THINKING SKILLS

Paper 9694/21
Critical Thinking

Key messages

- When asked to assess an argument or position, candidates should ensure that they consider both sides.
- When asked to construct an argument, candidates should focus on creating a sound structure leading towards a conclusion, with reference to support from the sources where applicable.

General comments

Virtually all the questions produced some good answers, but very few candidates performed consistently well on all questions. Evaluation of source material continues to be a major weakness in the majority of candidates' scripts which inevitably results in very few candidates gaining above Level 2 on **Questions 1(d)**, **2(d)**, and **3(c)**. Overall, candidates performed best on the questions which did not require the application of specific skills from Critical Thinking.

Comments on specific questions

Question 1

(a) The key point here was "if". Some candidates realised this and scored 3, but most took it for granted that the driver could see the colour of the traffic light or some other significant element of the story, had noticed it and could remember it. They were awarded 1 mark. Any hint of doubt (such as "may have" or "possibly") was given 2.

(b) Most candidates recognised that Colin's evidence was more reliable and made at least one valid point concerning the credibility of both sources in respect of vested interest and/or ability to see. So they achieved 3 marks. However, several candidates wrongly accused Colin of bias because he offered to give evidence for Dennis and even claimed that he was lying when he denied knowing either of the drivers.

(c) Most candidates judged correctly that the letter was of very little use. The most popular reason was that the letter attributed blame equally, but some candidates also saw the significance of the companies' vested interest and/or the lack of evidence.

(d) Most answers fell into Level 2. In order to reach Level 3, it was necessary both to evaluate evidence and seriously consider an alternative explanation of events, and most candidates who did one of those did not achieve the other. Weak answers (some of which began "As a driver myself….") tended to try to work out what happened instead of evaluating the evidence. Answers were divided roughly equally between blaming Alice or Dennis, with a few attributing the blame to the people who installed the roadworks or even Colin, the motorcyclist. Most candidates took it for granted that Dennis was telling the truth about the light changing as he passed it, rather than as he approached it, although this was an obvious point to question.

Question 2

(a) Many candidates achieved 3 marks on this question, by giving valid reasons why this claim extreme to be inferred from Dr Asif's statement. A few misinterpreted the question and disc Dr Asif's credibility ("reliability") instead of the quality of the inference.

(b) Most candidates judged correctly that Dr Branchflower's response was effective, but many of them then summarized or paraphrased what he said rather than explaining how it challenged Mrs Courtney's claims, thereby gaining only 1 mark.

(c) This question referred to the research report from the second half of Source D, but some candidates misinterpreted it as referring to the undercover investigation mentioned in the second sentence. Most candidates recognized that the research study was unlikely to cause everyone to cease to use homoeopathic treatment.

(d) Nearly all candidates did refer to the sources in their answers to this question, which is an advance on previous sessions, but many of them did not evaluate their credibility. Since the sources included claims both for and against homoeopathic medicine, it was necessary to refer to both sides of the question in order to achieve full marks.

Question 3

(a) Very few candidates correctly identified the main conclusion of this argument. Some gained 1 mark by linking the correct answer with the major intermediate conclusion which followed it in the passage. The most popular answer was the intermediate conclusion, "there is no such thing as unselfishness", even though this clause is introduced by the word "because", which should have alerted candidates to the fact that it could not be the main conclusion. In addition, it was not very likely that the Examiners would reveal the answer to part **(a)** in part **(b)**. Candidates may have thought that the task of identifying the main conclusion was a matter of meaning rather than structure. It could certainly be argued that "there is no such thing as unselfishness" is the main point of the argument, but structurally it is not the main conclusion.

On many occasions, the passage in **Question 3** consists of several sub-arguments, each of which feeds directly into the main conclusion. In such cases, part **(b)** simply asks candidates to identify reasons which directly support the main conclusion. In other passages, such as this one, the sub-arguments feed into a major intermediate conclusion, which in turn supports the main conclusion. In those cases, there is technically only one reason supporting the main conclusion, and so the question identifies the major intermediate conclusion and asks for reasons supporting it. Teachers are advised to explain this to their candidates.

As on previous occasions, candidates from some Centres expressed the gist of the argument in their own words instead of identifying the main conclusion.

(b) Many candidates correctly identified at least one reason supporting the major intermediate conclusion, but very few spotted all three. Most candidates recognised that each paragraph constituted a mini-argument, but some of them summarised those mini-arguments in their own words instead of identifying the part which fed directly into the stated intermediate conclusion. The task in this question is always one of analysis, rather than comprehension, and the correct answer always consists of a sentence or clause quoted from the passage.

(c) The fundamental weakness of this argument is that it begins by assuming its conclusion. Another way of putting the same point is that the author shows that all acts of apparent unselfishness *could* be motivated selfishly, but not that they *are*. A good number of candidates recognised this at least dimly, but very few were able to express it clearly.

(d) Fewer candidates than usual achieved full marks on this question, largely because they tried to relate their own argument to the passage instead of discussing the stated claim in isolation, as they were expected to do. It was easier to argue convincingly against the claim than to support it.

THINKING SKILLS

Paper 9694/22
Critical Thinking

Key messages

- When asked to assess an argument or position, candidates should ensure that they consider both sides (see below).
- When asked to construct an argument, candidates should focus on creating a sound structure leading towards a conclusion, with reference to support from the sources where applicable.

General comments

Virtually all the questions produced some good answers, but very few candidates performed consistently well on all questions. Candidates need to be aware that many questions require an assessment of both sides of an argument or position (as indicated by expressions such as 'how likely….'). Many candidates respond to this type of question by taking up a position on one side and arguing for it, as if they were in a debate. However, there are occasions where only one position is possible so candidates need to make a judgement on this. It is in the nature of most issues that there will be two sides to the question but this should not be taken as a hard and fast rule.

Comments on specific questions

Question 1

(a) Most candidates obtained at least 2 marks, often by taking up the point about tension between cabin crew and the pilots. Other points in the mark scheme also figured, but only a minority of candidates discussed whether looking tired and being tired were necessarily the same thing. Some candidates wrote at rather great length in this question and perhaps need to guard against spending too much time on early questions where it might seem there is plenty of time to go before the finish. Such candidates often seemed rushed in **Question 3**.

(b) Again, most candidates obtained at least 2 marks, usually by pointing out that Source D said the tablets could cause drowsiness and that, in his e-mail, Bob Andrews said he took an extra phyllogen. The more perceptive candidates pointed out that 'extra' did not necessarily mean the dose had been exceeded.

(c) A number of candidates misunderstood this question and referred to information already in the sources rather than *additional* information. In the correct answers most of the possible additional information figured with information from the co-pilot or others on the plane probably being the most popular.

(d) The issues raised by the sources seemed to engage the interest of the candidates and there was more consideration of "plausible alternative scenarios" than in the past, which enabled more candidates to access the Level 3 mark band. Some candidates wrote no more than they did for the other questions and they need to be aware that, as there are 6 marks being awarded, they need to write rather more. These briefer answers tended to stick with the idea that Bob Andrews was drowsy as a result of the phyllogen and therefore responsible. More thorough treatments blaming Andrews picked up on the point that landing required "all the concentration and skill of the pilots" and/or that he was relying on good weather. Fuller answers went beyond Andrew's responsibility and explored the idea that this was 'an accident waiting to happen' and that the airport had not kept pace with expansion. A few candidates questioned whether "Top Gun" and Bob Andrews were one and the same person. Whilst it is reasonable to assume they were, candidates who raised this question were certainly thinking critically.

Question 2

A number of candidates found it difficult to understand the issues raised by the sources and obtained low marks as a result. This was compensated for later in **Question 3** (see below). Those who did cope with the content of the sources went on to obtain medium to good marks.

(a) This was a case where there was only one answer, which was 'no'. Better candidates saw that Source A only applied to humans and not all organisms.

