

THINKING SKILLS

Paper 9694/21
Critical Thinking

Key message

Candidates need to be sure they understand precisely what each question is asking them to do. As part of their preparation for the exam, they should familiarise themselves with the prompt words used and their precise meaning in the exam. Some quite good answers – and a few very good answers – gained 0 marks because they answered a different question from the one asked, e.g. discussing the relevance of a source when the question asked about its reliability.

General comments

A wide range of marks was accessed, but a significant number of candidates achieved marks in single figures because they gave little evidence of understanding the sources or the questions. Although a good number of candidates performed well on at least one question, very few of them achieved equally well on all three questions.

Comments on specific questions

Question 1

Most of the stories used in these exams are either entirely fictitious or fictionalised versions of real events, but this story is a true one. Several candidates misunderstood it, some thinking that Florence Bravo had died before her husband, and some imagining they were being asked about her death rather than his. Quite a lot of candidates thought Florence might have wanted to inherit a fortune from Charles, because they did not realise that the money was hers, not his.

- (a) There were several valid points which candidates could make in relation to this piece of additional evidence, and most candidates spotted one or more of them. Marks for answers which focused on one side of the issue only (generally that the additional evidence was significant) were capped at 2. Some candidates took it for granted that the medicine supplied to Florence was (rather than might have been) the poison which killed Charles. Weaker answers tended to discuss the story as a whole rather than the specific piece of evidence to which this question refers.
- (b) Most candidates identified at least one reason why the television programme was not of much use. Answers which did not make any positive comment were capped at 2 marks.
- (c) This question required quite a lot of thought. A few candidates recognized that if Mrs Cox knew in advance that she was due to receive the legacy, it removed a possible financial motive for her to kill Charles Bravo. 1 mark was awarded to those candidates who stated that this additional information was not significant, because it was unconnected to Charles Bravo's death. Most candidates wrongly inferred or guessed that either Charles or Florence was the relative and that Mrs Cox murdered Charles in order to receive the legacy; these speculations were not credited. It may be that some candidates did not know that a "relative" is a family member.
- (d) Nearly all candidates succeeded in coming up with an explanation of how Charles Bravo met his death, but some were more speculative and owed less to the sources than others. A fair number achieved Level 3, by making evaluative use of the sources and considering more than one possible course of events. Several candidates accused Florence of having murdered her first husband.

Question 2

This was a genuine piece of research.

- (a) Many candidates judged (rightly) that the additional information did not contradict the claim in Source B, but a significant minority thought it did. Most of those who made the right judgment based it on the preferred flying height of midges rather than the fact (clearly stated in paragraph 3 of the source) that the information about midge bites was obtained by asking people and was therefore independent of any explanation. Several candidates implausibly suggested that if there are no trees available, midges rest on tall men, because they mistake them for trees.
- (b) Several candidates pointed out that the newspaper report conflated the genders in the research results and gave a different (simpler) explanation for why overweight people were likely to be bitten. Not many candidates commented on the difference in the flying height attributed to midges in the two sources, and most of those who did thought that 2 metres was more credible because it fitted the hypothesis better; only the most perceptive answers recognized that the opposite is true.
- (c) There were several ways of achieving marks for this question, and a fair proportion of candidates did so. Others criticised the claim without specific reference to the question asked – e.g. for being unsupported by evidence – but this was not credited.
- (d) Nearly all candidates made at least some pertinent comment in response to this question, mostly pointing out (correctly) that the findings highlighted in the reports were of very little use in helping people to avoid midge bites – for example, because tall men cannot lose height. A fair number of candidates spotted that the important point was the development of an improved repellent, but not many of them realised that the people who were found to be immune to bites could be the key to such development.

Question 3

As on many other occasions, there was a kernel of truth in this argument, but it was over-stated and contained some flaws.

- (a) Most candidates correctly identified the main conclusion. Some identified various other parts of the passage as the main conclusion, while candidates from a few Centres gave the gist of the argument in their own words instead of selecting the main conclusion from the passage itself.
- (b) Not many candidates correctly identified reasons used to support the main conclusion, even though there were five to choose from. The most popular answers were the first sentences in paragraphs 2, 3 and 4, but each of these supports an intermediate conclusion, not the main conclusion. The correct answers from these paragraphs consist of those intermediate conclusions.
- (c) As in previous sessions, a few candidates achieved 4 or 5 marks by making two or more relevant evaluative comments, but most limited themselves to 1 or 2 marks by agreeing or disagreeing with the passage. Quite a lot of candidates rightly criticised the author for generalising, but not many of them focused that criticism on the principal instance, namely generalising from the extreme example of experts on extra-terrestrial life. Many candidates wrongly claimed that various statements from the passage were “unstated assumptions”, apparently not realising that if they are in the passage they are not unstated. In many cases, the point they were trying to make was valid, namely that a claim lacked support, but their incorrect use of technical terminology fundamental to the syllabus prevented them from gaining credit. Some candidates ignored qualifications such as “likely” or “usually” and criticised the author for making absolute claims, whereas others criticised him for not being definite enough. Some candidates claimed that the author was presenting himself as an expert about experts and that his argument was therefore self-defeating. No credit was given for criticisms that the argument was one-sided or an expression of the author’s opinion, since arguments normally articulate the opinion of the implied author and writers should not be expected to do their opponents’ work for them. Of course, candidates had no way of knowing what the actual author thinks about this subject. There were several ways of achieving 0 marks, including paraphrase and literary evaluation.
- (d) Candidates achieved the full range of marks for this question. The biggest problem which they encountered was not understanding the meaning of “amateur”; many apparently thought it was a synonym of “novice”.

THINKING SKILLS

Paper 9694/22
Critical Thinking

Key messages

Some candidates need to understand that expressing opinions about the issues raised or showing further knowledge of them is not the focus of the paper and cannot receive much credit if any. Some candidates also spend too much of their time re-iterating what is in the sources and this also cannot receive any credit, apart from in **Questions 3(a)** and **(b)** where they are required to stick closely to the text.

General comments

As in the summer examination, there were fewer questions requiring an assessment of both sides of a position or argument and this seemed to help candidates. Most candidates seemed to respond to the issues raised by the questions and were able to cope with the content of the sources. Able candidates were able to use the material as a vehicle for illustrating their thinking skills.

Comments on specific questions

Question 1

- (a) This was generally done well with many candidates gaining at least 2 marks. Three distinct points needed to be made in order to gain 3 marks. Weaker answers tended to just re-iterate what the supermarket manager said without actually evaluating it. Only the strongest answers recognised the distinction between his evidence on supermarket policy, which was reliable, and his account of the incident, which was unreliable. This did not hinder candidates as covering both sides was not a requirement for maximum marks.
- (b) Candidates struggled a little more with this question, and there were very few 3 mark answers and quite a number only gaining 1 mark. Again, there was a tendency in weaker answers to simply re-iterate what the report said without moving on to the significance of this in backing up the manager's account. Very few candidates picked up on the point that Mrs Kitty is only claiming that the cans were badly positioned, rather than making any claims that Benjy was calm or well controlled. Indeed, her account hints strongly that he was behaving in a hyperactive manner. Therefore the significance of the report is reduced.
- (c) This was not done particularly well. Candidates tended to make rather generic points along the lines of 'it is only a chatroom', which were not credited in the mark scheme. This was often followed by an account of what was said rather than an evaluation of its usefulness. Stronger answers most usually identified the uncertainty as to whether the child was actually Benjy and the question of the neutrality of the sources (which could be argued either way).
- (d) The issues raised seem to engage the candidates, most tending to side with the supermarket. There was a reasonable spread of answers between the levels with most, as one would expect, falling into Level 2. Few of those answers which sided with the supermarket picked up on the point that Mrs Kitty does not claim that she was with Benjy when the accident happened. This suggests she probably was not there, adding to the impression that the child was running around, out of control. Equally, not many of that minority of answers that sided with Mrs Kitty picked up on the point that the supermarket manager's explanation of the positioning of the cans does not have any impact on the question of whether they were a hazard.

