

# THINKING SKILLS

---

Paper 9694/21  
Critical Thinking

## Key Messages

The main reason why candidates lose marks seems to be that they do not understand what questions expect them to do. Candidates and teachers are strongly advised to study previous question papers and mark schemes in order to find out what kind of answers are expected in response to the different types of question.

Candidates and teachers need to understand that disagreeing with claims or evidence does not constitute an evaluation of reasoning.

There are not many technical terms in Critical Thinking, but candidates are expected to understand and be able to use the specialised meanings of “argument” and “assumption”.

## General Comments

There were a few good scripts, but most marks fell within the lower half of the range. A few candidates did not complete the exam in the time allowed.

## Comments on Specific Questions

### Question 1

Almost all candidates seemed able to understand both the scenario and the questions.

- (a) Most candidates recognised that Source B was of little or no use in this respect, and most rightly pointed out that the captain would not necessarily have known about the other boys’ intentions and/or that he might have lied to the Headteacher.
- (b) Most candidates gained at least 1 mark for this question, and a good number identified both the valid points and thereby gained 2 marks.
- (c) Several points were available in response to this question, and most candidates correctly identified one or more of them. Many candidates slightly lost the focus, discussing the content/truth of the Deputy Head’s evidence rather than its reliability. Very few correctly observed that the fact that the Deputy Head recorded Mr Perez’s comment and differentiated carefully between what he could and could not see increased his reliability.
- (d) A lot of good answers to this question were offered, and a good number of candidates gained 5 or 6 marks. More candidates than in previous sessions addressed issues of credibility of sources. Nearly all candidates judged that Mr Perez’s injury was caused either by accident or deliberately, and a few recognised the possibility of the compromise answer from the mark scheme, that the boys may have played within the rules of the game but more aggressively than usual. A few candidates claimed that it was impossible to decide between the two main explanations, but this is never an appropriate response to question 1(d) of this examination, which always asks candidates to come to a judgment.

## Question 2

Most candidates seemed to understand the main conclusions of the research, although many found difficulties in one or more of the questions.

- (a) A few candidates understood the point of this question, and realised that a statistical link between sleeplessness and serious illness could be explained by the illness causing the sleeplessness or by some other factor, such as stress, causing both. Most candidates, however, apparently misunderstood the question, and either explained the researcher's findings or suggested other causes for ill health.
- (b) A variety of answers to this question was offered. A fair number of candidates correctly stated that Source C is not an argument, because it consists of research findings without a persuasive conclusion. Other candidates claimed that it was an argument, because they interpreted the evidence as reasons and the first sentence as a conclusion, but this was incorrect. Quite a lot of candidates appeared not to know the technical definition of argument used in Thinking Skills, and said that Source C was not an argument because it presented only one point of view or because it was not arguing against anyone.
- (c) Most candidates addressed this question by discussing Source D only and misjudged their response because they exaggerated the claims made by Source C, failing to realise that "73% more likely" does not include everyone and is not refuted by a few contrary examples. Those who also looked closely at Source C tended to realise that the response in Source D was very ineffective. The most popular point from the mark scheme was that the author of Source D relied on a small number of examples.
- (d) Nearly all candidates achieved some marks on this question, by correctly drawing relevant inferences from one or more of the sources. A significant number misinterpreted the statistics in Source B, and focused on the number of deaths instead of the risk of death. A very few candidates wrote about their own opinions without reference to the sources, and were awarded no marks.

## Question 3

Candidates' lack of sympathy with this argument tended to cloud their judgment. Because arguments written for question 3 in these exams are designed to provide material for evaluation, they are often extreme or counter-intuitive. One of the reasons for studying Critical Thinking is to encourage candidates to keep a cool head when encountering arguments with which they profoundly disagree.

- (a) Most candidates correctly identified the main conclusion of the argument, although a few lost 1 mark by adding in the first half of the sentence. A few candidates still misunderstood the nature of this task, expressing the gist of the argument in their own words or analysing the whole argument.
- (b) Not many candidates correctly identified any of the reasons which directly supported the main conclusion. Such reasons are almost always – as in this case – technically Intermediate Conclusions.
- (c) There are several ways of scoring 0 marks for this question, and many candidates opted for one or other of them. The most popular approach was to disagree with the author's argument, either as a whole or point by point, instead of evaluating its reasoning. Many candidates criticised the argument for being one-sided and/or for not supporting its claims by the use of statistics, while a few gave a literary critique or identified strengths in the reasoning: none of these approaches was credited. Some candidates must have spent a significant amount of time writing long answers which were awarded 0 marks. Study of the mark scheme will reveal the valid evaluative points which were credited and should give some indication of what to look for in future sessions.

As in previous sessions, nearly all candidates who referred to "unstated assumptions" wrongly interpreted that expression as meaning "unsupported statements". It is never correct to claim that a quotation from the passage is an unstated assumption, because if it can be quoted, it is not unstated.

- (d) Many candidates seemed to have little idea what legal restrictions on advertising might look like, but this did not necessarily prevent them from successfully writing a short argument in favour of them or against them. As usual, a complete range of marks was awarded, with many candidates achieving 3 marks and a good number 4 or 5. Quite a lot of candidates conflated “law” and “government”.

# THINKING SKILLS

---

**Paper 9694/22**  
**Critical Thinking**

## Key Messages

- Little credit can be given for answer content which merely repeats what is in the passage. Many candidates waste time by doing this and typically gain any marks for one or two sentences at the end of their answer.
- In several questions, candidates need to think beyond the more obvious points that can be made if they are to gain a mark of pass standard. This is particularly the case in 3-mark questions where many candidates only succeed in gaining 1-mark.
- Candidates need to adjust the length of their answers to the number of marks awarded. There were still a number of cases where candidate answers to 3 mark questions were as lengthy as their answers to 6 mark questions.

## General Comments

Candidates seemed to respond well to the issues raised by the questions and were able to tackle them effectively. As in previous papers, 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.

## Comments on Specific Questions

### Question 1

- (a) Many candidates made at least one point of significance, usually that it indicated incompetence on the part of the Centre. Only a few candidates achieved 3 marks, though a reasonable number did also point out that the children's physical state would not have deteriorated as much if they had been rescued earlier. Weaker answers tended to repeat what was in the source, leaving the reader to infer the significance, which could not be given any credit.
- (b) This was answered less well. Surprisingly few candidates made the obvious points about expertise and the source being an 'insider'. Many candidates assumed that the Centre had not reacted to the letter and that the staff resigned because of the concerns about safety standards. Others thought one could infer that the Centre was short-staffed.
- (c) Many candidates were able to gain marks by pointing out the relevance of the information about wind and tide which the Centre should have taken into account. Few candidates succeeded in explicitly making the point that the information did not have relevance to the question of who or what was responsible for the state that the children were in. Some candidates simply said it was not relevant to a judgment about responsibility for the incident, but this was not enough to gain credit.
- (d) The issues raised seem to engage the candidates. The vast majority thought the Budmouth Sea Adventure Centre should be held responsible and this is a reasonable judgment to make given the information in the sources. A reasonable number of candidates produced a Level 3 answer. However, many assumed that the children did not have 30 hours of canoeing in a freshwater environment, which the sources do not allow us to conclude. Few candidates explored the distinction between staff errors of judgement and overall incompetence of the Centre. It is possible that the Centre was fully compliant with regulations and had responded to the letter in Source B, but that the instructors made a poor decision in the heat of the moment.