(b) Only the best candidates managed to spell out the issues clearly here. Many dealt with Sources A and E at greater length than intended and it needs to be seen that the expression "with the help of" does not mean that explicit reference to these sources (or an examination of what they contain) is required in answering the question. Most successful answers took up the more obvious point that, if the notion of biological ageing is correct, one should not be able to show how people have aged to the same degree at certain ages (as in Source B) therefore Source B is incompatible. A minority did take up the point that appearance is not sufficient to judge how well people function and that somebody who appeared to be older might actually still be biologically younger and more functional than they appeared. However, candidates making this point did not always see that this would mean Source B was compatible with the notion of biological age.

(c) As in part **(a)** above, this discriminated well, with better candidates seeing that although this information showed that some people started life in a better genetic position than others, it did not necessarily mean that these genetic factors *outweighed* lifestyle factors. Source C suggests that lifestyle can negate the good/bad genetic starting position.

(d) Candidates who had performed poorly in the previous sections were able to obtain better marks here. As usual in this question, a significant number of candidates restricted their answer to a rendition of the content of each source with no or little evaluation of this content. Such answers cannot move beyond Level 1. Even candidates who managed to combine this approach with some genuine evaluative comment hampered themselves by spending too much time repeating what was in the sources. Candidates should be advised that the best way to approach this question is to construct an argument supporting a conclusion which then selectively uses the information in the sources to reinforce their reasoning. However, they should not go too far the other way and end up writing an essay with no reference to the sources.

Question 3

The structure of the argument confused a number of candidates. The key reasoning was in paragraphs 4 and 5 with paragraphs 1, 2 and 3 exploring the dilemma that faces people who want to decide whether biofuels are a green form of energy. The argument suggests that this dilemma can be resolved. Allowance was made, as indicated below, for the difficulties candidates encountered in getting to grips with the structure of the argument in this passage.

(a) This was intended to refer to the argument that is covered in both paragraphs 4 and 5 combined. Some candidates thought they had to identify a conclusion in paragraph 4 and then another in paragraph 5. In these cases, the conclusion in paragraph 5 was accepted and the conclusion written for paragraph 4 was ignored. Many candidates correctly identified the main conclusion, though a number scored only 1 mark because they included the reason "it is either that or the end of civilisation as we know it". Candidates need to be aware that this question now gets 2 marks, and they need to make sure they do not include reasoning as well as the actual main conclusion. If they do include extra reasoning their mark will be limited to 1.

(b) Many candidates referred to points in paragraphs 1 and 2, whereas the reasons the author uses to support his main conclusion are confined to paragraphs 4 and 5. Examiners accepted statements in paragraphs 1 and 2 which were reasons that supported the main conclusion (e.g. (fossil fuels) offer a green solution to the planet's energy needs) even though the author did not actually use them. However, candidates were capped at 2 marks if one or more of these reasons were offered in their answer. This reserved 3 marks for candidates who did identify the reasons the author actually used, in paragraphs 4 and 5.

(c) Compared to previous years, many candidates successfully identified flaws and ass[illegible]d were ably to access the Level 3 mark band. Difficulties in analysing structure did n[illegible] extend into evaluation of the reasoning. This meant that, overall, **Question 3** compensate[illegible] difficulties some candidates encountered in **Question 2**. There was a tendency to confus[illegible] hominem' with 'straw man'; the flaw in dealing with "environmental extremists" was not [illegible] hominem' because the author does tackle a position that he attributes to them, rather than just dismissing them for who they are. However, this position is so distorted that it is easy for him to knock it down (hence 'straw man').

A minority of candidates referred to the author 'contradicting' himself and failed to see the significance of outlining a dilemma.

(d) More or less split between candidates arguing for and against the proposition. The issue engaged candidates, perhaps a little too much insofar as some answers were rather lengthy, a bit rhetorical and tending towards essays. However, such answers usually managed to fit the criteria for reasonable marks.

THINKING SKILLS

Paper 9694/23
Critical Thinking

Key messages

- When asked to assess an argument or position, candidates should ensure that they consider both sides (see below).
- When asked to construct an argument, candidates should focus on creating a sound structure leading towards a conclusion, with reference to support from the sources where applicable.

General comments

Virtually all the questions produced some good answers, but very few candidates performed consistently well on all questions. Candidates need to be aware that many questions require an assessment of both sides of an argument or position (as indicated by expressions such as 'how likely….'). Many candidates respond to this type of question by taking up a position on one side and arguing for it, as if they were in a debate. However, there are occasions where only one position is possible so candidates need to make a judgement on this. It is in the nature of most issues that there will be two sides to the question but this should not be taken as a hard and fast rule.

Comments on specific questions

Question 1

(a) Most candidates obtained at least 2 marks, often by taking up the point about tension between cabin crew and the pilots. Other points in the mark scheme also figured, but only a minority of candidates discussed whether looking tired and being tired were necessarily the same thing. Some candidates wrote at rather great length in this question and perhaps need to guard against spending too much time on early questions where it might seem there is plenty of time to go before the finish. Such candidates often seemed rushed in **Question 3**.

(b) Again, most candidates obtained at least 2 marks, usually by pointing out that Source D said the tablets could cause drowsiness and that, in his e-mail, Bob Andrews said he took an extra phyllogen. The more perceptive candidates pointed out that 'extra' did not necessarily mean the dose had been exceeded.

(c) A number of candidates misunderstood this question and referred to information already in the sources rather than *additional* information. In the correct answers most of the possible additional information figured with information from the co-pilot or others on the plane probably being the most popular.

(d) The issues raised by the sources seemed to engage the interest of the candidates and there was more consideration of "plausible alternative scenarios" than in the past, which enabled more candidates to access the Level 3 mark band. Some candidates wrote no more than they did for the other questions and they need to be aware that, as there are 6 marks being awarded, they need to write rather more. These briefer answers tended to stick with the idea that Bob Andrews was drowsy as a result of the phyllogen and therefore responsible. More thorough treatments blaming Andrews picked up on the point that landing required "all the concentration and skill of the pilots" and/or that he was relying on good weather. Fuller answers went beyond Andrew's responsibility and explored the idea that this was 'an accident waiting to happen' and that the airport had not kept pace with expansion. A few candidates questioned whether "Top Gun" and Bob Andrews were one and the same person. Whilst it is reasonable to assume they were, candidates who raised this question were certainly thinking critically.

Question 2

A number of candidates found it difficult to understand the issues raised by the sources and obtained low marks as a result. This was compensated for later in **Question 3** (see below). Those who did cope with the content of the sources went on to obtain medium to good marks.

(a) This was a case where there was only one answer, which was 'no'. Better candidates saw that Source A only applied to humans and not all organisms.

(b) Only the best candidates managed to spell out the issues clearly here. Many dealt with Sources A and E at greater length than intended and it needs to be seen that the expression "with the help of" does not mean that explicit reference to these sources (or an examination of what they contain) is required in answering the question. Most successful answers took up the more obvious point that, if the notion of biological ageing is correct, one should not be able to show how people have aged to the same degree at certain ages (as in Source B) therefore Source B is incompatible. A minority did take up the point that appearance is not sufficient to judge how well people function and that somebody who appeared to be older might actually still be biologically younger and more functional than they appeared. However, candidates making this point did not always see that this would mean Source B was compatible with the notion of biological age.

(c) As in part **(a)** above, this discriminated well, with better candidates seeing that although this information showed that some people started life in a better genetic position than others, it did not necessarily mean that these genetic factors *outweighed* lifestyle factors. Source C suggests that lifestyle can negate the good/bad genetic starting position.