Question 2

- (a) Most candidates could intuitively see that the conclusion was unreliable but often struggled to explain why this was so. It was not enough to say that the taste would be different as this was self-evident. The crucial question is whether *combining* two nice tastes produces a nice taste. The best way to illustrate the unreliability of the conclusion was to give an example and the best answers did this. Candidates who recognised that the conclusion was unreliable but did not convincingly explain this were given 1 mark.
- (b) This was not answered well, with most candidates concluding that the evidence was relevant and then simply re-iterating it. As illustrated in the mark scheme, there are a number of problems with this evidence if it is intended to re-assure people about hybrid fruits.
- (c) A number of answers could not be credited because they were too general and failed to focus on the rise between 2003 and 2004 (e.g. 'hybrid fruit tastes better'). Answers had to focus on what was different about 2004 compared to 2003.
- (d) A number of candidates were managing to reach Level 2, though Level 3 answers were rare. This is because, as noted in previous reports, there is a tendency to deal with each source in turn and then comment on it, rather than taking an overview and drawing on the sources to illustrate the points one is making. Level 1 answers either simply re-iterated what was in the sources or, at the other extreme, wrote an 'essay' on hybrid fruits with no reference to the source material.

Question 3

- (a) This question discriminated well between candidates with a good spread of marks between 2 and 0.
- (b) This also discriminated well, although many candidates got rather bogged down in the paragraph on antibiotics and did not identify the key point. This limited such candidates to 2 marks.
- (c) The crucial thing in this question is to *evaluate the reasoning* rather than to *challenge the propositions* that constitute that reasoning. There were still a substantial number of candidates doing the latter rather than the former, limiting their marks to a maximum of 2. The more able candidates were able to identify key points of evaluation with some good challenges to the analogy, in particular. There were rather fewer examples of candidates referring to explicit statements as 'assumptions' and this was encouraging.
- (d) Candidates tended to construct arguments in favour of the proposition, though a minority of able candidates did pick upon the 'always' which clearly makes the proposition more vulnerable to criticism. The claim seemed to induce somewhat clearer and more succinct arguments than in some past sessions and this was welcome.

THINKING SKILLS

Paper 9694/23
Critical Thinking

Key message

Candidates need to be sure they understand precisely what each question is asking them to do. As part of their preparation for the exam, they should familiarise themselves with the prompt words used and their precise meaning in the exam. Some quite good answers (and a few very good answers) gained 0 marks because they answered a different question from the one asked, e.g. discussing the relevance of a source when the question asked about its reliability.

General comments

A very wide range of marks was achieved, but there was a long “tail” of candidates who did not appear to understand the sources or the questions and therefore achieved very low marks. Although a good number of candidates performed well on at least one question, very few of them achieved equally well on all three questions.

Some candidates did not attempt the whole examination, but in most cases this appeared to be because they did not understand what some questions expected of them rather than because they were short of time.

Comments on specific questions

Question 1

The subject-matter and tone of this case were familiar enough for most candidates to understand at least the outline, although some candidates thought Bernard Bruges was Anton Aschenbach’s son, that Aschenbach was a civil servant, or that he was being accused of receiving bribes rather than paying them. Some candidates did not realise that “service charges” and “voluntary contributions” were euphemisms for bribes.

- (a) Most candidates recognized that the prevalence of bribery in Ruritania reported in Source B made it likely that Anton Aschenbach had engaged in it, as alleged in Source A, but fewer made the further observation that if nearly everyone in the country paid bribes, this could hardly have been the real reason for his arrest. A significant number of candidates scored 0 marks because they correctly summarised the relevant information from Source B but did not draw an inference from it.
- (b) Many candidates recognized that the reliability of the source was reduced by the bias or vested interest of the opposition party to portray the government in a bad light, but not many addressed the issue of ability to see. Some candidates appeared not to understand the meaning of “exiled” or of an “opposition party”. Some scored 0 marks because they summarised the evidence or discussed its significance, without considering its reliability, which is what this question required.
- (c) Many candidates recognized that because the allegations were only rumours, they were inherently unreliable, but others took it for granted that they were true. Quite a lot claimed that coming from a special correspondent or being published in a newspaper made the claims reliable or unreliable, but these judgments were too speculative to be credited.
- (d) Most candidates correctly identified two or three possible reasons for Aschenbach’s arrest and related them to the sources. A fair number achieved full marks by using the sources with critical detachment and considering at least two possible explanations for the arrest. A few candidates thought that the reason stated by the police was genuine, but most posited a more sinister motive for the arrest.

Question 2

This was a genuine piece of research, but many candidates found its conclusions counter-intuitive.

- (a) There were several ways of gaining marks on this question, and a good proportion of candidates achieved 3 marks out of 3.
- (b) Some candidates thought of one or two of the answers on the mark scheme, but most misunderstood what they were being asked, and tried (more or less successfully) to explain why the connection between tooth-brushing and heart disease is strong, rather than why it might be stronger than the research had suggested. A few discussed how the research itself might have produced stronger results – e.g. if the statistics had been higher.
- (c) Most candidates interpreted “support” as meaning “agree with” or “be consistent with” rather than “strengthen”. They were awarded 1 mark for recognizing that Sources C and D were consistent with each other. To gain more marks, it was necessary to recognize that Source D gave an explanation for the correlation between tooth-brushing and heart disease and/or that Source D challenged Source C by claiming that the length of time spent brushing one’s teeth might be more important than the number of occasions. Several candidates misinterpreted the admission in Source C that a cause-and-effect relationship had not been established as a claim that there was no such relationship and used that as the basis for judging that Source D challenged Source C; this was not credited.
- (d) Some candidates produced good answers to this question and achieved 6 marks out of 6, by identifying the support for the claim to be found in the sources but also its limitations. Some candidates reached Level 1, by expressing their own opinion without reference to the sources. A popular fallacy was to argue that since people who clean their teeth regularly typically take better care of their health in general, adopting regular tooth cleaning would improve people’s overall health.

Question 3

Most candidates were deeply unsympathetic to the views expressed in the passage. As on many other occasions, there was a kernel of truth in the argument, but it was over-stated and contained some flaws.