## Question 2

- (a) Many candidates made the points about ethnicity and gender which were allowed in the mark scheme. However, few made the more subtle points that the research was not trying to generalise beyond the sample and that what was true of Swedish men was probably applicable to any other human. These points meant it was not a valid criticism.
- (b) This was done well with most candidates seeing that Whizzo was not pure chocolate but had other ingredients that might not be good for you. Others suggested eating lots of Whizzos might not be good for you.
- (c) Many candidates thought that the information in Source E did challenge the conclusion in Source A. This was not the answer that was being looked for. Surprisingly few candidates made the distinction between physical health in Source A and the psychological health being referred to in Source E.
- (d) A pleasing number of candidates recognised this was a rather overdrawn conclusion and argued that the sources suggested a rather more modified conclusion, e.g. pure chocolate in moderate amounts was probably good for you. Many also rightly inferred that if chocolate was addictive, as suggested in Source D, it might be difficult to limit the amount that one ate. A reasonable number of candidates produced Level 3 answers. The subject matter of this question 2 seemed more to accessible to candidates than some previous question 2s.

## Question 3

- (a) More candidates managed to identify the 2-mark answer than in previous papers.
- (b) Again, significantly more candidates correctly identified 2 or 3 reasons than in previous papers. Along with the responses to part (a), this suggests the structure of the argument was grasped reasonably well by a good proportion of candidates.
- (c) Candidates who understood the nature of the exercise did well and there was a significant increase in the number who did correctly evaluate the reasoning rather than challenging propositions or commenting on the style of the argument. There were many 4- and 5-mark answers. Many candidates pointed out that electricity could be produced without burning fossil fuels.
- (d) Candidates seemed engaged with this conclusion and put forward interesting and often detailed reasons to support their conclusion. Most defended the car and a significant number were able to produce arguments with counter arguments and/or intermediate conclusions.

# THINKING SKILLS

---

Paper 9694/23  
Critical Thinking

## Key Messages

The main reason why candidates lose marks seems to be that they do not understand what questions expect them to do. Candidates and teachers are strongly advised to study previous question papers and mark schemes in order to find out what kind of answers are expected in response to the different types of question.

Candidates and teachers need to understand that disagreeing with claims or evidence does not constitute an evaluation of reasoning.

There are not many technical terms in Critical Thinking, but candidates are expected to understand and be able to use the specialised meanings of “argument” and “assumption”.

## General Comments

There were a few very good answers to this exam, but most candidates fell in the lower half of the range. A few candidates did not complete the exam in the time allowed.

## Comments on Specific Questions

### Question 1

Most candidates understood the main point of this story, although a few confused Eastland and Westland and some candidates believed one side and were suspicious of the other, instead of maintaining a sceptical attitude towards both.

- (a) Quite a lot of candidates pointed out that the movement of Westland troops provided a motive for Eastland to send spies, but very few recognised Westland’s motive for provoking trouble with Eastland by falsely accusing some of their soldiers of spying. Some candidates appeared not to understand the question, and summarised the evidence instead of drawing an inference from it.
- (b) Most candidates recognised that the source was unreliable because of bias in favour of Eastland, although a few discussed the content of the source rather than its credibility or plausibility.
- (c) Nearly all candidates understood the reference to the Red Cross, and judged rightly that the evidence given by the observer was reliable because of a lack of bias, although a few claimed that the report was biased in favour of Westland. Only the most perceptive answers distinguished between the reliability of the observer and the vested interest of the soldiers to deny anything which might incriminate them.
- (d) Quite a lot of good answers to this question were offered, and a good number of candidates were awarded 5 or 6 marks. A fair number of candidates addressed issues of credibility of sources, although many wrongly claimed that statements from one side of the dispute or the other “proved” what they alleged. The most popular answer claimed that the soldiers were not spies, but did not say whether they had been kidnapped from barracks or had accidentally strayed over the frontier while on a training exercise. A few candidates recognised that the strongest argument in favour of the soldiers’ guilt was the discrepancy between the alternative explanations offered by the Eastland authorities and the soldiers themselves.

### Question 2

Coffee-drinking should have been a familiar topic to candidates, but many of them seemed to struggle with the idea that it might have medical benefits.

- (a) Most candidates scored 2 marks out of 3 for this question, by pointing out a weakness in the credibility of Source A and a strength in the credibility of Source B. Some gave only one answer, apparently thinking that two sides of one point counted as two points. Very few gained the third mark, by recognising that although Source B was **more** reliable than Source A, this was a matter of degree, rather than all or nothing. As the mark scheme indicates, Source B is biased and makes implausible claims – just not as biased or implausible as Source A; similarly, Source A does appear to be based on some scientific knowledge, albeit not as much as Source B.
- (b) A variety of answers to this question was offered. A fair number of candidates correctly stated that Source C is not an argument, because it consists of research findings without a persuasive conclusion. Others claimed that it was an argument, because they interpreted the evidence as reasons and the first sentence as a conclusion, but this was incorrect. Quite a lot of candidates appeared not to know the technical definition of argument used in Thinking Skills, and said that Source C was not an argument because it presented only one point of view or because it was not arguing against anyone.
- (c) Some candidates apparently did not understand the meaning of the word “representative”, and gave general criticisms of the research, which were not credited. Criticisms of the number of people in the sample were also not credited. Candidates who understood what the question was asking focussed on any of: gender, occupation, nationality and age. To score 2 marks for each answer, they needed to link the category with either coffee-drinking or depression. The fact that none of the sample was suffering from depression at the beginning of the study was not a criticism of the representativeness of the research, which was about avoiding depression, not curing it.
- (d) Most candidates made some valid comments in the light of the claims made in the sources, although many comments were uncritical and vague. Some candidates scored low marks because they did not make detailed reference to the sources.

### Question 3

Although an argument about the qualifications required by teachers should have been interesting to candidates, most of them had little sympathy with the passage, which tended to cloud their judgment. Because arguments written for question 3 in these exams are designed to provide material for evaluation, they are often extreme or counter-intuitive. One of the reasons for studying Critical Thinking is to encourage students to keep a cool head when encountering arguments with which they disagree.

- (a) Most candidates correctly identified the main conclusion of the argument, which was in a fairly prominent position. A few candidates still misunderstood the nature of this task, expressing the gist of the argument in their own words or analysing the whole argument.
- (b) Some candidates correctly identified one or more of the reasons which directly supported the main conclusion, and a few identified three, but many scored 0 on this question. The reasons directly supporting the main conclusion are almost always – as in this case – technically Intermediate Conclusions.

- (c) There are several ways of scoring 0 marks for this question, and many candidates opted for one or other of them. The most popular approach was to disagree with the author's argument, either as a whole or point by point, instead of evaluating its reasoning. Many candidates criticised the argument for being one-sided and/or for not supporting its claims by the use of statistics, while a few gave a literary critique or identified strengths in the reasoning: none of these approaches was credited. Some candidates must have spent a significant amount of time writing long answers which were awarded 0 marks. Study of the mark scheme will reveal the valid evaluative points which were credited and should give some indication of what to look for in future sessions.

As in previous sessions, nearly all candidates who referred to "unstated assumptions" wrongly interpreted that expression as meaning "unsupported statements". It can never be correct to claim that a quotation from the passage is an unstated assumption, because if it can be quoted, it is not unstated.

- (d) As usual, a complete range of marks was awarded, with many candidates achieving 3 marks and a good number 4 or 5. A few candidates gave their opinions about the subject of the passage, instead of supporting or challenging the claim stated in the question. Some candidates stated their opinions, in some cases at length, but did not present reasons supporting a conclusion.