(d) Candidates who had performed poorly in the previous sections were able to obtain better marks here. As usual in this question, a significant number of candidates restricted their answer to a rendition of the content of each source with no or little evaluation of this content. Such answers cannot move beyond Level 1. Even candidates who managed to combine this approach with some genuine evaluative comment hampered themselves by spending too much time repeating what was in the sources. Candidates should be advised that the best way to approach this question is to construct an argument supporting a conclusion which then selectively uses the information in the sources to reinforce their reasoning. However, they should not go too far the other way and end up writing an essay with no reference to the sources.

Question 3

The structure of the argument confused a number of candidates. The key reasoning was in paragraphs 4 and 5 with paragraphs 1, 2 and 3 exploring the dilemma that faces people who want to decide whether biofuels are a green form of energy. The argument suggests that this dilemma can be resolved. Allowance was made, as indicated below, for the difficulties candidates encountered in getting to grips with the structure of the argument in this passage.

(a) This was intended to refer to the argument that is covered in both paragraphs 4 and 5 combined. Some candidates thought they had to identify a conclusion in paragraph 4 and then another in paragraph 5. In these cases, the conclusion in paragraph 5 was accepted and the conclusion written for paragraph 4 was ignored. Many candidates correctly identified the main conclusion, though a number scored only 1 mark because they included the reason "it is either that or the end of civilisation as we know it". Candidates need to be aware that this question now gets 2 marks, and they need to make sure they do not include reasoning as well as the actual main conclusion. If they do include extra reasoning their mark will be limited to 1.

(b) Many candidates referred to points in paragraphs 1 and 2, whereas the reasons the author uses to support his main conclusion are confined to paragraphs 4 and 5. Examiners accepted statements in paragraphs 1 and 2 which were reasons that supported the main conclusion (e.g. (fossil fuels) offer a green solution to the planet's energy needs) even though the author did not actually use them. However, candidates were capped at 2 marks if one or more of these reasons were offered in their answer. This reserved 3 marks for candidates who did identify the reasons the author actually used, in paragraphs 4 and 5.

(c) Compared to previous years, many candidates successfully identified flaws and ass[illegible]d were ably to access the Level 3 mark band. Difficulties in analysing structure did n[illegible] extend into evaluation of the reasoning. This meant that, overall, **Question 3** compensate[illegible] difficulties some candidates encountered in **Question 2**. There was a tendency to confus[illegible] hominem' with 'straw man'; the flaw in dealing with "environmental extremists" was not [illegible] hominem' because the author does tackle a position that he attributes to them, rather than just dismissing them for who they are. However, this position is so distorted that it is easy for him to knock it down (hence 'straw man').

A minority of candidates referred to the author 'contradicting' himself and failed to see the significance of outlining a dilemma.

(d) More or less split between candidates arguing for and against the proposition. The issue engaged candidates, perhaps a little too much insofar as some answers were rather lengthy, a bit rhetorical and tending towards essays. However, such answers usually managed to fit the criteria for reasonable marks.

THINKING SKILLS

Paper 9694/31
Problem Analysis and Solution

Key message

This examination assesses the twelve problem-solving skills detailed in the syllabus, and as such candidates should be aware that, where available, partial credit is generously awarded for evidence of these skills, even if the correct final answers are not eventually arrived at. Thus it is vital for candidates always to present their working, and to do so in a clear and orderly fashion, if they are to gain marks to their full potential. Candidates should also be encouraged to develop the skills to find efficient methods and present concise solutions, as a lack of these caused some candidates to sumbit themselves to unnecessary time pressures.

Comments on specific questions

Question 1

Both **Question 1** and **Question 2** required candidates to master a collection of rules and limitations from a realistic situation, as precisely phrased in the introductory text, and then answer directed questions based on them. The precise interpretation of what is given in the text is crucial here; almost every statement in the introductory text is vital to a correct set of answers.

(a) This was answered well, in general. Some successful candidates drew an example to check that their calculations were correct; such additional working is advisable, since most errors creep in when candidates attempt to perform a complex calculation in their heads. Clearly such working must be accompanied by a clearly-identified numerical answer. The most common misconception which affected answers to this question was the belief that a viewer would record the heights of the nearest two columns, rather than the highest of the pair (for instance recording 2 4 for the temple in the question when seen from the south). This illustrates the need for careful analysis of the information given in the diagrams.

(b) Part **(i)** was answered well by the vast majority of candidates. The demand for "a possible plan" confused some candidates, because a number of correct answers were possible. It is advisable to give one clear example in such cases, since there is nothing to be gained by trying to exhaustively list the options unless the question clearly demands it. No marks were available for ambiguous answers here – for instance omitting the height of the fourth column, or marking it as "X".

Part **(ii)** introduced the idea of a temporal succession of ruins, and with it the careful analysis of what was possible as blocks were removed. The key to the problem was an appreciation that a picture with a column of height 6 must have been taken before any picture with columns all smaller than that. Most candidates laid out their answers accessibly. A small number needed to exercise more care in counting the heights in picture C (mistakenly concluding that they were both 6 cubits high). A small number of candidates suffered by not giving all the information required in part **(ii)**, for instance the clear labelling of the order of the pictures.

(c) The majority of candidates scored 1 or 2 out of 3 in this question. As with part **(a)**, many successful candidates drew a possible plan in order to assist their analysis. The subtle arrangement necessary to achieve the third mark here shows how useful the drawing of such diagrams is (and sceptical scrutiny of them) in answering these questions.

Question 2

(a) The vast majority of candidates correctly saw how the birth dates were encoded, and g least one mark here. Many candidates did not fully appreciate what was given in part **(ii)**: th that the code could be unlocked given Iain's and Jeremy's dates of birth. As a result, suggesti about the scientific reliability of the deduction (for instance "*it could have been a coincidence*" o "*you need more than one instance to be sure of the theory*") were irrelevant. This was a very common misconception in this question. A number of candidates managed to offer a viable answer to **(iii)** without having answered **(ii)** correctly: it is clearly worth a candidate offering an example in this case, even if the logic of the question is not clear to them.

(b) This question was answered well on the whole. The majority of candidates were able to appreciate the implications of the clue given about female passport-holders. In answering the question a few candidates offered only one of the two pieces of information required for **(i)**, or did not give the birth year in **(ii)** – a stark reminder that performance on these questions under pressures of time is as much about careful reading of the questions as careful reading of the text. With only one mark per item of information, there was no credit available for answers involving minor errors.

(c) This question tested the logical implications of adding numbers to the digits, and attracted lots of creative answers, some of which were right. The question tested candidates' abilities to express their identification system clearly, as well as their ability to identify the digits which had sufficient freedom. There was only one mark available here, so there was no credit available for the numerous imaginative solutions which included adding extra symbols on the end of the 6 digits, inverting certain digits and adding numbers to digits which were already 'full' of information.

(d) This question generated a number of extensive written replies. The key information that candidates needed to identify was that the 10-year age difference would distinguish parents from children in all cases. Those candidates who offered an extended written reply would be advised to spend more time thinking about what is the decisive issue in the matter, and writing a single sentence, rather than discussing the issue publicly.

(e) This question proved to be very challenging for a lot of candidates. Most candidates were able to make qualitative assessments of the likelihood of failure, but did not have the mathematical skills to approach the question quantitatively. Candidates should be made aware of the need for numerical answers when asked for probability.

Question 3

This question follows the model offered by previous 9694 Paper 4 **Question 1**s. It is designed to prompt candidates to investigate a fairly large 'solution space', and thus offers a chance for decisive and structured experimentation. It demands careful, well-explained working; there are many marks to be gained by intelligent attempts at finding a solution which demonstrate some modelling skill, irrespective of whether the optimum is reached, and candidates should be encouraged to make tentative attempts at the questions, with explanatory comments where necessary, even if they are not able to pursue them fully.

This question depended upon mathematical familiarity with calculating the volume of cuboids and speed (given distance and time). A sizeable number of candidates were not confident in this.