- (a) The most popular answer was the final sentence of the passage, which was given 1 mark because it was nearly right; it was wrong because the earlier part of the argument did not support it. However, a fair number of candidates recognized the correct main conclusion (the last sentence in paragraph 1). A significant minority offered various incorrect answers.
- (b) Many candidates succeeded in identifying one or two of the main reasons from the passage, and a few found three. A popular wrong answer was the first sentence of paragraph 3, but this is the first step of a mini-argument in that paragraph, the intermediate conclusion of which is the final sentence, clearly indicated in this case by the adverb “so”, and it is this intermediate conclusion which directly supports the main conclusion.
- (c) As on previous occasions, many candidates claimed that various quotations from the passage (such as the stipulative definition of “human” in paragraph 3) were “unstated assumptions”, apparently not realising that if they are in the passage they are not unstated. In many cases, the point they were trying to make was valid, namely that a claim lacked support, but their incorrect use of technical terminology fundamental to the syllabus prevented them from gaining credit. In paragraphs 5 and 6, the author draws a distinction between tastes and opinions, but most candidates rejected or ignored this distinction and accused him of contradicting himself between the two paragraphs. Many candidates recognized that there was a problem in the author’s use of an extreme example in paragraph 6, but they tended to reject the example itself (the claim that torturing babies is wrong) rather than criticising him for generalizing from an extreme example. Many candidates were offended by the claim that Bach was a greater musician than John Lennon. Many of the evaluations were *ad hominem*, accusing the author of arrogance. No credit was given for criticisms that the argument was one-sided or an expression of the author’s opinion, since arguments normally articulate the opinion of the implied author and writers should not be expected to do their opponents’ work for them. Of course, candidates had no way of knowing what the actual author thinks about this subject. There were several ways of achieving 0 marks, including paraphrase and literary evaluation.

- (d) A fair number of candidates presented arguments which were developed sufficiently to achieve the full 5 marks. The majority supported the claim, apparently rejecting completely the arguments presented in the passage (which they are, of course, entitled to do). Some of the arguments relied on very dubious assumptions.

THINKING SKILLS

<p>Paper 9694/31 Problem Analysis and Solution</p>
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Key messages

- Candidates should ensure that they study all the details in the questions and examples very carefully.
- It is very important that candidates lay out their working in a clear and orderly fashion. Marks will often be awarded for clear evidence of good problem-solving methods, even if the final solution is not arrived at. When candidates are not confident of obtaining the full solution, they should be aware that they may gain credit for showing that they understand some aspects of the problem if not all.

General comments

This paper required candidates to engage in the full range of problem-solving skills: the questions involved careful reading of the text laying out the problems' structures, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements. Although some candidates clearly suffered because they misallocated their time, the vast majority attempted all four questions. Candidates' answers to **Question 4** tended to garner the most marks, and **Question 3** delivered the least in general.

Comments on specific questions

Question 1

This question depended upon careful tracking of the state of the system, combined with constructive pattern-spotting. No examples were given of how to do this efficiently – and a number of candidates may have attempted to track the states of the system on the question paper. Such an approach did not allow for any partial marks and would have quickly become extremely messy. Some of the successful solutions included lists of the nodes up to the 16th signal.

- (a) Most candidates submitted correct answers to this. The most common error was to assume that the signal would travel symmetrically off to the right (1, 3, 6, 10, 15, 19, 22, 24, 25). This reveals a common tendency which needs to be addressed by candidates: to follow instincts, and not read the details of the question carefully enough. The initial instructions almost always contain significant details, which candidates should highlight, and consider carefully.
- (b) This question required a careful working through of the first four signals. The simplest way of doing this – listing the nodes, horizontally – required a series of methodical checks to gauge which way the nodes were oriented. Those who made errors in this process, but offered a feasible route to node 21 (passing through nodes from each row) were awarded one mark. This mark was achieved by almost all those who attempted the question.
- (c) This question could be answered by a continuation of the listing begun in part (b). It is worth observing that a look through the questions ahead can be very instructive when candidates are trying to assess how to attempt a question – in this case it shows that a careful listing is likely to inform parts (a) to (d), but that a more abstract viewpoint is going to be needed for (e). A number of candidates saw the link to the powers of two and hazarded a guess; pattern-spotting like this is at the heart of such questions, and will generally be rewarded.
- (d) This question could be confidently accomplished by listing the pathways of the signals (in some manner).

- (e) This question required candidates to consider the symmetries of the network extremely carefully. Almost all of those who answered this question appreciated that nodes 2 and 3 received half of the signals – and many saw that node 5 must receive them too. The complexity of considering which nodes received half the signals in the bottom half of the network tempted many to assume that a symmetrical combination (21, 23 and 24) was likely. An appreciation that node 21 receives far less than half of the signals demands careful analysis of the first 16 signals (which ‘reset’ the top five rows), or a continuation of the list.

Question 2

This question required candidates to consider the subtle interplay of restrictions on the serial numbers on banknotes. As with all such questions, it was important to separate the stated restrictions from coincidental patterns in the examples given. A number of candidates attempted to answer the question by speculating about aspects that were beyond what was stated in the question (such as whether any such system can function entirely reliably). When such creative solutions are required, it will be explicitly stated in the question.

- (a) This required consideration of the pattern visible in the €5 serial numbers. Many candidates assumed that the note must be one of the serial numbers in the list; the correct order of events (withdrawal of notes, spending one, recording the serial numbers) is implicit in the introductory paragraph. Lack of success in this part of the question did not affect answers to the remaining parts.
- (b) It is quickly obvious that the only options are 0, 3 and 6 (because all the rest appear in the list). The answer ‘0’ gained a mark, regardless of explanation. A full answer to the question required candidates to consider the implications of choosing such a check digit, and to appreciate that 9 and 0 performed the same task. Few candidates articulated this clearly.
- (c) A substantial number of candidates saw that the mere transposition of digits would not be picked up by the check system, and stated this clearly. This gained two marks for (ii), and one mark for (i) if clearly explained. A substantial minority of candidates thought that a transposition would not be noticed when “inside” the serial number, but would cause problems when the check digit became entangled in it (for which they scored two marks, for (ii), and none for (i)). The mark scheme credited those who made an intelligent comment based upon an appropriately chosen example.
- (d) The instinctive answer (that the system always noticed a wrong digit) needed to be rejected because of the interchangeability of 0 and 9. This process, of explicitly considering what are the unusual cases, should be advised whenever candidates are considering the truth of general statements.
- (e) This question attracted a number of speculative answers, which strayed beyond the logical structure of check digits, and were awarded no marks. A number of candidates attempted to draw ‘national’ rules out of the serial numbers in the table. Candidates should be aware of the significant difference between a rule given in the question, and an example.

Question 3

This question required candidates to consider the implications of a fairly simple collection of rules, restricting how the three stations could spend their budgets. The combination of the three stations, the three types of equipment, and the three different costs was challenging for many, and few candidates found their way through the question correctly.

- (a) (i) This question aimed to draw candidates attention to the fact that the same equipment was needed at both ends – and thus a replacement at both end-stations would cost HQ a minimum of \$140. This simple, but vital, aspect of the problem was ignored by a number of candidates.
- (ii) The implications of such a purchase for HQ was appreciated by most of those who correctly answered part (i). Those who did not select the appropriate aspect of the problem tended to lose their confidence, and their direction, from this point forward.
- (iii) There were a number of different reasons and explanations offered by candidates here, but few were awarded two marks – the key element being a justification that the only feasible option was Sicher Red.

