and accurate use of documents to support reasoning.<br>Reference three or more documents.<br>Sustained and confident evaluation of documents to support reasoning (two or more valid **evaluative** references to documents).<br>Able to combine information from two or more documents and draw a precise inference.<br>**8–9** |
| 3 | Clear conclusion that is more than 'I agree'.<br>Clear argument structure, which may be simple and precise or attempt complexity with some success.<br>Appropriate use of intermediate conclusions.<br>Use of other argument elements to support reasoning.<br>Generally makes thinking clear.<br>Appropriate use of vocabulary of reasoning.<br>**5–7** | Effective and persuasive reasoning which answers the question which was asked. (There may be some irrelevance or reliance on dubious assumptions.)<br>Use of own ideas and ideas from documents.<br>Consideration of and effective response to counter-arguments.<br>Few significant gaps or flaws.<br>Some use of appropriate terminology.<br>**5–7** | Relevant and accurate use of documents which supports reasoning.<br>Reference three or more documents.<br>Some evaluation **and** comparison of documents to support reasoning.<br>Reasoned inference drawn from at least one document.<br>**5–7** |
| 2 | Clear conclusion stated.<br>Sufficient clarity for meaning to be clear throughout.<br>Structure may be easy to follow but brief or a longer argument which has a less clear structure.<br>Uses reasons.<br>Some appropriate use of vocabulary of reasoning.<br>**3–4** | A reasoned stance which attempts to answer the question which was asked.<br>Some support for the conclusion (there may be considerable irrelevance or reliance on dubious assumptions).<br>Some use of own thinking.<br>Reference to counter-position with direct response, which may be weak or taken entirely from documents.<br>**3–4** | Some relevant use of documents to support reasoning.<br>Some comparison of documents<br>**or**<br>some critical evaluation of documents<br>**or**<br>reasoned inference drawn from document.<br>**3–4** |
| 1 | Attempt to construct an argument.<br>Some reasoning present.<br>**1–2** | Attempt to answer the general thrust of the question.<br>Attempt to support their view.<br>Counter-positions, if mentioned, are not addressed.<br>**1–2** | Some use, perhaps implicit, of documents.<br>**1–2** |
| 0 | No creditable response.<br>**0** | No creditable response.<br>**0** | No creditable response.<br>**0** |

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| Question | Answer | Marks |
|---|---|---|
| 4 | **'We should explore space.'**<br><br>*Use the marking criteria for question 4 to award:*<br>*up to 9 marks for Structure*<br>*up to 9 marks for Quality of argument*<br>*up to 9 marks for Use of documents.*<br><br>***Example Level 4 answers***<br><br>*Argument to support (777 words)*<br><br>It is often said that humans are a curious species and this, in turn, is often cited as sufficient reason to spend money on space exploration, indeed it is mentioned early on in Doc 2 from NASA who, although they have a bias towards promoting the business in which they operate, undoubtedly have a lot of expertise. Satisfying human curiosity, however, is unlikely to convince everyone. We should explore space, and the reasons for this go well beyond mere curiosity.<br><br>It should be made clear that by 'explore space' I mean send crafts and people beyond the immediate confines of Earth's orbit for the purpose of gathering information about what is 'out there'. It is almost a given that the continued use of Earth-orbiting satellites is a worthwhile exercise, but we should not limit ourselves to this.<br><br>Space exploration has produced, and is likely to produce, benefits in terms of technological advancement that can be used on Earth. The author of Doc 1 claims the Apollo programme had no practical results and asks rhetorically of the Voyager space probe, 'What benefits has it brought?' The Apollo claim is plain wrong – most people are aware of the oft-cited Teflon and there are many other benefits from this and other space programmes. However, even if this claim in Doc 1 were correct, the absence of success in the past would not mean that future exploration would not bring benefits.<br><br>Doc 1 cites what are, on the face of it, more pressing problems here on Earth – diseases to cure, pollution to control, crops to improve. A flippant response would be that if we cure more diseases we will further increase an ageing population which would lead to more pollution and the requirement for more crops. More optimistically, it is possible, perhaps equally so, that technology or knowledge that helps with some of these problems would come from the space exploration or its development. Many discoveries are made along the way as an unexpected by-product of scientific research.<br><br>Space exploration will bring economic benefits to the countries involved. Many gainsayers, including Doc 1, cite the enormous sums of money involved, and the claims about large sums of money could be corroborated by Doc 5. However, this is somewhat misleading as much of the 'wasted' money goes in wages to the people employed in the space programme which then feeds back into the economies of nations throughout the world, many of which are less wealthy. However, Doc 3 shows that it may well be possible to do things much more cheaply than the most commonly cited counter-examples. The exploration technology can then be sold to anyone who wishes to, for example, launch a commercial satellite. | **27** |