(a) This was a tough first question, since it required an appreciation of the different orientations of the block, and a correct calculation of the time. Many candidates calculated the time taken for one revolution along the 2 x 6 axis, which gained no marks in this case.

(b) This question required three-dimensional reasoning, which many candidates clearly found hard. A number of successful candidates appreciated the need for careful consideration of all the orientations, and gave the 6 possible lengths (with repeats) in what appeared to be fairly time-consuming written answers. This was a reliable approach, but inefficient. Brief written notes are all that is needed to clarify the structure of such a solution: for example, "*different orientations: 1 x 4 gives 10 m, 1 x 6 gives 14 m, 4 x 6 gives 20 m*".

(c) This required careful investigation, and there were many opportunities for arithmetical errors. As such, carefully-expressed working was highly recommended. Offering unclear or non-existent working followed by a single numerical answer was a gamble which did not pay off for many candidates.

(d) Few candidates were able to tackle this effectively, perhaps due to the pressures of time by inefficient approaches to the investigation. It is strongly advised that candidates be optimisation questions (in which they are asked to find a smallest or largest value) by laying least one clear attempt, regardless of whether it is vaguely optimal, in the sense required in question. This should then be followed up by an attempt to improve upon the time taken (in this case), if no further structural insights have occurred. At this point candidates may decide that time will not permit further investigation, but they will have reliably gained half the marks available.

(e) This relied upon a substantially correct approach to **(d)**, and further investigation. The comments made about how to tackle such investigations apply here: any attempt to calculate the time taken to move a differently proportioned block was likely to gain marks. Both **(d)** and **(e)** were clearly tough questions to complete in the time allotted, but any attempts by candidates to develop their models (PS11) were treated generously; this was however of no benefit to candidates who left no clear trace of their working.

(f) This final question depended upon a conceptual appreciation of what constituted a 'fast' block size, and was answerable without the more extensive numerical work involved in **(c)**, **(d)** and **(e)**. Unfortunately, few candidates made it to this stage of the question.

Question 4

This question follows the model offered by previous 9694 Paper 4 **Question 2**s. It is designed to test candidates' ability to interrogate interlinked sets of data, and requires careful identification of the relevant information as well as appreciation of how the varieties of information need to be combined. In order to answer such questions well, candidates need to pursue orderly searches of the data, noting down the information they need, and then lay out the possible solutions carefully and exhaustively.

(a) Most candidates tackled this correctly. A brief list of the scores after each heat often accompanied correct solutions. Some candidates misread the question, and offered the first heat that the Sharks won (heat 3). Such mistakes reinforce the need to read the question before and after tackling it, in order to ensure that it has been read correctly.

(b) Correct answers to this depended upon careful reading of the key 2nd paragraph in the question. Many candidates appeared to become confused, particularly when trying to comprehend the number of laps that were possible in each race, in their head. At the end of this exhausting process, many had overlooked the length of a lap, or the number of laps which gain 0 points. Some attempt to record this process on paper seemed to ease the path to a solution.

(c) This question was performed well by most candidates. Some working probably occurred on the question papers, which is advisable for questions like this. Some candidates offered explanations of their choices, which were not credited in this case – although the phrasing of such an explanation can be a good way of checking that all the necessary restrictions have been abided by.

(d) In part **(i)**, a number of candidates attempted to consider the possible outcomes of the game from the position given in the question, and were credited for their efforts. Very few appreciated the short cut to the correct answer, involving consideration of the total number of points available.

Part **(ii)** stimulated a lot of intelligent reasoning by candidates. Many gained all 3 marks, and submitted thoughtful, clearly-expressed answers.

THINKING SKILLS

Paper 9694/32

Problem Analysis and Solution

Key message

This examination assesses the twelve problem-solving skills detailed in the syllabus, and as such candidates should be aware that, where available, partial credit is generously awarded for evidence of these skills, even if the correct final answers are not eventually arrived at. Thus it is vital for candidates always to present their working, and to do so in a clear and orderly fashion, if they are to gain marks to their full potential. Candidates should also be encouraged to develop the skills to find efficient methods and present concise solutions, as a lack of these caused some candidates to sumbit themselves to unnecessary time pressures.

Comments on specific questions

Question 1

Both **Question 1** and **Question 2** required candidates to master a collection of rules and limitations from a realistic situation, as precisely phrased in the introductory text, and then answer directed questions based on them. The precise interpretation of what is given in the text is crucial here; almost every statement in the introductory text is vital to a correct set of answers.

Most candidates found **Question 1** accessible, with roughly a third of those who attempted the question achieving 8 marks or more.

(a) This question was answered well by most candidates, demonstrating considered reading of the initial instructions. A number of candidates assumed that additional restrictions were in place, such as the need for one of each type of villa to be included; it is easy to make such assumptions in these questions, and it should be stressed to candidates that all restrictions will be stated explicitly in the text.

(b) Most candidates who managed to answer **(a)** correctly also managed part **(b)**. The most common source of lost marks was failing to state explicitly the number of each type of villa needed for **(b)(i)**, merely giving examples of viable sequences.

(c) Part **(c)(i)** was answered well by almost all candidates, many giving brief explanations of their working. Parts **(ii)** and **(iii)** proved to be a degree harder than **(a)** and **(b)**, and many candidates concluded that only 5 *Rockhampton* villas were permissible in the most profitable combination, rather than 6.

(d) Most candidates found the search for alternative arrangements fairly easy. Those who had coped with **(c)(iii)** tended to gain both of the available marks here.

Question 2

Although a small minority navigated their way through this question successfully, most candidates found it difficult to access.

(a) This question allowed candidates to either count the gaps carefully, or apply some consideration to what must separate the 30 black bars given in the question. Most candidates achieved this without incident.

(b) Few candidates appreciated the implication of the two left-hand side versions of '0', combined with the need for digits not to be confused. This vital leap of logic, combined with the amount of information in the question, clearly prompted many candidates to focus on the other questions in the paper. Many candidates might have been encouraged to persevere if they had appreciated the active nature of the instruction, "given this information about 0…."; this directed candidates to focus on the way that "0" could be written, appreciate the relationship linking left and right, and then provide the ambiguous pattern.

A number of candidates attempted to extract the patterns used in the barcode in the diagram, although such analysis would clearly be insufficient to answer what would **never** be possible on the right-hand side.

(c) Most candidates who attempted this question managed to deliver the correct answer. This did not depend on correctly answering **(b)**, although a number of candidates appeared to give up on the entire question after wrestling unsuccessfully with **(b)**.

(d) Few candidates were able to offer credit-worthy answers to this question. Many of those who attempted this tackled it as an AS Level Maths 'permutations' question, assuming that the number of *x*s and *y*s was predetermined. Marks were available for working (independent of the correctness of the overall method) which showed appreciation that 10 digits had already been taken, and that 1 pattern was going to be indistinguishable from the right-hand side, but few responses showed this explicitly.

Question 3

This question follows the model offered by previous 9694 Paper 4 **Question 1**s. It is designed to prompt candidates to investigate a fairly large 'solution space', and thus offers a chance for decisive and structured experimentation. It demands careful, well-explained working; there are many marks to be gained by intelligent attempts at finding a solution which demonstrate some modelling skill, irrespective of whether the optimum is reached, and candidates should be encouraged to make tentative attempts at the questions, with explanatory comments where necessary, even if they are not able to pursue them fully.

(a) Most candidates found this initial calculation unproblematic**.**

(b) This involved a very small search of two-layer rafts, and the two marks available for the optimal answer were accessible to most candidates. The justification that was required was ignored by many candidates, or dealt with cursorily. Some explicit appeal to the possible constitution of smaller rafts, and their bottom row, was necessary to gain the mark. This could be as simple as "3+2 is the next smallest raft which might submerge the bottom row, but it has been shown in **(a)** that only 98.3% of the bottom row is submerged. So 4+3 must be the smallest".