# THINKING SKILLS

---

**Paper 9694/31**  
**Problem Analysis**  
**and Solution**

## **Key Message**

Candidates must ensure that answers contain sufficient detail and precision to be distinguished from viable misconceptions – this is particularly the case with diagrammatic answers. Candidates should aim to offer one ‘personal best’ solution to any question which involves searching a problem space for a solution – even if it clearly does not satisfy all the restrictions. Partial marks are awarded for this.

## **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 problem’s structure, some experimental investigation of the options, and considered reflection on what best fitted the questions’ requirements. Mathematical preparation for these questions involved familiarity with square numbers, systematic listing of independent factors, Cartesian Coordinates and fractions.

Many questions required only a brief, unsupported answer, but some needed an explanation or a diagram. These latter questions did not all require verbal explanations (a demonstration can simply involve a carefully selected series of calculations), but some did. And a number of candidates struggled to find the balance between precision (a numerical answer is normally required if it is possible) and clear explanation (some words are normally needed to make it clear what the significance of a calculation is).

Although some candidates clearly suffered because they misallocated their time, most 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 required candidates to represent the arrangements of squares inside different trays in sufficient detail to precisely consider their mobility. The movement of the squares was not at all easy to represent, and hence required a degree of 2D visualisation on the part of the candidate. Very few candidates attempted to produce scale drawings of the tray – and this was certainly not needed in order to reach secure judgments on the arrangements; those who succeeded did tend to offer diagrams in which the relative sizes of the squares were shown.

- (a) (i) The majority of candidates saw that squares 1 and 2 were mobile in the arrangement offered – but the mobility of square 4 was not specified in many responses. Square 4’s ability to move was a result of square 1 moving, and hence required a more pronounced visualisation of the problem – beyond the mere ‘spatial deduction’ of moving squares into adjacent spaces.
- (ii) The most common solution to this problem was to place square 5 in the middle of the tray, or to reverse the position of squares 2 and 3. Many students were awarded marks here even though they had not identified the mobility of square 4 in (a)(i) – and hence not managed to improve upon their own analysis of the initial arrangement.

- (b) This was the only part of the question which did not depend upon spatial understanding of the problem – and was not completed successfully by many candidates. Too many responses appeared to attempt an inference from the diagram given in the question, apparently balking at the prospect of listing the sizes of the 11 squares and subtracting from 513. A number of answers also offered solitary numerical answers which were wrong, probably resulting from minor arithmetic errors.
- (c) This part was answered well in general. A correctly justified answer did depend upon realistic visualisation of the tray (mentally moving 1, 2 and 3, in order to confirm 4's mobility). But any inferential path that led to the answer '5' gained full marks.
- (d) This part required candidates to judiciously choose a means of representing the 'filler' piece, with sufficient detail to establish its correctness. A substantial number of candidates offered solutions in which the lengths of certain sections of the piece were not given – and if such ambiguity required the examiner to choose a correct interpretation from an incorrect one, no marks were awarded. This principle is applied throughout the paper, and needs to be articulated to students preparing for the exam – they must ensure that their solutions are not ambiguous.

There were a number of correct possible solutions to the question – the cross-piece given in the mark scheme was the most popular. There was no need for the position of the surrounding pieces to be included in a correct answer.

- (e) This part involved experimental manipulation of the pieces, verification that the conditions had been satisfied, and an appropriately precise diagram. Diagrammatic precision certainly helped here, but it was not necessary – as long as it was clear in the final answer which squares were situated where. Strategically the best approach to this problem was to use the small pieces to pin the large pieces in place, and ensure that their 'mobility spaces' were not adjacent. As with most such problems in Paper 3, in which a demanding condition is to be satisfied as a result of some experimentation, suboptimal answers do gain partial marks – and hence it is worth leaving one clear attempt, even if it is obvious that it does not succeed in satisfying all the conditions.

## Question 2

This question involved an exploration of which four-digit codes could be produced by simple arithmetic rules, and some awareness of how the totality of such arrangements can be summarised. Unlike Question 1, in which the restrictions on what was possible were manifest in the everyday visualisation of the 2-dimensional space, this question did depend upon carefully establishing exactly what was permitted in the rules. The job of doing this is vital to any further investigation of the options. The main error that was made in this was the inclusion of two-digit numbers in the rules: for instance **3 12 +**. The conditions of the problem did not allow these, but such answers were treated with generosity.

- (a) Most candidates managed to move from the sequence (8, 15, 22, 29) to the code 8 5 2 9. Some candidates omitted the first number (yielding 5 2 9 7), but this was rare.
- (b) This part was not answered correctly by many candidates – the most common answer being 81, which seems to show an understanding of what was needed, combined with a misconception that only the digits 1–9 were to be used. In general 0 should be considered a digit of equal stature to any other. This misconception was nevertheless often combined with the use of '0' in rules for part (d).

A correct response to this part does depend on an appreciation of the independent effects of altering the two digits, and an understanding of how this manifests itself in the lists. A formal understanding of combinatorics is not expected for this paper, but some experience of exhaustive listing, as is common for '2 dimensional sample spaces' in probability questions, is certainly helpful.

- (c) Most candidates offered correct answers to this problem – appreciating that **2 4 +** would not yield the code beyond the first two digits, and then seeking a rule involving multiplication.

- (d) Most candidates offered two or three correct solutions to this problem, and were awarded 1 mark as a result. The variety of solutions showed that the incompleteness of these lists was due to a variety of problem-solving deficiencies. Some did not see the numerical possibilities of  $66 \times$ . Some did not consider subtraction. Some did not consider including a '0' in the rule. These all result from not attempting to see the problem from more than one perspective – an active attempt to step back from any solution (which may appear complete) and consider what might constitute an alternative approach is one of the most useful, and sophisticated, problem-solving strategies.
- (e) This part was answered fairly well by candidates: it was not obvious how to systematically tackle the problem, apart from choosing a rule, considering its code, and attempting to replicate it with another. As can be seen in the mark scheme, consideration of even-numbered cases was more fruitful in this regard. Of those who attempted this part with appropriate experimentation, the most common error was to not abide by the restriction that all four digits must be different.
- (f) As with part (d), most candidates offered two or three correct answers to this part. The unfamiliarity of the modular sequences here should have prompted a more systematic approach – considering how the second number could be reached by addition, subtraction and multiplication. Very few candidates appeared to do this.  $38 +$  and  $37 \times$  were found by most.  $34 -$  and  $32 -$  were rarer.
- (g) Few candidates attempted this part, and very few offered a convincing demonstration. A successful attempt needed to show awareness of the total number of codes available ( $10 \times 10 \times 10 \times 10$ ) and of the number which could be produced by the rules. This required a major abstraction from the details of the question so far experienced, and it is understandable that few candidates felt confident in doing this.

### Question 3

This question required candidates to convert the physical, spatial process described in rolling out the pastry into a rule applied to coordinates. The process was fairly simple (involving two steps, both of which involved a factor of 2), and examples of the effect on coordinates were given for both of the key cases. However, most candidates really struggled with applying the rule, and were reduced to intuitive guesswork for the central parts of the question. Very few made serious attempts at sections (d) and (e).

- (a) (i) The lack of successful solutions to this initial part seems to reveal how few were able to confirm how the process worked from the examples given. A broad perspective on the problem, rather than immersion in the details, was needed here, but this required confidence.