- (iv) It was hoped that candidates could access this question even if they had not managed all the previous three questions – since it was implicit in the questions that one of the stations needed Sicher Red, and the other needed paper tape. However, it seemed that those who struggled with the first three questions often lost their confidence by this point, and either moved on or ignored the implicit guide that had been offered.
- (b) This was answered fairly well, although a significant number of candidates did not offer all four required pieces of information (what equipment? which year?). The details of the costs were not needed to answer this; just an appreciation that the cheapest option in the short term was Sicher Red.
- (c) (i) The lower running cost of Securite Blue, combined with East's inability to buy it, made the tactical decision for 20 years fairly easy to identify. Although it is not stated explicitly what is required for a 'purchasing strategy', candidates were expected to state which station buys which equipment and when. Very few candidates answered this correctly.
- (ii) Candidates did not tend to lay out their working clearly here, and as a result very few gained the partial marks which were reserved for "a clearly defined strategy correctly costed." Such strategic marks are common, particularly when problems require candidates to find maxima or minima, and candidates should aim to lay out their attempts with this in mind.
- (d) (i) As with (c)(ii), few candidates managed to gain the partial marks for "a clearly budgeted option".
- (ii) This was answered more successfully than the previous three questions, and rewarded those who had persevered with their solution. The simplest solution – requiring no spread payments at all – was the optimal one. In this case, it was important to be able to stand back from the calculations which dominated the intervening questions, and manage to judge what the question was asking afresh.

Question 4

This question required candidates to process the data from the two tables, and make comparisons with two alternative pricing schemes (involving percentages, and further processing of the data). The question was well answered in general. Candidates who had struggled to lay out their solutions to **Question 3** often gave clearly-articulated strategies for **Question 4**, perhaps reflecting the fact that the options to be investigated were more clearly separated.

- (a) This was well answered in general.
- (b) Most candidates succeeded in identifying the correct cell of the pricing table for this question. A small minority treated the \$80 as the total cost of all six chairs.
- (c) (i) A number of candidates were confused by the qualification that Wheelduit charge \$7 per 10 km (or part of 10 km), but partial marks were available for solutions whose only error was a misinterpretation of this.
- (ii) This part of the question required a basic search, and some elementary mathematical reasoning, and was the part which caused most problems. Of those who did not tackle the question correctly, some candidates appeared unsure how to begin, but most made minor errors in their calculations (possibly affected by time considerations).
- (d) This question clearly depended upon a carefully laid out presentation of the four different options, and many candidates did this admirably. The most common error was to overlook the fact that the Go-4-It journey had to go to Candela *and back*. Almost all those who attempted this question made it clear which of the delivery options cost which amount, and scored at least some partial marks.

THINKING SKILLS

<p>Paper 9694/32 Problem Analysis and Solution</p>
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Key messages

- Candidates should ensure that they study all the details in the questions and examples very carefully.
- It is very important that candidates lay out their working in a clear and orderly fashion. Marks will often be awarded for clear evidence of good problem-solving methods, even if the final solution is not arrived at. When candidates are not confident of obtaining the full solution, they should be aware that they may gain credit for showing that they understand some aspects of the problem if not all.

General comments

This paper required candidates to engage in the full range of problem-solving skills: the questions involved careful reading of the text laying out the problems' structures, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements. Although some candidates clearly suffered because they misallocated their time, the vast majority attempted all four questions. Candidates' answers to **Question 4** tended to garner the most marks, and **Question 3** delivered the least in general.

Comments on specific questions

Question 1

This question depended upon careful tracking of the state of the system, combined with constructive pattern-spotting. No examples were given of how to do this efficiently – and a number of candidates may have attempted to track the states of the system on the question paper. Such an approach did not allow for any partial marks and would have quickly become extremely messy. Some of the successful solutions included lists of the nodes up to the 16th signal.

- (a) Most candidates submitted correct answers to this. The most common error was to assume that the signal would travel symmetrically off to the right (1, 3, 6, 10, 15, 19, 22, 24, 25). This reveals a common tendency which needs to be addressed by candidates: to follow instincts, and not read the details of the question carefully enough. The initial instructions almost always contain significant details, which candidates should highlight, and consider carefully.
- (b) This question required a careful working through of the first four signals. The simplest way of doing this – listing the nodes, horizontally – required a series of methodical checks to gauge which way the nodes were oriented. Those who made errors in this process, but offered a feasible route to node 21 (passing through nodes from each row) were awarded one mark. This mark was achieved by almost all those who attempted the question.
- (c) This question could be answered by a continuation of the listing begun in part (b). It is worth observing that a look through the questions ahead can be very instructive when candidates are trying to assess how to attempt a question – in this case it shows that a careful listing is likely to inform parts (a) to (d), but that a more abstract viewpoint is going to be needed for (e). A number of candidates saw the link to the powers of two and hazarded a guess; pattern-spotting like this is at the heart of such questions, and will generally be rewarded.
- (d) This question could be confidently accomplished by listing the pathways of the signals (in some manner).

- (e) This question required candidates to consider the symmetries of the network extremely carefully. Almost all of those who answered this question appreciated that nodes 2 and 3 received half of the signals – and many saw that node 5 must receive them too. The complexity of considering which nodes received half the signals in the bottom half of the network tempted many to assume that a symmetrical combination (21, 23 and 24) was likely. An appreciation that node 21 receives far less than half of the signals demands careful analysis of the first 16 signals (which ‘reset’ the top five rows), or a continuation of the list.

Question 2

This question required candidates to consider the subtle interplay of restrictions on the serial numbers on banknotes. As with all such questions, it was important to separate the stated restrictions from coincidental patterns in the examples given. A number of candidates attempted to answer the question by speculating about aspects that were beyond what was stated in the question (such as whether any such system can function entirely reliably). When such creative solutions are required, it will be explicitly stated in the question.

- (a) This required consideration of the pattern visible in the €5 serial numbers. Many candidates assumed that the note must be one of the serial numbers in the list; the correct order of events (withdrawal of notes, spending one, recording the serial numbers) is implicit in the introductory paragraph. Lack of success in this part of the question did not affect answers to the remaining parts.
- (b) It is quickly obvious that the only options are 0, 3 and 6 (because all the rest appear in the list). The answer ‘0’ gained a mark, regardless of explanation. A full answer to the question required candidates to consider the implications of choosing such a check digit, and to appreciate that 9 and 0 performed the same task. Few candidates articulated this clearly.
- (c) A substantial number of candidates saw that the mere transposition of digits would not be picked up by the check system, and stated this clearly. This gained two marks for (ii), and one mark for (i) if clearly explained. A substantial minority of candidates thought that a transposition would not be noticed when “inside” the serial number, but would cause problems when the check digit became entangled in it (for which they scored two marks, for (ii), and none for (i)). The mark scheme credited those who made an intelligent comment based upon an appropriately chosen example.
- (d) The instinctive answer (that the system always noticed a wrong digit) needed to be rejected because of the interchangeability of 0 and 9. This process, of explicitly considering what are the unusual cases, should be advised whenever candidates are considering the truth of general statements.
- (e) This question attracted a number of speculative answers, which strayed beyond the logical structure of check digits, and were awarded no marks. A number of candidates attempted to draw ‘national’ rules out of the serial numbers in the table. Candidates should be aware of the significant difference between a rule given in the question, and an example.