It was not deemed necessary to consider the 4+1 raft in the justification.

(c) As with **(b)**, this involved a fairly small collection of values to search (between 1 and 10, at most), and many candidates managed to appropriately conclude that 6 logs were possible. A similar approach to the justification was needed to be awarded the third mark; in this case, a calculation showing the amount submerged in a 10+7 raft was adequate.

(d) This question, requiring an exhaustive list of possible rafts, and an appreciation of the vertical symmetry requirement, caused many candidates problems. Many candidates ignored the requirement for vertical symmetry; only 1 mark was available for an otherwise correct attempt which did this. Furthermore, many candidates did not consider the one-layer raft: there was nothing in the constraints which forbade this, and it may be worth reminding future candidates of the need to consider the extreme cases in such problems.

(e) This question required a creative search through a potentially large range of raft arra... Many responses tackled this in an organised manner, clearly stating the variety of arrang... considered, and the number of dry logs in each case. As is liable to be the case in more ext... investigations, time constraints seem to have truncated the process. Candidates must be willing... set themselves a time limit for this question in case they do not locate a solution which they are... sure is optimal.

Question 4

This question follows the model offered by previous 9694 Paper 4 **Question 2**s. It is designed to test candidates' ability to interrogate interlinked sets of data, and requires careful identification of the relevant information as well as appreciation of how the varieties of information need to be combined. In order to answer such questions well, candidates need to pursue orderly searches of the data, noting down the information they need, and then lay out the possible solutions carefully and exhaustively.

(a) This identification of the correct times, and calculation of the difference, was performed correctly by the vast majority of candidates.

(b) Few candidates managed to correctly identify the number of trams going in both directions, on both of the lines through Snout. This may have been partly due to reluctance on the part of candidates to list the tram times/directions/lines, perhaps because the problem initially looked simple enough to 'do in your head'.

(c) More than half the candidates managed to correctly identify the time Peter arrives at Lysander, often laying out the intermittent times in the process. A number of candidates approached the solution by calculating the tram times and waiting times for each stage of the journey; this method follows on from **(a)**, but is not the most efficient here.

The calculation of the cost of the tickets was performed well by those who correctly answered **(c)(ii)**.

(d) This question was correctly navigated by very few candidates, perhaps partly due to the time pressures at the end of the paper. A correct solution to the question required methodical listing of the four possible routes, calculation of the times taken, and rejection of the route which takes too long. There was ample opportunity for numerical errors here, and many candidates appeared to be engaging in much of the work in their heads rather than on paper. The calculations were no harder than those in **(c)(i)**, but the success rate was far less impressive.

The time pressures and confused answers to **(d)(i)** did not lead to a good success rate at **(d)(ii)**. Certain candidates misunderstood the charges, applying them per section of the journey, rather than per station (even though this is explicitly stated); this is a good example of how easy it is to make assumptions about the terminology in these questions.

THINKING SKILLS

Paper 9694/33
Problem Analysis and Solution

Key message

This examination assesses the twelve problem-solving skills detailed in the syllabus, and as such candidates should be aware that, where available, partial credit is generously awarded for evidence of these skills, even if the correct final answers are not eventually arrived at. Thus it is vital for candidates always to present their working, and to do so in a clear and orderly fashion, if they are to gain marks to their full potential. Candidates should also be encouraged to develop the skills to find efficient methods and present concise solutions, as a lack of these caused some candidates to sumbit themselves to unnecessary time pressures.

Comments on specific questions

Question 1

Both **Question 1** and **Question 2** required candidates to master a collection of rules and limitations from a realistic situation, as precisely phrased in the introductory text, and then answer directed questions based on them. The precise interpretation of what is given in the text is crucial here; almost every statement in the introductory text is vital to a correct set of answers.

Most candidates found **Question 1** accessible, with roughly a third of those who attempted the question achieving 8 marks or more.

(a) This question was answered well by most candidates, demonstrating considered reading of the initial instructions. A number of candidates assumed that additional restrictions were in place, such as the need for one of each type of villa to be included; it is easy to make such assumptions in these questions, and it should be stressed to candidates that all restrictions will be stated explicitly in the text.

(b) Most candidates who managed to answer **(a)** correctly also managed part **(b)**. The most common source of lost marks was failing to state explicitly the number of each type of villa needed for **(b)(i)**, merely giving examples of viable sequences.

(c) Part **(c)(i)** was answered well by almost all candidates, many giving brief explanations of their working. Parts **(ii)** and **(iii)** proved to be a degree harder than **(a)** and **(b)**, and many candidates concluded that only 5 *Rockhampton* villas were permissible in the most profitable combination, rather than 6.

(d) Most candidates found the search for alternative arrangements fairly easy. Those who had coped with **(c)(iii)** tended to gain both of the available marks here.

Question 2

Although a small minority navigated their way through this question successfully, most candidates found it difficult to access.

(a) This question allowed candidates to either count the gaps carefully, or apply some consideration to what must separate the 30 black bars given in the question. Most candidates achieved this without incident.

(b) Few candidates appreciated the implication of the two left-hand side versions of '0', combined with the need for digits not to be confused. This vital leap of logic, combined with the amount of information in the question, clearly prompted many candidates to focus on the other questions in

the paper. Many candidates might have been encouraged to persevere if they had appreciated the active nature of the instruction, "given this information about 0…."; this directed candidates' attention on the way that "0" could be written, appreciate the relationship linking left and right, and thus provide the ambiguous pattern.

A number of candidates attempted to extract the patterns used in the barcode in the diagram, although such analysis would clearly be insufficient to answer what would **never** be possible on the right-hand side.

(c) Most candidates who attempted this question managed to deliver the correct answer. This did not depend on correctly answering **(b)**, although a number of candidates appeared to give up on the entire question after wrestling unsuccessfully with **(b)**.

(d) Few candidates were able to offer credit-worthy answers to this question. Many of those who attempted this tackled it as an AS Level Maths 'permutations' question, assuming that the number of *x*s and *y*s was predetermined. Marks were available for working (independent of the correctness of the overall method) which showed appreciation that 10 digits had already been taken, and that 1 pattern was going to be indistinguishable from the right-hand side, but few responses showed this explicitly.

Question 3

This question follows the model offered by previous 9694 Paper 4 **Question 1**s. It is designed to prompt candidates to investigate a fairly large 'solution space', and thus offers a chance for decisive and structured experimentation. It demands careful, well-explained working; there are many marks to be gained by intelligent attempts at finding a solution which demonstrate some modelling skill, irrespective of whether the optimum is reached, and candidates should be encouraged to make tentative attempts at the questions, with explanatory comments where necessary, even if they are not able to pursue them fully.

(a) Most candidates found this initial calculation unproblematic**.**

(b) This involved a very small search of two-layer rafts, and the two marks available for the optimal answer were accessible to most candidates. The justification that was required was ignored by many candidates, or dealt with cursorily. Some explicit appeal to the possible constitution of smaller rafts, and their bottom row, was necessary to gain the mark. This could be as simple as "3+2 is the next smallest raft which might submerge the bottom row, but it has been shown in **(a)** that only 98.3% of the bottom row is submerged. So 4+3 must be the smallest".

It was not deemed necessary to consider the 4+1 raft in the justification.

(c) As with **(b)**, this involved a fairly small collection of values to search (between 1 and 10, at most), and many candidates managed to appropriately conclude that 6 logs were possible. A similar approach to the justification was needed to be awarded the third mark; in this case, a calculation showing the amount submerged in a 10+7 raft was adequate.

(d) This question, requiring an exhaustive list of possible rafts, and an appreciation of the vertical symmetry requirement, caused many candidates problems. Many candidates ignored the requirement for vertical symmetry; only 1 mark was available for an otherwise correct attempt which did this. Furthermore, many candidates did not consider the one-layer raft: there was nothing in the constraints which forbade this, and it may be worth reminding future candidates of the need to consider the extreme cases in such problems.