(ii) and (iii)

These 'standard applications' of the rule were successfully completed by less than a third of those who tackled the part. It is difficult to establish what misconceptions were at play here – the rule for the coordinates was awkward to express since it divided into two separate sections, and many candidates may have been defeated by the attempt to articulate the entire process. The simpler rule needed for (ii) – "if on the left half of the grid, then double the x-coordinate and halve the y-coordinate" – did depend upon a sense of what stretching does to a coordinate, and this may have paralysed some candidates. Formal study of graph transformations is not expected for this paper, and this process was considered to be a natural extension of students' knowledge of Cartesian coordinates.

- (b) (i) This part seemed to attract intuitive guesses – mostly the answer '6'. It does not depend on precise calculation using the coordinate rule – and a series of rough sketches confirms that the layers are doubling.
- (ii) This tended to be answered correctly by those who appreciated the doubling/halving logic required in part (i).
- (c) (i) This part required an appreciation of the precise coordinate algorithm required in part (a), since differently-sized patches of butter would be affected differently by the cutting and rolling. Very few candidates managed to model this correctly. A series of carefully-drawn diagrams were used by those who managed to do it.
- (ii) This part required the abstract perspective of part (a)(i) and was answered more effectively than the previous parts. A number of candidates saw that a pair of lumps of butter could be joined up into one piece when the two halves are placed on top of each other.

**(d) (i) and (ii)**

This part depended on correct application of the coordinate algorithm, and was tackled correctly by very few candidates. The use of 'awkward' fractions further hampered the attempts that were made. Mastery and confidence in wielding fractions is certainly expected in preparation for the paper.

**(e) (i), (ii) and (iii)**

This final section of the exploration required candidates to reflect on the cyclical process encountered in **(d)**, and hence was inaccessible to most candidates. The vast majority did not attempt these parts.

**Question 4**

The data which generated the problems for this question was fairly straightforward, and most candidates were able to explore and hypothesise confidently.

**(a) (i) and (ii)**

A number of candidates listed all the plays, and their frequencies, which led reliably to correct solutions to these parts. Such a demonstration was not needed, and most candidates managed to tally the performances with due precision (perhaps on the Question Paper), and draw the appropriate inferences.

**(b)** This part required a limited search of the dates on which the relevant plays were enacted. This was a test of candidates' care more than logic, and most succeeded in identifying the correct pair of dates.

**(c) (i)** This part required identification of the two sets of dates, and of their intersection. Candidates were much more prone to error in this than the previous parts. The most common error was the accidental inclusion of dates on which both sons were performing. This task would certainly be made substantially easier if candidates circled the appropriate dates on the Question Paper, allowing a measured comparison and listing. Some candidates appeared to simply misread the question, and offered all the dates on which the two were performing, rather than when they were being watched by Kate.

**(ii)** There was a lot of scope for hasty misapplication of the pricing regulations here, and this part was answered correctly by only about half the candidates. This part did build on the answer to part **(i)**, but one 'follow through' mark was available for those who gave incorrect answers to part **(i)**. Most incorrect answers erroneously treated one of the performances as a 'first performance'.

**(d)** This part involved a tactical approach to the pricing structure – in particular, it required candidates to select as many plays as possible for a 'first performance', and then fit as many of those left into the first fortnight. Few candidates managed this correctly. The pressures of time may have been the source of these errors, since the allocation of plays was not particularly tortuous – but it did require a complete attempt at the process, rather than an optimistic extrapolation from what was offered in the price list.

**(e) (i)** The explanation required here needed some reference to the consecutive performances of King Lear and Timon of Athens. There were many creative explanations offered, but most appeared to substantially over-complicate the issue.

**(ii)** This part required a sustained chain of logical reasoning, abiding by the small number of awkwardly interlinking strictures. Of those who offered sensible answers to this part, about half managed a correct list. As mentioned in the comments on **Question 1(e)**, there were partial marks for incorrect solutions, and hence it was definitely worth leaving one 'best attempt' for the consideration of the examiner.

# THINKING SKILLS

---

**Paper 9694/32**  
**Problem Analysis**  
**and Solution**

## **Key Message**

Candidates must ensure that answers contain sufficient detail and precision to be distinguished from viable misconceptions – this is particularly the case with diagrammatic answers. Candidates should aim to offer one ‘personal best’ solution to any question which involves searching a problem space for a solution – even if it clearly does not satisfy all the restrictions. Partial marks are awarded for this.

## **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 problem’s structure, some experimental investigation of the options, and considered reflection on what best fitted the questions’ requirements. Mathematical preparation for these questions involved familiarity with square numbers, systematic listing of independent factors, Cartesian Coordinates and fractions.

Many questions required only a brief, unsupported answer, but some needed an explanation or a diagram. These latter questions did not all require verbal explanations (a demonstration can simply involve a carefully selected series of calculations), but some did. And a number of candidates struggled to find the balance between precision (a numerical answer is normally required if it is possible) and clear explanation (some words are normally needed to make it clear what the significance of a calculation is).

Although some candidates clearly suffered because they misallocated their time, most 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 required candidates to represent the arrangements of squares inside different trays in sufficient detail to precisely consider their mobility. The movement of the squares was not at all easy to represent, and hence required a degree of 2D visualisation on the part of the candidate. Very few candidates attempted to produce scale drawings of the tray – and this was certainly not needed in order to reach secure judgments on the arrangements; those who succeeded did tend to offer diagrams in which the relative sizes of the squares were shown.

- (a) (i) The majority of candidates saw that squares 1 and 2 were mobile in the arrangement offered – but the mobility of square 4 was not specified in many responses. Square 4’s ability to move was a result of square 1 moving, and hence required a more pronounced visualisation of the problem – beyond the mere ‘spatial deduction’ of moving squares into adjacent spaces.
- (ii) The most common solution to this problem was to place square 5 in the middle of the tray, or to reverse the position of squares 2 and 3. Many students were awarded marks here even though they had not identified the mobility of square 4 in (a)(i) – and hence not managed to improve upon their own analysis of the initial arrangement.

- (b) This was the only part of the question which did not depend upon spatial understanding of the problem – and was not completed successfully by many candidates. Too many responses appeared to attempt an inference from the diagram given in the question, apparently balking at the prospect of listing the sizes of the 11 squares and subtracting from 513. A number of answers also offered solitary numerical answers which were wrong, probably resulting from minor arithmetic errors.
- (c) This part was answered well in general. A correctly justified answer did depend upon realistic visualisation of the tray (mentally moving 1, 2 and 3, in order to confirm 4's mobility). But any inferential path that led to the answer '5' gained full marks.
- (d) This part required candidates to judiciously choose a means of representing the 'filler' piece, with sufficient detail to establish its correctness. A substantial number of candidates offered solutions in which the lengths of certain sections of the piece were not given – and if such ambiguity required the examiner to choose a correct interpretation from an incorrect one, no marks were awarded. This principle is applied throughout the paper, and needs to be articulated to students preparing for the exam – they must ensure that their solutions are not ambiguous.

There were a number of correct possible solutions to the question – the cross-piece given in the mark scheme was the most popular. There was no need for the position of the surrounding pieces to be included in a correct answer.

- (e) This part involved experimental manipulation of the pieces, verification that the conditions had been satisfied, and an appropriately precise diagram. Diagrammatic precision certainly helped here, but it was not necessary – as long as it was clear in the final answer which squares were situated where. Strategically the best approach to this problem was to use the small pieces to pin the large pieces in place, and ensure that their 'mobility spaces' were not adjacent. As with most such problems in Paper 3, in which a demanding condition is to be satisfied as a result of some experimentation, suboptimal answers do gain partial marks – and hence it is worth leaving one clear attempt, even if it is obvious that it does not succeed in satisfying all the conditions.