Question 3

This question required candidates to consider the implications of a fairly simple collection of rules, restricting how the three stations could spend their budgets. The combination of the three stations, the three types of equipment, and the three different costs was challenging for many, and few candidates found their way through the question correctly.

- (a) (i) This question aimed to draw candidates attention to the fact that the same equipment was needed at both ends – and thus a replacement at both end-stations would cost HQ a minimum of \$140. This simple, but vital, aspect of the problem was ignored by a number of candidates.
- (ii) The implications of such a purchase for HQ was appreciated by most of those who correctly answered part (i). Those who did not select the appropriate aspect of the problem tended to lose their confidence, and their direction, from this point forward.
- (iii) There were a number of different reasons and explanations offered by candidates here, but few were awarded two marks – the key element being a justification that the only feasible option was Sicher Red.

- (iv) It was hoped that candidates could access this question even if they had not managed all the previous three questions – since it was implicit in the questions that one of the stations needed Sicher Red, and the other needed paper tape. However, it seemed that those who struggled with the first three questions often lost their confidence by this point, and either moved on or ignored the implicit guide that had been offered.
- (b) This was answered fairly well, although a significant number of candidates did not offer all four required pieces of information (what equipment? which year?). The details of the costs were not needed to answer this; just an appreciation that the cheapest option in the short term was Sicher Red.
- (c) (i) The lower running cost of Securite Blue, combined with East’s inability to buy it, made the tactical decision for 20 years fairly easy to identify. Although it is not stated explicitly what is required for a ‘purchasing strategy’, candidates were expected to state which station buys which equipment and when. Very few candidates answered this correctly.
- (ii) Candidates did not tend to lay out their working clearly here, and as a result very few gained the partial marks which were reserved for “a clearly defined strategy correctly costed.” Such strategic marks are common, particularly when problems require candidates to find maxima or minima, and candidates should aim to lay out their attempts with this in mind.
- (d) (i) As with (c)(ii), few candidates managed to gain the partial marks for “a clearly budgeted option”.
- (ii) This was answered more successfully than the previous three questions, and rewarded those who had persevered with their solution. The simplest solution – requiring no spread payments at all – was the optimal one. In this case, it was important to be able to stand back from the calculations which dominated the intervening questions, and manage to judge what the question was asking afresh.

Question 4

This question required candidates to process the data from the two tables, and make comparisons with two alternative pricing schemes (involving percentages, and further processing of the data). The question was well answered in general. Candidates who had struggled to lay out their solutions to **Question 3** often gave clearly-articulated strategies for **Question 4**, perhaps reflecting the fact that the options to be investigated were more clearly separated.

- (a) This was well answered in general.
- (b) Most candidates succeeded in identifying the correct cell of the pricing table for this question. A small minority treated the \$80 as the total cost of all six chairs.
- (c) (i) A number of candidates were confused by the qualification that Wheelduit charge \$7 per 10 km (or part of 10 km), but partial marks were available for solutions whose only error was a misinterpretation of this.
- (ii) This part of the question required a basic search, and some elementary mathematical reasoning, and was the part which caused most problems. Of those who did not tackle the question correctly, some candidates appeared unsure how to begin, but most made minor errors in their calculations (possibly affected by time considerations).
- (d) This question clearly depended upon a carefully laid out presentation of the four different options, and many candidates did this admirably. The most common error was to overlook the fact that the Go-4-It journey had to go to Candela *and back*. Almost all those who attempted this question made it clear which of the delivery options cost which amount, and scored at least some partial marks.

THINKING SKILLS

Paper 9694/33

Problem Analysis and Solution

Key messages

- Candidates should ensure that they study all the details in the questions and examples very carefully.
- It is very important that candidates lay out their working in a clear and orderly fashion. Marks will often be awarded for clear evidence of good problem-solving methods, even if the final solution is not arrived at. When candidates are not confident of obtaining the full solution, they should be aware that they may gain credit for showing that they understand some aspects of the problem if not all.

General comments

This paper required candidates to engage in the full range of problem-solving skills: the questions involved careful reading of the text laying out the problems' structures, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements. A number of candidates showed evidence of mismanaging their time, performing impressively on the first three questions, and then barely starting the fourth. Candidates' answers to **Question 1** tended to garner the most marks, and **Question 2** delivered the least, on average.

Comments on specific questions

Question 1

This question involved the investigation of a play-off matrix, applied to six different strategies. All the problems could be solved by complete methodical comparisons of the different strategies without excessive time being wasted. The relative simplicity of the game, and the lack of limiting rules/distractions, enabled many candidates to investigate the outcomes thoroughly and carefully, and score well.

- (a) Candidates were required to formulate their own way of comparing sequences, and a good number found clear and dependable ways of symbolising it on paper. Almost all those who attempted this question managed to do it correctly.
- (b) This question required candidates to consider what would constitute a win "before all rounds have been completed" – which was implicit in the fact that there were 30 points to be shared between the two players, and so a score of 16 at any time ensured victory. Only one further comparison was needed, since candidates had already considered the outcomes of Maggie and Nigel against Luke in part (a). However, there was evidence that many candidates did not appreciate this, or did not record the details of their comparisons in part (a) and so had to do it twice.
- (c) Although it was possible to complete this question mechanically (listing the outcomes of each of the three players' outcomes against Ophelia), it was far from efficient. Some candidates showed evidence of considering the three sequences against Ophelia's concurrently, by which method it was fairly easy to see which one looked most likely to succeed.
- (d) Most candidates found this question easy to answer.
- (e) There were a number of different situations to consider in choosing Quentin's sequence. But the problem was fairly 'tolerant', in the sense that a variety of sequences were maximal. Candidates coped with this choice-making procedure fairly well, and many achieved full marks.

Question 2

This question required candidates to follow a more complex set of instructions, which required appropriately methodical care, although none of the processes was difficult to do. This intricate logical basis was then subjected to a number of subtle challenges, and very few candidates managed to see their way through correctly.