(e) This question required a creative search through a potentially large range of raft arrangements. Many responses tackled this in an organised manner, clearly stating the variety of arrangements considered, and the number of dry logs in each case. As is liable to be the case in more extended investigations, time constraints seem to have truncated the process. Candidates must be willing to set themselves a time limit for this question in case they do not locate a solution which they are sure is optimal.

Question 4

This question follows the model offered by previous 9694 Paper 4 **Question 2**s. It is designed to test candidates' ability to interrogate interlinked sets of data, and requires careful identification of the relevant information as well as appreciation of how the varieties of information need to be combined. In order to answer such questions well, candidates need to pursue orderly searches of the data, noting down the information they need, and then lay out the possible solutions carefully and exhaustively.

(a) This identification of the correct times, and calculation of the difference, was performed correctly by the vast majority of candidates.

(b) Few candidates managed to correctly identify the number of trams going in both directions, on both of the lines through Snout. This may have been partly due to reluctance on the part of candidates to list the tram times/directions/lines, perhaps because the problem initially looked simple enough to 'do in your head'.

(c) More than half the candidates managed to correctly identify the time Peter arrives at Lysander, often laying out the intermittent times in the process. A number of candidates approached the solution by calculating the tram times and waiting times for each stage of the journey; this method follows on from **(a)**, but is not the most efficient here.

The calculation of the cost of the tickets was performed well by those who correctly answered **(c)(ii)**.

(d) This question was correctly navigated by very few candidates, perhaps partly due to the time pressures at the end of the paper. A correct solution to the question required methodical listing of the four possible routes, calculation of the times taken, and rejection of the route which takes too long. There was ample opportunity for numerical errors here, and many candidates appeared to be engaging in much of the work in their heads rather than on paper. The calculations were no harder than those in **(c)(i)**, but the success rate was far less impressive.

The time pressures and confused answers to **(d)(i)** did not lead to a good success rate at **(d)(ii)**. Certain candidates misunderstood the charges, applying them per section of the journey, rather than per station (even though this is explicitly stated); this is a good example of how easy it is to make assumptions about the terminology in these questions.

THINKING SKILLS

Paper 9694/41
Applied Reasoning

Key Message

Candidates need to have good grasp of core skills CT1-12 in order to make creditworthy responses that demonstrate their ability to do critical reasoning and synthesis, which comprise the extension skill CT13. A developed evaluation of varying claims or the construction of a reasoned argument should demonstrate candidates' abilities to identify and explain flaws, weaknesses and assumptions in the given stimulus material. Candidates should also demonstrate the skill to put such material to good use by constructing critical reasoning in a meticulous and rational manner.

Comments on specific questions

Interpretation of Statistics

This is a new question for Paper 4 and is aimed at assessing candidates' ability to identify flaws in the use of statistics in supporting a particular claim and understand what might reasonably be inferred from a given set of statistics. It draws on the skills of evaluating evidence (CT11) and engaging in inference and deduction (CT12).

On the whole, candidates appear to have taken well to this question, making appropriate attempts to respond and gaining, in general, at least 1 mark. Candidates needed to understand the distinction between part **(a)** and part **(b)**, with **(a)** directing candidates to criticise the statistical data, and **(b)** expecting candidates to interpret the data with respect to supporting a claim or inference. There were many candidates who responded in reverse order, giving responses that could be credited to **(b)** in **(a)** and vice versa.

Question 1

(a) The question required the candidates to be straight to the point and only identify 3 criticisms of the statistics. There are only 3 marks reserved for this question and each distinct point would have gained only 1 mark. Candidates who simply identified the criticisms accurately and tersely gained the same marks as candidates who identified and further developed or expanded on the flaws. The latter wrote far more for this question than they needed to. Precision, clarity and brevity mark the skill targeted.

Many candidates were aware of the importance of sample size in statistics; but the sample size is not given in this case, and therefore criticisms of the sample size could not earn credit. Problems with sampling were also vaguely or incorrectly expressed, such as saying that the results were faulty because every individual on the planet had not been accounted for. Many candidates expanded on the very small change between the 2 years, but this response was properly a problem with the interpretation of statistics which is called for in **(b)** rather than a criticism of the statistics, which is what **(a)** requires.

Candidates also need to understand the distinction between a critical thinking 'statistics' question and a critical thinking 'credibility of evidence' question. Attempts to explain weakness in the use of statistics by using the CT1–11 or RAVEN criteria, such as bias or vested interest, miss the point of the question entirely. What is looked for is candidates' ability to spot misuse or abuse of statistics.

(b) Successful candidates treated this as distinct from **(a)** and saw that they needed to [illegible] explanation of whether the inference could be reasonably drawn from the evidence [illegible]. Where candidates only repeated the criticism point(s) made in **(a)** in **(b)** they would [illegible] gained credit; but if they developed this with a fresh creditworthy element they would have g[illegible] maximum 1 mark. Candidates who wrote about why global poverty was or was not decreasing [illegible] no relevant link to the data would not have gained any credit.

Question 2

Candidates performed considerably better on this question than in previous sessions. More and more candidates are correctly recognising this as a 'technical' question about the underpinning structure of the argument; most are responding adequately and many very well. Apart from the majority being able to identify correctly the main conclusion, many candidates were precisely labelling intermediate conclusions and the counter-argument. There are, though, a fair number of candidates still who mistakenly read this as a question of literary criticism, evaluating literary features of a given argument such as style, rhetorical ploys language etc. rather than as a critical thinking question penetrating only the structure of the reasoning.

Question 3

The assessment objectives of this question are very specific, and target the skills that lie at the heart of critical thinking activity. Candidates have to be able to demonstrate the critical thinking skills of identifying and evaluating flaws, assumptions, strengths (if any) and weaknesses of a given argument, in order to gain credit. The best answers accurately identified assumptions, flaws and/or weaknesses, and justified their findings with precise and well-developed explanations. On the whole, though, many candidates have been found to be lacking in competence here. A substantial number of candidates offered counter-assertions to claims in the passage they considered to be weak, rather than correctly describing the weakness of the claim. To counter-assert that there is no evidence for a claim is merely to pose a vague or weak challenge and will gain no credit. Another common error was to offer counter-assertions and mis-label them as assumptions, such as "*NU assumes India could not have developed by itself over the years*".

Candidates need to be able to explain the flaw or assumption or weakness critically by applying the relevant critical thinking criteria CT 4–9. For example, "*it is assumed that the gain in culture outweighs any loss*" (implicit assumption, CT4) or "*NU uses a straw man argument, trivialising the consequences of invasion as minor disruptions to aspects of domestic life such as grocery shopping*" (reasoning flaw, CT6). Several candidates showed limited skill in developing accurate explanations, unable to go beyond pinpointing one correct flaw. For example, "*only one example was used*" would only score 1 mark. In order to gain a second mark, the response would have to have gone on to develop this in critical thinking terms by explaining that it was a weakness to make a generalisation from this one example – e.g. "*he generalises from India to all other countries*" or "*generalisation from Roy to all true leaders and intellectuals*".

An assessment of a point of strength would not have been credited if it was a mere appraisal. For example, "*NU's argument that there are benefits from invasion is very strong*" would have gained no credit as it amounts to no more than an observation; however, "*the strength of his argument is that he does show us that not all the consequences of invasion are negative*" would have been credited because it has a critical element, i.e. it critically evaluates the strength.

Question 4

Overall, performance on this question was much improved compared with last session. Whereas the report for the last session reported that many "barely made reference to the source documents", the majority of candidates in this session did sift through the documents and make explicit cross-references to the sources and a good many kept within the scope provided by the sources. The best responses demonstrated the following elements of higher order skills of critical reasoning:

- ability to judiciously use some or all the documents;
- ability to critically refer to the documents while building their case;
- ability to draw significant inferences and construct critical reasoning by juxtaposing multiple documents;
- ability to develop the more subtle aspects of complexities that are apparent;
- ability to acknowledge or foresee and respond to counter-positions that challenge or could possibly challenge their own arguments.