## Question 2

This question involved an exploration of which four-digit codes could be produced by simple arithmetic rules, and some awareness of how the totality of such arrangements can be summarised. Unlike Question 1, in which the restrictions on what was possible were manifest in the everyday visualisation of the 2-dimensional space, this question did depend upon carefully establishing exactly what was permitted in the rules. The job of doing this is vital to any further investigation of the options. The main error that was made in this was the inclusion of two-digit numbers in the rules: for instance **3 12 +**. The conditions of the problem did not allow these, but such answers were treated with generosity.

- (a) Most candidates managed to move from the sequence (8, 15, 22, 29) to the code 8 5 2 9. Some candidates omitted the first number (yielding 5 2 9 7), but this was rare.
- (b) This part was not answered correctly by many candidates – the most common answer being 81, which seems to show an understanding of what was needed, combined with a misconception that only the digits 1–9 were to be used. In general 0 should be considered a digit of equal stature to any other. This misconception was nevertheless often combined with the use of '0' in rules for part (d).

A correct response to this part does depend on an appreciation of the independent effects of altering the two digits, and an understanding of how this manifests itself in the lists. A formal understanding of combinatorics is not expected for this paper, but some experience of exhaustive listing, as is common for '2 dimensional sample spaces' in probability questions, is certainly helpful.

- (c) Most candidates offered correct answers to this problem – appreciating that **2 4 +** would not yield the code beyond the first two digits, and then seeking a rule involving multiplication.

- (d) Most candidates offered two or three correct solutions to this problem, and were awarded 1 mark as a result. The variety of solutions showed that the incompleteness of these lists was due to a variety of problem-solving deficiencies. Some did not see the numerical possibilities of  $66 \times$ . Some did not consider subtraction. Some did not consider including a '0' in the rule. These all result from not attempting to see the problem from more than one perspective – an active attempt to step back from any solution (which may appear complete) and consider what might constitute an alternative approach is one of the most useful, and sophisticated, problem-solving strategies.
- (e) This part was answered fairly well by candidates: it was not obvious how to systematically tackle the problem, apart from choosing a rule, considering its code, and attempting to replicate it with another. As can be seen in the mark scheme, consideration of even-numbered cases was more fruitful in this regard. Of those who attempted this part with appropriate experimentation, the most common error was to not abide by the restriction that all four digits must be different.
- (f) As with part (d), most candidates offered two or three correct answers to this part. The unfamiliarity of the modular sequences here should have prompted a more systematic approach – considering how the second number could be reached by addition, subtraction and multiplication. Very few candidates appeared to do this.  $38 +$  and  $37 \times$  were found by most.  $34 -$  and  $32 -$  were rarer.
- (g) Few candidates attempted this part, and very few offered a convincing demonstration. A successful attempt needed to show awareness of the total number of codes available ( $10 \times 10 \times 10 \times 10$ ) and of the number which could be produced by the rules. This required a major abstraction from the details of the question so far experienced, and it is understandable that few candidates felt confident in doing this.

### Question 3

This question required candidates to convert the physical, spatial process described in rolling out the pastry into a rule applied to coordinates. The process was fairly simple (involving two steps, both of which involved a factor of 2), and examples of the effect on coordinates were given for both of the key cases. However, most candidates really struggled with applying the rule, and were reduced to intuitive guesswork for the central parts of the question. Very few made serious attempts at sections (d) and (e).

- (a) (i) The lack of successful solutions to this initial part seems to reveal how few were able to confirm how the process worked from the examples given. A broad perspective on the problem, rather than immersion in the details, was needed here, but this required confidence.

(ii) and (iii)

These 'standard applications' of the rule were successfully completed by less than a third of those who tackled the part. It is difficult to establish what misconceptions were at play here – the rule for the coordinates was awkward to express since it divided into two separate sections, and many candidates may have been defeated by the attempt to articulate the entire process. The simpler rule needed for (ii) – "if on the left half of the grid, then double the x-coordinate and halve the y-coordinate" – did depend upon a sense of what stretching does to a coordinate, and this may have paralysed some candidates. Formal study of graph transformations is not expected for this paper, and this process was considered to be a natural extension of students' knowledge of Cartesian coordinates.

- (b) (i) This part seemed to attract intuitive guesses – mostly the answer '6'. It does not depend on precise calculation using the coordinate rule – and a series of rough sketches confirms that the layers are doubling.
- (ii) This tended to be answered correctly by those who appreciated the doubling/halving logic required in part (i).
- (c) (i) This part required an appreciation of the precise coordinate algorithm required in part (a), since differently-sized patches of butter would be affected differently by the cutting and rolling. Very few candidates managed to model this correctly. A series of carefully-drawn diagrams were used by those who managed to do it.
- (ii) This part required the abstract perspective of part (a)(i) and was answered more effectively than the previous parts. A number of candidates saw that a pair of lumps of butter could be joined up into one piece when the two halves are placed on top of each other.

**(d) (i) and (ii)**

This part depended on correct application of the coordinate algorithm, and was tackled correctly by very few candidates. The use of 'awkward' fractions further hampered the attempts that were made. Mastery and confidence in wielding fractions is certainly expected in preparation for the paper.

**(e) (i), (ii) and (iii)**

This final section of the exploration required candidates to reflect on the cyclical process encountered in **(d)**, and hence was inaccessible to most candidates. The vast majority did not attempt these parts.

**Question 4**

The data which generated the problems for this question was fairly straightforward, and most candidates were able to explore and hypothesise confidently.

**(a) (i) and (ii)**

A number of candidates listed all the plays, and their frequencies, which led reliably to correct solutions to these parts. Such a demonstration was not needed, and most candidates managed to tally the performances with due precision (perhaps on the Question Paper), and draw the appropriate inferences.

**(b)** This part required a limited search of the dates on which the relevant plays were enacted. This was a test of candidates' care more than logic, and most succeeded in identifying the correct pair of dates.

**(c) (i)** This part required identification of the two sets of dates, and of their intersection. Candidates were much more prone to error in this than the previous parts. The most common error was the accidental inclusion of dates on which both sons were performing. This task would certainly be made substantially easier if candidates circled the appropriate dates on the Question Paper, allowing a measured comparison and listing. Some candidates appeared to simply misread the question, and offered all the dates on which the two were performing, rather than when they were being watched by Kate.

**(ii)** There was a lot of scope for hasty misapplication of the pricing regulations here, and this part was answered correctly by only about half the candidates. This part did build on the answer to part **(i)**, but one 'follow through' mark was available for those who gave incorrect answers to part **(i)**. Most incorrect answers erroneously treated one of the performances as a 'first performance'.

**(d)** This part involved a tactical approach to the pricing structure – in particular, it required candidates to select as many plays as possible for a 'first performance', and then fit as many of those left into the first fortnight. Few candidates managed this correctly. The pressures of time may have been the source of these errors, since the allocation of plays was not particularly tortuous – but it did require a complete attempt at the process, rather than an optimistic extrapolation from what was offered in the price list.

**(e) (i)** The explanation required here needed some reference to the consecutive performances of King Lear and Timon of Athens. There were many creative explanations offered, but most appeared to substantially over-complicate the issue.

**(ii)** This part required a sustained chain of logical reasoning, abiding by the small number of awkwardly interlinking strictures. Of those who offered sensible answers to this part, about half managed a correct list. As mentioned in the comments on **Question 1(e)**, there were partial marks for incorrect solutions, and hence it was definitely worth leaving one 'best attempt' for the consideration of the examiner.