- (a) Most candidates were able to select and convert appropriate digits, and sum them to 55. However, the need to encode the missing 5 eluded many candidates – although these could still obtain partial marks if they laid out their solution clearly. There were a number of misinterpretations of how this process worked, mostly involving the encoding of even numbers, or all the numbers, and/or the adding of only those encoded. No example was offered here, and the careful following of the bulleted instructions was vital to success.
- (b) This question daunted many candidates, since it seemed to require a large search space – 45 possible pairings, each needing attention. Some candidates did make a few comparisons, attempting to establish a short-cut to judging whether it will affect the total. A more efficient strategy was to look for special cases from the table – which led candidates to choose 3 and 6 (as uniquely symmetrical) or 0 and 9. Such a high-level search for unusual cases must be married to a thorough verification process – which would quickly confirm that 36 and 63 yield different totals.
- (c) This question offered a counter-balance to (b), in that it could not be solved by a sweeping eye, selecting unusual cases to test. The nature of the misreading which was being proposed yielded no easy patterns, and the only way to be sure that all of them would be detected was to check them methodically. This only involved seven comparisons – but many candidates were convinced of a short-cut, and did not complete the search.
- (d) The only answers that tempted candidates were ‘all’ or ‘in the even positions’. Quite a few candidates appeared to appreciate that there was no problem with use of the odd positions, and hence arrived at the correct answer.
- (e) This question required candidates to appreciate the fact that the last digit would be fixed (so there were only three degrees of freedom), and to confidently approach the basic combinations problem. It seemed that the difficulties engendered by the latter obscured many candidates’ insight into the former. Quite a few candidates offered answers like ${}^{10}C_4$ or ${}^{10}P_4$, for instance. These sorts of mathematical techniques can be very useful for problems such as this, and some training in them would be time well-spent; but they need to be used correctly or, as in these examples, the need for clear thinking about the problem might be overlooked.
- (f) There were a number of highly speculative answers to this question – involving the spacing of the digits, for instance – some of which often allowed for identity cards to be distinguished from credit card numbers, but at the cost of some of the credit card numbers. These were credited with partial marks.

Question 3

This question required candidates to explore the highly flexible space provided by the rectangular mazes, while comparing and optimising the two coefficients. Almost all the candidates who tackled the question found it accessible initially. The searches that were required depended as much on making creative choices (with the positioning of the entrance and exit, for instance) as a methodical approach. The rules that emerged governing the complexity and simplicity of the mazes were essentially spatial, and many candidates clearly found these difficult to identify within the time constraints of the paper.

- (a) This question was well answered, in general. Some candidates established the length of the path first (13), and then were able to quickly check that their route was appropriate.
- (b) Almost all those who attempted to provide a maze in answer to this question answered correctly. This question was designed to invite candidates to investigate the effect of different internal structures on the complexity coefficient, starting with the simplest example.

- (c)(i)** This question required candidates to experiment with the positioning of the entrance and exit (of which there are only six substantially different options), while monitoring the effect on the longest path. This could be done methodically, although there was little evidence that candidates tried this (it was easy to do mentally, so little can be concluded from this absence). A number of candidates considered a sporadic collection of mazes, and then appeared to give up – and it is possible that there is useful preparation to be done in assisting the less visually intuitive by developing methodical techniques (listing the options).
- (ii)** This question depended upon a successful attempt at **(c)(i)**, in order that the ‘general principle’ be visible. The generalised case – which involved moving round the entire maze, and then back to a square adjacent to the start – then had to be carefully applied to the 5 x 5 case. This was found difficult by many; as with **(c)(i)**, this may have been because of difficulties in considering the case methodically.
- (d)** This question involved the introduction of a new coefficient, which was easy to calculate, followed by an invitation for candidates to investigate which mazes would minimise this. It may not have been immediately obvious how the size and shape of the possible rectangles affected the simplicity coefficient – and so candidates needed to try some examples. The strategic way to do this was to try extreme cases (such as squares, 1 x n rectangles, large and small).
- (e)(i)** In order to answer this question, candidates needed to have a robust sense of what defined a shortest path, and a longest path, and to experiment. As with part **(d)**, this was best done by considering extreme cases, from which it was quickly clear that bigger rectangles allowed for a greater difference. Combining this with the fact that the more square a maze was, the shorter its shortest path, candidates were expected to arrive at the 3 x 6 case. This was achieved by about 10% of candidates.
- (ii)** This question involved generalising the insights of **(e)(i)**, and was easy to trip up on. Candidates who had clearly grasped the key ideas in **(e)(i)** had to ensure that they appropriately generalised the shortest path algorithm, and the construction of the internal dead-end which defined the longest path. Both of these processes involved linear relations, which were easy to misjudge.

Question 4

This question required candidates to carefully extract data from the seating diagram – ideally using some alternative method to double-check their counting – and then engage in problems based on some simple financial relations. It highlighted the crucially important skills of precision and checking when handling complex data, in this case to avoid miscounting the number of seats sold in part **(a)**; although substantial follow-through marks were available throughout the question for those who did so.

- (a)(i)** This required candidates to identify the two seats from the \$12 section of the auditorium. Most found this easy to do.
- (ii)** This was effectively a test of how to efficiently check the number of empty seats counted. It was clearly easier to count empty seats, than ones which had been accounted for. There was little evidence of working, unsurprisingly, and so it is difficult to offer advice to those who made small errors, except to find ways of double-checking where possible – in this case, by counting the number of gaps in each row, and totalling, and then comparing it to an answer calculated by column.
- (iii)** This proved very difficult to find reliably. The advice about checking answers given for **(a)(ii)** weighs even more heavily here.
- (b)(i)** This question was well answered in general, and did not depend on the previous question.
- (ii)** This required a simple inversion of the process needed for **(b)(i)** and did not cause too many problems. There were a few numerical errors.

- (c)(i)** Any errors made in **(a)** and **(b)** were tolerated here, so long as candidates dealt with them appropriately. The problem required a careful assembly of the different costs (including the pre-calculated numbers of seats sold on the weeknights, and the numbers sold on Friday and Saturday, and the hire of the hall). The accumulation of partial marks was possible for those who laid out the separate calculations separately and carefully.
- (ii)** This required candidates to calculate the income generated (partly worked out in **(b)(i)**), and to subtract the costs calculated in **(c)(i)**. Once again, this depended upon answers given in **(a)** and **(b)**, but candidates were not penalised for any mistakes they made twice. These simple economic systems (of income, costs and profit) are worth practising, if candidates are unfamiliar with the relationship.
- (d)** This question was managed competently by very few – perhaps partly affected by time constraints. The required combination of cost and income analysis, with some processes inverted, required tracking on the page. And although some candidates attempted this, very few made it through without making a mistake. To assist candidates who are preparing for such questions, it is often a good idea to consider replacing all the key quantities with much more manageable quantities (between 1 and 12), so that candidates' natural instincts can inform their behaviour. It is also much easier to check any solutions that have been reached – which gives an opportunity for trial and improvement, if things turn out wrong.

THINKING SKILLS

Paper 9694/41
Applied Reasoning

Key message

Candidates need to have good time management, allocating time to each question proportionate to the marks weighting; they also need to demonstrate the appropriate skills in the questions which are assessing them. Several candidates wrote far too much on the five-mark **Question 1** and did not have sufficient time for **Question 4** which carried 30 marks, or by-passed **Question 3** to gain time for **Question 4**.

Candidates need to ensure they have fully understood the demands of each question; several appear to have misread **Question 1 (b)** and lost credit. Candidates should remember that what is being examined are the thinking skills of analysis, evaluation and ability to construct good arguments with precision and clarity, and not subject knowledge. In both **Questions 3** and **4** candidates generally tended to demonstrate more their subject knowledge of communism and capitalism and how things should be, rather than critically assessing the stimulus materials and responding with a relevant argument.

General comments

Performance on **Question 1** was overall quite unsatisfactory, as a majority earned no credit for part **(b)**. It was good to see many candidates approach **Question 2** methodically, labelling component parts of the argument neatly, with a fair number of candidates getting at least 3 marks for this question. There is much room for improvement in **Question 3**, since many candidates tended to challenge statements in document 2 rather than clearly identifying and explaining a weakness or flaw. Most candidates found **Question 4** accessible, with many responding vociferously, however fewer were able to ascend higher up the band level descriptors than mid-band 3.