Generally, responses that had more potential to improve used two methods, both of which stand in need of correction.

- Some candidates may plough through the documents, sometimes one by one, making some critical observations here and there, but be quite uncertain about where they stand on the debate, making their reasoning unconvincing.
- Some candidates may take a strong stand, but provide less rational or convincing support because they have veered too far into their own further arguments, without giving adequate consideration to significant counter-arguments found in the sources. Their conclusions may therefore be overdrawn.

Candidates need to develop the skills not only to select relevant information, but to organise these for either side of the debate. Synthesis involves combining information or opinion critically to elicit lines of reasoning to build up a case. Each critically selected or synthesised strand of critical reasoning should relevantly support the main conclusion. Candidates could then *additionally* draw from their own ideas and knowledge to construct further reasoning to support their conclusion.

There were some very good responses demonstrating commendable creative critical thinking. Relatively few candidates, though, attained upper band 4, as although several candidates provided very well-constructed and coherent arguments, they stopped short of recognising the complexities that could challenge their own arguments or considering counter-positions to their own reasoning.

Candidates who constructed most of a good argument, but did not give an explicit conclusion and only implied a conclusion, were capped at the middle band.

THINKING SKILLS

Paper 9694/42
Applied Reasoning

Key Message

Candidates need to have good grasp of core skills CT1-12 in order to make creditworthy responses that demonstrate their ability to do critical reasoning and synthesis, which comprise the extension skill CT13. A developed evaluation of varying claims or the construction of a reasoned argument should demonstrate candidates' abilities to identify and explain flaws, weaknesses and assumptions in the given stimulus material. Candidates should also demonstrate the skill to put such material to good use by constructing critical reasoning in a meticulous and rational manner.

Comments on specific questions

Interpretation of Statistics

This is a new question for Paper 4 and is aimed at assessing candidates' ability to identify flaws in the use of statistics in supporting a particular claim and understand what might reasonably be inferred from a given set of statistics. It draws on the skills of evaluating evidence (CT11) and engaging in inference and deduction (CT12).

On the whole, candidates appear to have taken well to this question, making appropriate attempts to respond and gaining, in general, at least 1 mark. Candidates needed to understand the distinction between part **(a)** and part **(b)**, with **(a)** directing candidates to criticise the statistical data, and **(b)** expecting candidates to interpret the data with respect to supporting a claim or inference. There were many candidates who responded in reverse order, giving responses that could be credited to **(b)** in **(a)** and vice versa.

Question 1

(a) The question required the candidates to be straight to the point and only identify 3 criticisms of the statistics. There are only 3 marks reserved for this question and each distinct point would have gained only 1 mark. Candidates who simply identified the criticisms accurately and tersely gained the same marks as candidates who identified and further developed or expanded on the flaws. The latter wrote far more for this question than they needed to. Precision, clarity and brevity mark the skill targeted.

Many candidates were aware of the importance of sample size in statistics; but the sample size is not given in this case, and therefore criticisms of the sample size could not earn credit. Problems with sampling were also vaguely or incorrectly expressed, such as saying that the results were faulty because every individual on the planet had not been accounted for. Many candidates expanded on the very small change between the 2 years, but this response was properly a problem with the interpretation of statistics which is called for in **(b)** rather than a criticism of the statistics, which is what **(a)** requires.

Candidates also need to understand the distinction between a critical thinking 'statistics' question and a critical thinking 'credibility of evidence' question. Attempts to explain weakness in the use of statistics by using the CT1–11 or RAVEN criteria, such as bias or vested interest, miss the point of the question entirely. What is looked for is candidates' ability to spot misuse or abuse of statistics.

(b) Successful candidates treated this as distinct from **(a)** and saw that they needed to [illegible] explanation of whether the inference could be reasonably drawn from the evidence [illegible]. Where candidates only repeated the criticism point(s) made in **(a)** in **(b)** they would [illegible] gained credit; but if they developed this with a fresh creditworthy element they would have g[illegible] maximum 1 mark. Candidates who wrote about why global poverty was or was not decreasing [illegible] no relevant link to the data would not have gained any credit.

Question 2

Candidates performed considerably better on this question than in previous sessions. More and more candidates are correctly recognising this as a 'technical' question about the underpinning structure of the argument; most are responding adequately and many very well. Apart from the majority being able to identify correctly the main conclusion, many candidates were precisely labelling intermediate conclusions and the counter-argument. There are, though, a fair number of candidates still who mistakenly read this as a question of literary criticism, evaluating literary features of a given argument such as style, rhetorical ploys language etc. rather than as a critical thinking question penetrating only the structure of the reasoning.

Question 3

The assessment objectives of this question are very specific, and target the skills that lie at the heart of critical thinking activity. Candidates have to be able to demonstrate the critical thinking skills of identifying and evaluating flaws, assumptions, strengths (if any) and weaknesses of a given argument, in order to gain credit. The best answers accurately identified assumptions, flaws and/or weaknesses, and justified their findings with precise and well-developed explanations. On the whole, though, many candidates have been found to be lacking in competence here. A substantial number of candidates offered counter-assertions to claims in the passage they considered to be weak, rather than correctly describing the weakness of the claim. To counter-assert that there is no evidence for a claim is merely to pose a vague or weak challenge and will gain no credit. Another common error was to offer counter-assertions and mis-label them as assumptions, such as "*NU assumes India could not have developed by itself over the years*".

Candidates need to be able to explain the flaw or assumption or weakness critically by applying the relevant critical thinking criteria CT 4–9. For example, "*it is assumed that the gain in culture outweighs any loss*" (implicit assumption, CT4) or "*NU uses a straw man argument, trivialising the consequences of invasion as minor disruptions to aspects of domestic life such as grocery shopping*" (reasoning flaw, CT6). Several candidates showed limited skill in developing accurate explanations, unable to go beyond pinpointing one correct flaw. For example, "*only one example was used*" would only score 1 mark. In order to gain a second mark, the response would have to have gone on to develop this in critical thinking terms by explaining that it was a weakness to make a generalisation from this one example – e.g. "*he generalises from India to all other countries*" or "*generalisation from Roy to all true leaders and intellectuals*".

An assessment of a point of strength would not have been credited if it was a mere appraisal. For example, "*NU's argument that there are benefits from invasion is very strong*" would have gained no credit as it amounts to no more than an observation; however, "*the strength of his argument is that he does show us that not all the consequences of invasion are negative*" would have been credited because it has a critical element, i.e. it critically evaluates the strength.

Question 4

Overall, performance on this question was much improved compared with last session. Whereas the report for the last session reported that many "barely made reference to the source documents", the majority of candidates in this session did sift through the documents and make explicit cross-references to the sources and a good many kept within the scope provided by the sources. The best responses demonstrated the following elements of higher order skills of critical reasoning:

- ability to judiciously use some or all the documents;
- ability to critically refer to the documents while building their case;
- ability to draw significant inferences and construct critical reasoning by juxtaposing multiple documents;
- ability to develop the more subtle aspects of complexities that are apparent;
- ability to acknowledge or foresee and respond to counter-positions that challenge or could possibly challenge their own arguments.

Generally, responses that had more potential to improve used two methods, both of which stand in need of correction.

- Some candidates may plough through the documents, sometimes one by one, making some critical observations here and there, but be quite uncertain about where they stand on the debate, making their reasoning unconvincing.
- Some candidates may take a strong stand, but provide less rational or convincing support because they have veered too far into their own further arguments, without giving adequate consideration to significant counter-arguments found in the sources. Their conclusions may therefore be overdrawn.