| Question | Answer | Marks |
|---|---|---|
| 4 | Furthermore, space exploration might reduce our tendency to go to war with one another. Doc 5 presents some figures about spending on space programmes around the world. While Wikipedia is a notoriously unreliable source, 'hard' facts like this can be easily checked and are therefore likely to have some truth in them. The list seems to suggest that many of the agencies with smaller budgets will have to cooperate with one another or with the larger agencies in order to bring any projects to completion, perhaps in the style of the ESA, thus increasing international cooperation. Moreover, if it can be discovered that there is intelligent life outside the solar system, and it is very different from us, this might be reason for nationalistic squabbles over petty differences to subside.<br><br>Most governments like to keep the general public on side, particularly around elections and so many do not want to risk large proportions of their annual budget on uncertainly successful space missions. However, Doc 4 does imply that, in countries sampled at least, the public are on the side of space exploration. The 'reputable polling company' is likely to have some expertise in the accurate collection and representation of statistics and, as a commercial company, would not want to risk their reputation by publishing false or misleading statistics. It might be considered weak to generalise results from only 12 countries but, 12 counties from 3 continents could well represent a reasonable cross-section of world opinion, and certainly could reflect opinion within those countries sampled.<br><br>For many reasons, in addition to human curiosity, we should explore space. Indeed, one pressing Earth-based problem not mentioned by Doc 1 is that of global climate change, the consequences of which could be that the Earth becomes uninhabitable. If that happens our only solution as a species, or community of species, will be to go and live somewhere else, which will be hard to do if we do not explore space.<br><br>*Argument to challenge (745 words)*<br><br>It is often said that humans are a curious species and this, in turn, is often cited as sufficient reason to spend money on space exploration; indeed, it is mentioned early on in Doc 2. However, Doc 2 is written by NASA who, although likely to have some expertise, has a bias towards promoting the business in which it operates. Satisfying human curiosity is not a good enough reason to justify space exploration – we would never justify similar levels of spending on, for example, butterfly identification. We should not explore space, as it diverts precious resources from more pressing concerns here on Earth.<br><br>It should be made clear that by 'explore space' I mean send crafts and people beyond the immediate confines of Earth's orbit for the purpose of gathering information about what is 'out there'. It is true that the continued use of Earth-orbiting satellites is a worthwhile exercise.<br><br>Space exploration has brought few tangible benefits. There exist many reports of serendipitous discoveries arising from space exploration but, when pressed, Teflon is the only example people ever come up with. Doc 1 claims there have been no benefits; this is a slight exaggeration but, despite Doc 1's hyperbole, the point remains that, in over 50 years, practical developments | |

| Question | Answer | Marks |
|---|---|---|
| 4 | have been few. Spending similar sums in other spheres of innovation is just as likely to have yielded technological benefits. Indeed, Earth-bound projects have a higher probability of producing solutions to Earth-bound problems. Docs 1 and 5 cite enormous sums of money and none of the documents, even NASA, mentions specific commercial benefits from space exploration. Any commercial research and development project here on Earth with a budget in the $ millions would soon be cancelled if it brought few tangible effects. Therefore, if space programmes were subject to the same constraints as commercial research and development programmes, they would presumably have been cancelled long ago.<br><br>Doc 1 cites some more-pressing problems here on Earth – diseases to cure, pollution to control, crops to improve. Although the author of Doc 1 is clearly biased, the point still stands. The money would be much better spent here on Earth, such as on the 'poor sanitation' in India mentioned in Doc 3.<br><br>Space exploration is very expensive, deep-space exploration even more so. Doc 3 suggests that affordable space travel might be upon us with the launch of the Indian Space Agency's Mars mission. However, it is likely that the Mars mission itself is merely an expensive shop window display with which to advertise much more commercially viable low-Earth-orbit space technology. With this sort of project, India could really make money and do something about its sanitation problem.<br><br>Most governments like to keep the general public on side, particularly around elections and so most do not want to risk large proportions of their annual budget on uncertainly successful space missions. Doc 4 does imply that, in those countries sampled at least, the public are on the side of space exploration. However, the question 'Do you agree that humans should explore space?' is leading in the extreme. Undecided people are far more likely to answer in the affirmative. More telling is the lower levels of space-related enthusiasm among the older and, one could easily argue on the basis of experience, wiser generation. Thus, the graph in Doc 4 cannot be used to claim that space exploration is supported by informed public opinion.<br><br>It has been said that space exploration might reduce our tendency to go to war with one another. India and Pakistan are famous rivals; Russia and China are close neighbours of India. According to Doc 5, all four countries have expensive space programmes (Pakistan less so). While Wikipedia is a notoriously unreliable source, 'hard' facts like the cost of a national space programme can be easily checked and are therefore likely to have some truth in them. The space race in general and the Indian space programme in particular seems likely to provide just another opportunity, or excuse, for petty nationalist posturing. While having a slightly shinier space rocket than your neighbour might not immediately lead to a declaration of war, it is unlikely to promote the spread of peace and harmony.<br><br>Humans are curious, but there are other ways to satisfy curiosity. The Earth is in trouble, the temperature is rising, the population is expanding, people are starving, biodiversity is reducing, and nuclear weapons have not gone away. We cannot afford to explore space and so we should not. | |

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