Comments on specific questions

Question 1

Part **(a)** required candidates to compare the research groups and make 3 criticisms of Group A's data, by precisely and clearly identifying a weakness or error. Several candidates commented on the credibility of the medical journal – which is not relevant, as that is evaluating the source with respect to the claims it makes (appropriate for **Question 3**) rather than identifying problems with the statistics. A number of responses for **(a)** were unnecessarily long and detailed, with annotations and explanations that were not related to criticism of the statistics. A majority of candidates correctly pinpointed a criticism of Group A in part **(a)**: that the 20 volunteers in Group A were mainly young and healthy and therefore would not have shown reduction in cholesterol in control experiments. However, most did not apply this insight to **(b)**, which required them to draw a credible inference from this criticism which could be reinforced by both studies. Performance in part **(b)** was clearly less satisfactory than in **(a)**. A common response was a vague observation that held no creditworthy element: *“Both oat bran and wheat bran have cholesterol lowering effect.”* An example of a fully creditworthy response for **(b)** is: *“Oat bran will only affect the high initial cholesterol levels; it does not decrease the low and healthy cholesterol levels.”* A candidate with skill for concise and precise expression stated: *“The higher the initial cholesterol level, the better the oat bran will work”*. Both these responses accessed the 2 marks available. Candidates did not need to write any more than this. There were also many lengthy responses to part **(b)** comparing Groups A and B in detail, but missing the precise requirement of the question.

Question 2

A good many candidates are still not comprehending the requirements of this question, which asks them to show the structure of the argument in document 1; rather, they provided summaries and literary critiques with little precise structural elements to credit. It was good that those who understood the requirement of the question worked systematically through the passage, labelling the main conclusion and the main or intermediate reasons and counter-arguments that fed into the main conclusion. Overall the performance was satisfactory, on average achieving 3 of 6 marks. Several candidates were also able to identify at least one counter-argument.

Question 3

This question tests the essential skills of evaluation, CT4 and CT6, which lie at the heart of critical thinking activity. The best responses accurately spotted assumptions, flaws and weaknesses, and gave clear explanations; though many candidates simply restated what was already claimed in the passage as 'assumptions', whereas credit can only be given for expressing the unstated assumptions upon which the validity of the reasoning depends. Some gave a good evaluative point about a strength of CAP's argument by pointing out that the rationale about capital flow was a sound one. But many simply gave an appraisal of CAP, looking for as many things about CAP's claims or the literary structure of the passage they could annotate or positively comment on, labelling these as 'strengths' – which are not critical evaluations as required in critical thinking. Responses that merely challenged CAP's claims as having no evidence, e.g. "*CAP has no strong evidence to back up his argument*", rather than critically evaluating the validity of the claims, earned no credit. Similarly, responses which focused on the literary aspects such as "*the argument is haphazard / does not flow*" (there were several such responses) were wholly disengaged with critical thinking.

Very few accessed credit for an overall judgment: candidates needed to have provided an overall evaluation of how strong/sound CAP's argument was in order to have gained the 2 marks available here.

Question 4

The subject this question alluded to, which required a comparison of communism and capitalism, was clearly within the grasp of the majority of candidates, and there were several enthusiastic responses. Many candidates, however, while writing up good and relevant further arguments using their own knowledge and observations, ignored the stimulus sources they were required to respond to. On the whole, therefore, while there were substantive further arguments, there was less judicious selection and critical evaluation of material from the sources. A great many candidates tended to write essay-type answers, starting off with preambles which could earn no credit while losing precious time, e.g. "*From mankind's recorded history there have been many forms of government from early barter system to the new age capitalistic-socialist hybrid – all of these systems have seen successes as well as monumental failures...*"; whereas the question asks them to do only critical thinking on the topic, i.e. construct an argument in response to the stimulus sources, supporting and rejecting claims and viewpoints in these, and invites them to supplement with their own knowledge and understanding. What was credited was not the knowledge candidates have of the systems, but their ability to apply critical thinking skills to the issues in order to offer a well-reasoned argument with a clear conclusion for or against the proposition. It is also noted that quite a few candidates did not do **Question 3** but went on to **Question 4**, giving good critically evaluative comments on the flaws in sources while constructing a well-reasoned argument. Had they also demonstrated these skills in response to **Question 3**, they would have been able to score marks there as well. It seemed that several candidates struggled for time in this question as they did not quite finish it; but those whose strategy was to forego **Question 3** would have lost the available 9 marks which could have been easily gained, seeing that the skills were then demonstrated in **Question 4**. It was good to see some responses of a very high standard that picked on document 3 as a rich and challenging resource, and drew a wealth of inferences, cross-referencing with the other documents and constructing a coherent argument. It was also good to see that the majority of candidates offered a clear conclusion to their arguments, whether at the beginning or towards the end. It is a fundamental feature of an argument that it has a conclusion, and this is reflected in the marking of responses.

THINKING SKILLS

Paper 9694/42
Applied Reasoning

Key message

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This question tests the essential skills of evaluation, CT4 and CT6, which lie at the heart of critical thinking activity. The best responses accurately spotted assumptions, flaws and weaknesses, and gave clear explanations; though many candidates simply restated what was already claimed in the passage as ‘assumptions’, whereas credit can only be given for expressing the unstated assumptions upon which the validity of the reasoning depends. Some gave a good evaluative point about a strength of CAP’s argument by pointing out that the rationale about capital flow was a sound one. But many simply gave an appraisal of CAP, looking for as many things about CAP’s claims or the literary structure of the passage they could annotate or positively comment on, labelling these as ‘strengths’ – which are not critical evaluations as required in critical thinking. Responses that merely challenged CAP’s claims as having no evidence, e.g. “CAP has no strong evidence to back up his argument”, rather than critically evaluating the validity of the claims, earned no credit. Similarly, responses which focused on the literary aspects such as “the argument is haphazard / does not flow” (there were several such responses) were wholly disengaged with critical thinking.

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The subject this question alluded to, which required a comparison of communism and capitalism, was clearly within the grasp of the majority of candidates, and there were several enthusiastic responses. Many candidates, however, while writing up good and relevant further arguments using their own knowledge and observations, ignored the stimulus sources they were required to respond to. On the whole, therefore, while there were substantive further arguments, there was less judicious selection and critical evaluation of material from the sources. A great many candidates tended to write essay-type answers, starting off with preambles which could earn no credit while losing precious time, e.g. “From mankind’s recorded history there have been many forms of government from early barter system to the new age capitalistic-socialist hybrid – all of these systems have seen successes as well as monumental failures...”; whereas the question asks them to do only critical thinking on the topic, i.e. construct an argument in response to the stimulus sources, supporting and rejecting claims and viewpoints in these, and invites them to supplement with their own knowledge and understanding. What was credited was not the knowledge candidates have of the systems, but their ability to apply critical thinking skills to the issues in order to offer a well-reasoned argument with a clear conclusion for or against the proposition. It is also noted that quite a few candidates did not do **Question 3** but went on to **Question 4**, giving good critically evaluative comments on the flaws in sources while constructing a well-reasoned argument. Had they also demonstrated these skills in response to **Question 3**, they would have been able to score marks there as well. It seemed that several candidates struggled for time in this question as they did not quite finish it; but those whose strategy was to forego **Question 3** would have lost the available 9 marks which could have been easily gained, seeing that the skills were then demonstrated in **Question 4**. It was good to see some responses of a very high standard that picked on document 3 as a rich and challenging resource, and drew a wealth of inferences, cross-referencing with the other documents and constructing a coherent argument. It was also good to see that the majority of candidates offered a clear conclusion to their arguments, whether at the beginning or towards the end. It is a fundamental feature of an argument that it has a conclusion, and this is reflected in the marking of responses.