Candidates need to develop the skills not only to select relevant information, but to organise these for either side of the debate. Synthesis involves combining information or opinion critically to elicit lines of reasoning to build up a case. Each critically selected or synthesised strand of critical reasoning should relevantly support the main conclusion. Candidates could then *additionally* draw from their own ideas and knowledge to construct further reasoning to support their conclusion.

There were some very good responses demonstrating commendable creative critical thinking. Relatively few candidates, though, attained upper band 4, as although several candidates provided very well-constructed and coherent arguments, they stopped short of recognising the complexities that could challenge their own arguments or considering counter-positions to their own reasoning.

Candidates who constructed most of a good argument, but did not give an explicit conclusion and only implied a conclusion, were capped at the middle band.

THINKING SKILLS

Paper 9694/43
Applied Reasoning

Key Message

Candidates need to have good grasp of core skills CT1-12 in order to make creditworthy responses that demonstrate their ability to do critical reasoning and synthesis, which comprise the extension skill CT13. A developed evaluation of varying claims or the construction of a reasoned argument should demonstrate candidates' abilities to identify and explain flaws, weaknesses and assumptions in the given stimulus material. Candidates should also demonstrate the skill to put such material to good use by constructing critical reasoning in a meticulous and rational manner.

Comments on specific questions

Interpretation of Statistics

This is a new question for Paper 4 and is aimed at assessing candidates' ability to identify flaws in the use of statistics in supporting a particular claim and understand what might reasonably be inferred from a given set of statistics. It draws on the skills of evaluating evidence (CT11) and engaging in inference and deduction (CT12).

On the whole, candidates appear to have taken well to this question, making appropriate attempts to respond and gaining, in general, at least 1 mark. Candidates needed to understand the distinction between part **(a)** and part **(b)**, with **(a)** directing candidates to criticise the statistical data, and **(b)** expecting candidates to interpret the data with respect to supporting a claim or inference. There were many candidates who responded in reverse order, giving responses that could be credited to **(b)** in **(a)** and vice versa.

Question 1

(a) The question required the candidates to be straight to the point and only identify 3 criticisms of the statistics. There are only 3 marks reserved for this question and each distinct point would have gained only 1 mark. Candidates who simply identified the criticisms accurately and tersely gained the same marks as candidates who identified and further developed or expanded on the flaws. The latter wrote far more for this question than they needed to. Precision, clarity and brevity mark the skill targeted.

Many candidates were aware of the importance of sample size in statistics; but the sample size is not given in this case, and therefore criticisms of the sample size could not earn credit. Problems with sampling were also vaguely or incorrectly expressed, such as saying that the results were faulty because every individual on the planet had not been accounted for. Many candidates expanded on the very small change between the 2 years, but this response was properly a problem with the interpretation of statistics which is called for in **(b)** rather than a criticism of the statistics, which is what **(a)** requires.

Candidates also need to understand the distinction between a critical thinking 'statistics' question and a critical thinking 'credibility of evidence' question. Attempts to explain weakness in the use of statistics by using the CT1–11 or RAVEN criteria, such as bias or vested interest, miss the point of the question entirely. What is looked for is candidates' ability to spot misuse or abuse of statistics.

(b) Successful candidates treated this as distinct from **(a)** and saw that they needed to [illegible] explanation of whether the inference could be reasonably drawn from the evidence [illegible]. Where candidates only repeated the criticism point(s) made in **(a)** in **(b)** they would [illegible] gained credit; but if they developed this with a fresh creditworthy element they would have g[illegible] maximum 1 mark. Candidates who wrote about why global poverty was or was not decreasing [illegible] no relevant link to the data would not have gained any credit.

Question 2

Candidates performed considerably better on this question than in previous sessions. More and more candidates are correctly recognising this as a 'technical' question about the underpinning structure of the argument; most are responding adequately and many very well. Apart from the majority being able to identify correctly the main conclusion, many candidates were precisely labelling intermediate conclusions and the counter-argument. There are, though, a fair number of candidates still who mistakenly read this as a question of literary criticism, evaluating literary features of a given argument such as style, rhetorical ploys language etc. rather than as a critical thinking question penetrating only the structure of the reasoning.

Question 3

The assessment objectives of this question are very specific, and target the skills that lie at the heart of critical thinking activity. Candidates have to be able to demonstrate the critical thinking skills of identifying and evaluating flaws, assumptions, strengths (if any) and weaknesses of a given argument, in order to gain credit. The best answers accurately identified assumptions, flaws and/or weaknesses, and justified their findings with precise and well-developed explanations. On the whole, though, many candidates have been found to be lacking in competence here. A substantial number of candidates offered counter-assertions to claims in the passage they considered to be weak, rather than correctly describing the weakness of the claim. To counter-assert that there is no evidence for a claim is merely to pose a vague or weak challenge and will gain no credit. Another common error was to offer counter-assertions and mis-label them as assumptions, such as "*NU assumes India could not have developed by itself over the years*".

Candidates need to be able to explain the flaw or assumption or weakness critically by applying the relevant critical thinking criteria CT 4–9. For example, "*it is assumed that the gain in culture outweighs any loss*" (implicit assumption, CT4) or "*NU uses a straw man argument, trivialising the consequences of invasion as minor disruptions to aspects of domestic life such as grocery shopping*" (reasoning flaw, CT6). Several candidates showed limited skill in developing accurate explanations, unable to go beyond pinpointing one correct flaw. For example, "*only one example was used*" would only score 1 mark. In order to gain a second mark, the response would have to have gone on to develop this in critical thinking terms by explaining that it was a weakness to make a generalisation from this one example – e.g. "*he generalises from India to all other countries*" or "*generalisation from Roy to all true leaders and intellectuals*".

An assessment of a point of strength would not have been credited if it was a mere appraisal. For example, "*NU's argument that there are benefits from invasion is very strong*" would have gained no credit as it amounts to no more than an observation; however, "*the strength of his argument is that he does show us that not all the consequences of invasion are negative*" would have been credited because it has a critical element, i.e. it critically evaluates the strength.

Question 4

Overall, performance on this question was much improved compared with last session. Whereas the report for the last session reported that many "barely made reference to the source documents", the majority of candidates in this session did sift through the documents and make explicit cross-references to the sources and a good many kept within the scope provided by the sources. The best responses demonstrated the following elements of higher order skills of critical reasoning:

- ability to judiciously use some or all the documents;
- ability to critically refer to the documents while building their case;
- ability to draw significant inferences and construct critical reasoning by juxtaposing multiple documents;
- ability to develop the more subtle aspects of complexities that are apparent;
- ability to acknowledge or foresee and respond to counter-positions that challenge or could possibly challenge their own arguments.

Generally, responses that had more potential to improve used two methods, both of which stand in need of correction.

- Some candidates may plough through the documents, sometimes one by one, making some critical observations here and there, but be quite uncertain about where they stand on the debate, making their reasoning unconvincing.
- Some candidates may take a strong stand, but provide less rational or convincing support because they have veered too far into their own further arguments, without giving adequate consideration to significant counter-arguments found in the sources. Their conclusions may therefore be overdrawn.

Candidates need to develop the skills not only to select relevant information, but to organise these for either side of the debate. Synthesis involves combining information or opinion critically to elicit lines of reasoning to build up a case. Each critically selected or synthesised strand of critical reasoning should relevantly support the main conclusion. Candidates could then *additionally* draw from their own ideas and knowledge to construct further reasoning to support their conclusion.

There were some very good responses demonstrating commendable creative critical thinking. Relatively few candidates, though, attained upper band 4, as although several candidates provided very well-constructed and coherent arguments, they stopped short of recognising the complexities that could challenge their own arguments or considering counter-positions to their own reasoning.

Candidates who constructed most of a good argument, but did not give an explicit conclusion and only implied a conclusion, were capped at the middle band.