# THINKING SKILLS

---

|   |
|---|
| <p><b>Paper 9694/33</b><br/><b>Problem Analysis</b><br/><b>and Solution</b></p> |
|---|

## Key Message

Candidates must attempt to check that their grasp of the logical structure of a problem fits all the information on offer (including examples given amidst the questions). They must also pay particular heed to the use of inequalities in questions. Candidates should aim to offer one 'personal best' solution to any question which involves searching a problem space for a solution – even if it clearly does not satisfy all the restrictions. Partial marks are awarded for this.

## 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 problem's structure, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements. Mathematical preparation for these questions involved familiarity with formulae, averages, percentages, basic probability and distance tables.

Many questions required only a brief, unsupported answer, but some needed an explanation or a diagram. These latter questions did not all require verbal explanations (a demonstration can simply involve a carefully selected series of calculations), but some did.

Although some candidates clearly suffered because they misallocated their time, most attempted all four questions. Candidates' answers to Question 2 tended to garner the most marks, and Question 4 delivered the least, in general.

## Comments on Specific Questions

### **Question 1**

This question required candidates to model two geometric processes ('folds' and 'faults'), represented as strings of digits representing the different layers of rock, and explore the interplay between the two. This appealed to candidates' visualisation skills, although the processes could be conceived as purely symbolic rules for the strings (repeating the string of digits, and reversing them). The possible outcomes of these processes were complicated by the additional impact of erosion and the taking of samples of insufficient depth. As with many such questions, candidates needed to establish that they had grasped the rules appropriately before experimenting with them, and for this purpose they were given two key examples, and some explanatory text. About a half of those who attempted this question appeared unable to master the two basic rules.

- (a) Success at this part depended on conformity to the requirement that no digits were repeated – almost all of those who did not manage to complete it successfully offered a solution in which a digit was repeated (e.g. 2341234). This question was answered fairly well, overall.
- (b) This part required a creative investigation of the simple cases, which established that most simple permutations could be unambiguously identified as one or other of the two processes. The disarmingly simple solution (121) was identified by a quarter of the candidates, with a few offering a sample which involved both a fold and a fault.
- (c) This part did not require any investigation – the instructions directed candidates to take 3 layers of rock (123), fold them (123–321), fault them (123321–123321), and then erode the top layer (23321123321). The repeated digits were permitted, but not needed for full marks here. This was

performed more successfully than part (b), and the most common error within complete attempts was to omit the erosion.

- (d) This part reversed the process required in part (c), requiring candidates to experiment with the small collection of samples caused by two distortions (there are only four basic possibilities). This is often how these questions develop, and it is hoped that candidates will have had some experience in such experimental reversals. The four options yield 123212321 (fold fold), 123212321 (fold fault), 12312321321 (fault fold) and 123123123123 (fault fault). Only the third of these offers the string of layers given in the question. About a quarter of the candidates managed to identify this successfully.
- (e) This part required candidates to reflect upon the possible arrangements that the processes produced, and create two that did not fit these patterns. The mark scheme was generous in this regard – any samples involving non-consecutive digits that could not have been produced by a fault without erosion (i.e. not involving a '1') were permitted. This was answered fairly well by those who offered answers.
- (f) The open nature of this question (“what can be concluded...?”) appeared to lull many candidates into a state of qualitative vagueness: such questions in a problem-solving paper should always be answered with the maximum precision possible. If numerical limits are possible, they should be given. An example of a statement that could be concluded, but that would have gained no marks is, “the second layer was thicker than the third layer”. There are a multitude of such statements which logically follow from the evidence, but which are insufficiently precise – another example might be “all the layers were at least 1 m in thickness” (which really only repeats some of the evidence rather than concluding something from it). Candidates must be encouraged to consider what is the most that can be concluded, and to express it in precise (numerical) terms.

## Question 2

This question required candidates to explore a number of wage-earning strategies, subject to a scheme of two-part deductions (e.g. deduct \$25 if that leaves \$100 or more weekly; deduct as much as will leave \$100, if not). The effect of these rules on individual pay was fairly easy to calculate (e.g. if she earns \$130, then \$25 is deducted; if she earns \$120, then \$20 is deducted), but the optimal strategy that she should employ was not. It was vital that candidates considered a few basic examples first, and checked that they were interpreting the rules correctly before embarking on the questions – in this case there were no examples offered, so the only check that could be made was to highlight the key regulatory statements, and check that any calculations abided by them.

- (a) (i) There were two tempting answers to this question – “equally between the weeks”, and “all in one week”. Each of these was fairly easy to calculate, but only a third of the candidates managed it successfully. It appears that many were tempted to make an ‘educated guess’ without checking the details.
- (ii) This part required candidates to evaluate the numerical implications of their strategy in part (a)(i). Follow through marks were offered, and the number who gained a mark was double the number for part (i). This does seem to demonstrate that many candidates were able to correctly evaluate the implications of the two obvious strategies, but did not deem it necessary to consider both for part (i). Problem-solving humility (or self-doubt) seems to be the characteristic in need of development in this case (a diagnosis which is supported by numerous other problem-solving solutions).
- (b) (i) This part required no investigation; candidates were directed to calculate Hannah’s earnings in the two cases mentioned, and carefully apply the new rule for deductions. A substantial number of candidates appeared to misread the question (omitting the comparative element), and offer \$485 as a final answer.
- (ii) Many more candidates offered a correct answer to part (ii) than to part (i). Without overtime Hannah earns \$480, and the protected earning rate delivers \$80 to Richard.

- (c) (i) This part required some investigation of options, with no explicit guidance as to where to begin. Some candidates managed to reach the correct conclusion deductively, but they were a small minority. Most candidates evaluated the amount she gained for a particular amount of overtime (e.g. 4 hours overtime yields  $\$480 + \$20 = \$500$ , all  $\$90$  of which goes to Richard), and then swiftly homed in on the correct number of hours. A number of candidates offered 10 hours as a solution, which gained no marks, even with appropriate supporting working: a warning to pay special heed to the strictness of inequalities in such questions.
- (ii) The most popular answer to this part, by far, was  $\$70$ . This gained no marks, being only half-way to a correct solution. Clearly this exemplified how easy it can be to misread a question under time pressure.
- (d) This part explicitly directed candidates to a particular solution, but required confidence in using percentages. It was only correctly tackled by a quarter of the candidates. The working that candidates showed in attempting this question was disorganised and incomplete in general, and very few candidates were awarded partial marks for incorrect solutions.
- (e) As with (d), this part directed candidates to the solution explicitly (without requiring investigation), and rewarded those who laid out their answers clearly. This part was answered correctly by more than half of those who attempted it.

### Question 3

This question required candidates to investigate the game-theoretic movements of citizens and a tax collector, on a hexagonal grid. Analysis of the problem did not involve any serious spatial visualisation, but it did depend upon careful interpretation of the rules, and some means of tracking the behaviour of the two competing parties. In order to offer a firm basis for investigation of this artificial scenario, candidates were given a couple of opportunities to confirm their application of the rules. These were clearly vital to success in the problem. There was a sharp distinction between those who clearly misapplied the basic rules of movement (whose modal score was zero), and those who managed to apply them correctly (who all scored substantially more). One common misconception about the rules was to allow the tax collector to travel through the streets (rather than around the city wall, as stated).