THINKING SKILLS

Paper 9694/43
Applied Reasoning

Key message

Evidently the majority of candidates found the topics for debate accessible, interesting and appealing and responded relevantly with a range of impassioned arguments. However, candidates need to remember that what is being examined are the skills of analysis and critical evaluation in each question, and not, or not just, one's own thinking on the matter. Several candidates lost marks through uncritical responses to **Question 1**. It was evident that on the whole those who wrote creditworthy answers in **Question 1** were also able to answer **Question 3** rather well. Both required the thinking skill of critically evaluating the stimulus material.

General comment

The majority of candidates earned 3 marks or less for **Question 1**, as they did not adequately scrutinise the 'statistics and information' for possible errors in order to develop a justification. Performance in **Questions 2** and **3** ranged from mediocre to poor. Candidates need to understand that identifying the main conclusion and main reasons and counter-argument/s (**Question 2**) is an *analysis* of structure of argument task, calling on skills learnt in CT1, CT2 and CT8; while identifying and explaining weaknesses / strengths (**Question 3**) is a task of critical *evaluation*, involving skills learnt in CT4, CT6 and CT11.

Many candidates responded appropriately to **Question 4**, relevantly integrating their own observations and knowledge. The best answers were those that gave equal attention to both of the tasks demanded by the question, i.e. commenting critically on the source materials and in doing so building up their own further arguments.

Comments on specific questions

Question 1

Those who were able to identify at least 3 problems, and give developed explanations for at least two of these, fully accessed the 5 marks for the question. A fully creditworthy point identified a flaw or error in the data and explained its significance to access 2 marks: e.g. "*The passage shows only statistical information for Sinar's Centre [identification of statistical flaw – 1 mark]. Without comparison with the other 7 Centres we can not justify the decision to close the Leisure Learning Centre because Sinar might be having the largest population and therefore cost more than the others to provide services*" [developed the significance of the identified factor – 1 mark]. A majority of candidates identified and explained no more than 2 factors, so gaining at most 4 marks. Candidates were only required to respond very briefly; however, many wrote unnecessarily long answers, giving lengthy explanations for the same point. Several showed unfamiliarity with the skill to analyse and evaluate statistical information when they uncritically justified the decision to close Sinar by speculating about reasons other than to do with the statistics, e.g. suggesting that there must have been some corruption in Sinar as the reason why it performed poorly. This skill, described as CT14 in the syllabus, requires candidates to adopt a sceptical approach to statistical inferences and query their validity.

Question 2

Candidates, on average, were able to access at least 2 marks out of 6 for this question. The best answers first carefully identified the main conclusion, and then worked out the supporting reasons, intermediate conclusions and counter-arguments, keeping closely to the wording of the text and neatly labelling the parts. Candidates should avoid additional material from the text which goes beyond the core reason, counter-argument or conclusion identified. For example, "*It is inevitable that AI will come into being because of how rapidly technology is advancing*" is not precisely an intermediate conclusion because it contains a reason as

well. Candidates should also write out the part of the sentence they identified as structure in full and not use ellipsis.

There were a fair number of candidates who mistakenly took this to be an evaluation question requiring identification of flaws and/or commentary. Some others misunderstood and commented on the literary features and stylistic devices of the passage. Analysing the structure of an argument is a technical exercise, requiring the candidate to uncover and label the skeletal framework of the reasoning underlying the argument. They are not required to explain or comment on any of the reasons, counter-arguments or conclusions they identify.

Question 3

This key question precisely tests crucial skills that lie at the heart of critical thinking activity, namely CT4 and CT6. Candidates are required to evaluate a given argument in order to come up with a judgment about the strength of the argument, and how well the main conclusion is supported. They have to precisely identify flaws and unstated assumptions which can weaken the main conclusion, and clearly explain each weakness they identify. The best answers were orderly and methodical, moving from paragraph to paragraph identifying a flaw here or a weakness there, explaining them, and in concluding gave an overall evaluation about the strength of Tan's argument as a whole. On average, candidates scored no more than 2 marks out of 9 for this question, making this a key area in which there is much room for improvement. Very few concluded with overall evaluations, losing the two marks available. Many candidates appeared not to understand that the question required them to detect implicit i.e. unstated assumptions (CT4), and merely re-phrased claims from the passage with the comment that "*Tan assumes that...*". Many candidates offered their own opinions about the concept of AI, or merely disagreed with Tan or challenged his claims with counter-assertions, e.g. "*A weakness is that it says a computer will have feelings, but feelings come about through our experiences in life, but a computer will not have these*". Such a response lacks the crucial element of focusing on a flaw in Tan's argument and so can earn no credit in this question, although such critical insights may be credited in **Question 4** when used to construct further arguments.

Question 4

Most candidates were able to appropriately respond to this question to varying degrees, accessing credit across upper band 2 to band 4. There were some very good attempts at applied reasoning, where candidates went about critically comparing and contrasting, and evaluating material in the sources, drawing inferences and integrating them with their own views and observations. The better candidates brought under scrutiny the terms 'good' and 'better' in the context of the argument about benefit and worth, selected and re-organised material from across the sources judiciously, responding to relevant points in the order of their own reasoning, and not in the order in which the source documents were presented, and thus earned credit from upper band 3. Responses that, in the course of synthesis and constructing further arguments, outlined complexities and counter-arguments to own arguments were able to move up into band 4.

Some able candidates, however, who offered good critical evaluation of sources and their own reasoning, lost credit by leaving their conclusion open: e.g. "*Whether or not a computer brain will be as good as if not better than a human brain is debatable*". This is abstention; **Question 4** specifically requires the candidate to opt for one side ("*...for or against...*") conclusively. Responses which had good evaluation of sources, but then did not go on to produce further arguments using one's own ideas and examples were limited to lower band 3. Candidates who merely cited references from the sources in support of their arguments, without demonstrating any evaluative element, were limited to band 2. For example, "*As stated in document 2 'thinking is fundamentally a computational process' meaning that computers cannot think, showing computers cannot be better than the human brain*" has only clearly expressed a reason uncritically selected from the sources. On the other hand, a candidate who noted that document 2 has not defined how 'computation' is different from 'thinking' and thus that a comparison between the brain and AI is difficult, but appreciated that the human brain may have a further dimension called the mind, as stated in document 4, which makes it possible that the human brain is far more autonomous than an electronic brain [inference], has constructed *developed critical reasoning* as described in band 3: "combining different viewpoints, or synthesising arguments from different documents, using own ideas or critical comments or fresh perspectives".