- (a) (i) This question aimed to elicit the fact that there were four blocks from the city centre to the edge, and only twelve blocks around the wall from the furthest point (on the opposite side of the city). Any evidence that candidates had calculated these distances merited a mark. Less than half of the candidates managed this.
- (b) (i) This question should have warned those candidates that were allowing the tax collector to stalk the city streets that they had made an error. The question clearly implies that it is possible to escape the tax collector. The change of direction has most effect after moving one block from the centre. Tracing the movements of the citizen and the tax collector should have yielded the answer '3'. For example, if the citizen moves one block towards U (with the tax collector starting at I), and then changes direction towards X, she has three blocks to travel, while the tax collector has twelve. This question was successfully tackled by a small number of candidates.
- (ii) Probability questions are generally tackled by considering the number of possible outcomes, and the number of successful outcomes, and expressing one as a fraction of the other. Very few candidates managed to successfully apply such an approach here.
- (c) (i) This part required candidates to consider all the points on the city wall that were more than nine blocks from M (since Tabitha was three blocks from M, and the tax collector could travel three times her speed). A substantial number of candidates managed to list these correctly. A minority applied the inequality incorrectly and included the points exactly nine blocks from M (prompting a similar warning to that given in Question 2(c)(i)).

- (ii) This development on part (i) required candidates to list the points from which M was accessible, and those from which P was not accessible, and consider the intersection of these sets. The overwhelming majority of those who answered part (i) correctly also answered this part correctly.
- (d) This question invited candidates to consider all the points within the city wall – the number 37 allowing candidates to confirm that they had identified the correct set – and group them in a way that made the problem manageable. A few specific cases should have made it apparent that those starting places which are one block from the city wall constitute one ‘case’ – and only five of them are ‘inescapable’. The group which are two blocks from the wall yield a similar collection (only five are ‘inescapable’). The group three blocks from the wall have already been considered, and only three of these are ‘inescapable’. The centre has already been classified as ‘inescapable’ (in part (a)). The working shown for this question was mostly disorganised and difficult to evaluate by the Examiners – so the vast majority scored 3 marks or 0.
- (e) This part involved an investigation of how circuitous routes could befuddle the tax inspector. An example of this was given in Morgana’s first two moves. 40% of the candidates tried this question, and the majority appeared to make a cursory engagement with tax collector’s movements, and conclude that a repetition of the same ‘zig-zag’ will enable Morgana to escape. Unfortunately, the two parties’ relative situation changes, and such as path (towards Q, then J, then P, then K, then O, then L...) will not lead to escape. A number of paths did manage to utilise the tax collector’s relative speed, and lure him to travel in perverse directions – and these were awarded partial credit.

#### Question 4

This question required candidates to combine awareness of a simple network (linking the five islands), a pricing structure (fairly simple, but divided into two parts), and an iteratively applied two-way table tracking the number of parcels. The latter aspect of the problem deserved careful study, and was illustrated with a number of examples. As with Question 3 (and many questions in Paper 3) it was vital that candidates established this process correctly before investigating. This question also tested candidates precision and accuracy – the summed totals being fairly large, and inviting casual arithmetic errors.

- (a) (i) This part required a careful application of the pricing instructions: \$7 per parcel for the first 10, and then \$4 for the rest, depending on their destination. Few candidates showed working, and hence it was difficult to understand what caused the common errors. Ignoring the words “to the same destination” yielded the result \$206 ( $7 \times 10 + 34 \times 4$ ), which was fairly common, and was awarded 1 mark. There were many erroneous solutions with no working, which scored 0.
- (ii) This part required a reflection on what possible numbers of parcels might make up the 44; and realisation that the maximum would be charged if each island received at least 10. As with part (i), there was little working offered here, and many incorrect answers.
- (b) The example given above this part invited candidates to check their understanding of the processes required. The combination of selecting data, and finding appropriate sums and differences defeated most candidates (84 parcels on arrival at Payli; 29 ( $12 + 17$ ) to be dropped off; 44 ( $17 + 8 + 5 + 14$ ) to be picked up; resulting in 99 on board). Once again the clarity of working left a lot to be desired, and few candidates were awarded partial credit.
- (c) Unsurprisingly, this was tackled less successfully than the previous part – it depended on careful evaluation of the process modelled in (b), for the remaining islands. Some candidates managed to offer a correct ordering of the islands, which garnered a mark, regardless of whether there were calculations to support the decision. Very few managed to navigate their way through the appropriate pick-ups and drop-offs without error.
- (d) This part did not depend on the iterative sums and differences that constituted the parcels table. This part should have attracted the time and efforts of those who were struggling with the parcels table – but more than half of the candidates omitted this part altogether (which is likely to reflect time pressures on the whole paper). Any explicitly articulated path which took in all the islands was credited here. Some tabulation of the distances clearly helped.

- (e) This final part was logically separate from the preceding parts, and invited some 'blind investigation' before reflecting on the efficient path to a solution. This can be an unappealing prospect under time pressures – if candidates' inspiration has been exhausted, a few clearly articulated precise calculations of the prices (under the two different systems) would be a recommended approach. A well-laid out 'trial and improvement' example is the most efficient approach to partial credit – and is likely to enable deeper understanding of the problem.

# THINKING SKILLS

---

Paper 9694/41  
Applied Reasoning

## Key Messages

- The first question in this paper tested the candidates' ability to evaluate claims based on statistical data.
- In **Question 2** candidates had the opportunity to display their ability to analyse the structure of a detailed argument.
- In **Question 3** candidates only gained marks if they made comments about the strength of the reasoning within the document.
- **Question 4** allowed candidates to use a full range of critical reasoning skills in order to construct a reasoned argument using information from the documents.

## General Comments

There was evidence that a very few candidates were running out of time on this paper. A small, but still significant, proportion of candidates are writing answers whose length does not reflect the mark allocation – responses to **Question 1** should be considerably shorter than those to **Question 4**.

The standard of candidates varied, although high scoring scripts were rare. There was evidence that many candidates had been taught some of the language of reasoning and some were familiar with the format of the paper. Indeed, some candidates appeared particularly well-prepared in this regard and answered **Question 4** first, attempting to ensure that the most creditworthy question was not rushed. However, the problem with this approach is that consideration of **Questions 2** and **3** often facilitates a deeper understanding of Document 1, which can allow candidates easier access to marks for use of documents in **Question 4**.

## Comments on Specific Questions

### **Question 1**

The majority of candidates attempted to criticise the passage, although many strayed beyond the question asked and discussed other aspects of the passage such as the claim about coronary heart disease in the first paragraph. Very few candidates scored highly but most did gain marks for mentioning the lack of comparison with competitors, the health effects of other ingredients or the unspecified type of fat. The issue of the size of the snack in comparison to the mass of fat was mentioned by a sizeable minority of candidates who were awarded one mark; a very few candidates discussed this point with clarity, using precise terms such as 'proportion', 'percentage' and 'total' and were awarded two marks.

### **Question 2**

Most candidates attempted an analysis, which is a clear indication that many Centres had been preparing candidates well for the examination. On the other hand, a minority of candidates still provided a summary or gist. Some candidates seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. The document provided was challenging to analyse thoroughly. A little under half of candidates correctly identified the main conclusion, a minority gained more than half marks and it was rare to award more than four. The best and most time-efficient answers copied directly (as far as possible) from the text and presented each element as a bullet point labelled MC, IC, CA, etc.

### Question 3

The argument itself was challenging to evaluate fully but marks were available for those who had been trained in critical evaluation. The majority of candidates, however, scored very few marks. Many merely listed counter assertions to points given in the document. Others cited a lack of supporting evidence, statistics or source identification. It is worth stating that answers such as “It is not true” or “No source is given” or “There are no statistics to back this up” never get any credit in this question. A response along the lines of “This is not backed up” will never gain any credit unless it refers to an outrageous statement upon which a substantial part of the reasoning rests. The most common marks were awarded for identifying one or more of the contradictions in the passage or the use of the author’s own definition. Discussion of the slippery slopes was weak but occasionally gained credit. Other evaluative points were awarded very rarely.

### Question 4

The majority of candidates appeared to find the subject matter accessible and many wrote confidently and at some length. However, the ambiguity in the question often meant that arguments lacked focus, or focused in a direction other than that intended by the question. Weaker answers often argued that prejudice was bad, but avoided the issue of whether or not it should be made a crime. A small number of candidates produced persuasive, well-focused and structured responses which scored highly in the first two skill areas. While the vast majority of candidates used the documents to support their argument, very few made any critical comments about the documents they were using, limiting their mark in the ‘use of documents’ skill area. It was, in many cases, difficult to award marks for treatment of counter-positions as it was often hard to identify what the counter-position would be. As ever, there were many candidates who merely listed the points and the documents supporting each side and did not make a reasoned case. Such answers were unlikely to gain marks for structure.

# THINKING SKILLS

---

Paper 9694/42  
Applied Reasoning

## Key Messages

- The first question in this paper tested the candidates' ability to evaluate claims based on statistical data.
- In **Question 2** candidates had the opportunity to display their ability to analyse the structure of a detailed argument.
- In **Question 3** candidates only gained marks if they made comments about the strength of the reasoning within the document.
- **Question 4** allowed candidates to use a full range of critical reasoning skills in order to construct a reasoned argument using information from the documents.

## General Comments

There was evidence that a very few candidates were running out of time on this paper. A small, but still significant, proportion of candidates are writing answers whose length does not reflect the mark allocation – responses to **Question 1** should be considerably shorter than those to **Question 4**.

The standard of candidates varied, although high scoring scripts were rare. There was evidence that many candidates had been taught some of the language of reasoning and some were familiar with the format of the paper. Indeed, some candidates appeared particularly well-prepared in this regard and answered **Question 4** first, attempting to ensure that the most creditworthy question was not rushed. However, the problem with this approach is that consideration of **Questions 2** and **3** often facilitates a deeper understanding of Document 1, which can allow candidates easier access to marks for use of documents in **Question 4**.

## Comments on Specific Questions

### **Question 1**

The majority of candidates attempted to criticise the passage, although many strayed beyond the question asked and discussed other aspects of the passage such as the claim about coronary heart disease in the first paragraph. Very few candidates scored highly but most did gain marks for mentioning the lack of comparison with competitors, the health effects of other ingredients or the unspecified type of fat. The issue of the size of the snack in comparison to the mass of fat was mentioned by a sizeable minority of candidates who were awarded one mark; a very few candidates discussed this point with clarity, using precise terms such as 'proportion', 'percentage' and 'total' and were awarded two marks.

### **Question 2**

Most candidates attempted an analysis, which is a clear indication that many Centres had been preparing candidates well for the examination. On the other hand, a minority of candidates still provided a summary or gist. Some candidates seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. The document provided was challenging to analyse thoroughly. A little under half of candidates correctly identified the main conclusion, a minority gained more than half marks and it was rare to award more than four. The best and most time-efficient answers copied directly (as far as possible) from the text and presented each element as a bullet point labelled MC, IC, CA, etc.



### Question 3

The argument itself was challenging to evaluate fully but marks were available for those who had been trained in critical evaluation. The majority of candidates, however, scored very few marks. Many merely listed counter assertions to points given in the document. Others cited a lack of supporting evidence, statistics or source identification. It is worth stating that answers such as “It is not true” or “No source is given” or “There are no statistics to back this up” never get any credit in this question. A response along the lines of “This is not backed up” will never gain any credit unless it refers to an outrageous statement upon which a substantial part of the reasoning rests. The most common marks were awarded for identifying one or more of the contradictions in the passage or the use of the author’s own definition. Discussion of the slippery slopes was weak but occasionally gained credit. Other evaluative points were awarded very rarely.

### Question 4

The majority of candidates appeared to find the subject matter accessible and many wrote confidently and at some length. However, the ambiguity in the question often meant that arguments lacked focus, or focused in a direction other than that intended by the question. Weaker answers often argued that prejudice was bad, but avoided the issue of whether or not it should be made a crime. A small number of candidates produced persuasive, well-focused and structured responses which scored highly in the first two skill areas. While the vast majority of candidates used the documents to support their argument, very few made any critical comments about the documents they were using, limiting their mark in the ‘use of documents’ skill area. It was, in many cases, difficult to award marks for treatment of counter-positions as it was often hard to identify what the counter-position would be. As ever, there were many candidates who merely listed the points and the documents supporting each side and did not make a reasoned case. Such answers were unlikely to gain marks for structure.

# THINKING SKILLS

---

**Paper 9694/43**  
**Applied Reasoning**

## Key Messages

- The first question in this paper tested the candidates' ability to evaluate claims based on statistical data.
- In **Question 2** candidates had the opportunity to display their ability to analyse the structure of a detailed argument.
- In **Question 3** candidates only gained marks if they made comments about the strength of the reasoning within the document.
- **Question 4** allowed candidates to use a full range of critical reasoning skills in order to construct a reasoned argument using information from the documents.

## General Comments

There was evidence that a very few candidates were running out of time on this paper. In recent sessions the number of candidates writing answers whose length does not reflect the mark allocation has been reducing as Centres have become more familiar with the requirements of the paper. It was surprising, therefore, to see a large number of candidates write answers of a similar length for each question.

The standard of candidates was lower than in recent sessions and, for the majority of candidates, there was scant evidence of familiarity with the language of reasoning and/or the format of the paper.

## Comments on Specific Questions

### **Question 1**

The majority of candidates at least attempted to criticise the passage, although many strayed beyond the statistics themselves and discussed other aspects of the passage, including the literary style. Very few candidates scored highly but some did gain marks for identifying the small number of deaths in comparison to competitors, the apparent paucity of examples or the ambiguous length of the races. Some even successfully questioned the link between mass-participation and injuriousness and the meaninglessness of 'potentially dangerous'.

### **Question 2**

Only a minority of candidates seemed aware of what was required for this task. Some discussed the literary style, others summarised the argument or provided paraphrases of the key structural elements. Successful candidates identified parts of the text, copied them out and labelled them as MC, IC, or CA.

### **Question 3**

The argument itself was challenging to evaluate fully but marks were available for those who had been trained in critical evaluation. The majority of candidates, however, scored very few marks. Many merely listed counter assertions to points given in the document. Other cited a lack of supporting evidence, statistics or source identification. It is worth stating that answers such as "It is not true" or "No source is given" never get any credit in this question. A response along the lines of "This is not backed up" will never gain any credit unless it refers to an outrageous statement upon which a substantial part of the reasoning rests. The most common mark awarded to low-scoring candidates was for criticising the use of a fictional example.

#### Question 4

The majority of candidates appeared to find the subject matter accessible but not to the extent that they were able to introduce much of their own thinking beyond what was provided in the documents. A very small number of candidates produced excellent responses which scored highly in all four skill areas. However, there were many candidates who merely listed the points and the documents supporting each side and did not make a reasoned case. Such answers were unlikely to gain marks for structure. Likewise, it was in many cases almost impossible to award marks for treatment of counter-positions as it was often very difficult to identify what the counter-position would be. While the vast majority of candidates used the documents to support their argument, many made no critical comments about the documents they were using, limiting their mark in the 'use of documents' skill area. Centres are again reminded that an argument needs a conclusion – and a precise and well-supported conclusion is likely to achieve more marks.