

THINKING SKILLS

Paper 9694/21
Critical Thinking

Key messages

Candidates and their teachers should study previous question papers, mark schemes and examiner reports, so that they understand what kinds of answer are expected in response to particular forms of question.

Candidates should read the whole of **Question 1** or **2** before attempting to answer part of it. Even if a part-question refers specifically to one source, it is likely to presuppose familiarity with all the sources and some reflection on the issue as a whole.

General comments

There was a fairly wide range of achievement, but the proportion of candidates who appear not to know how to approach the exam has continued to reduce.

Comments on specific questions

Question 1

Some candidates appeared to be confused about this story, claiming for example that Mr Guero and/or Mr Anson had been accused of ill-treating prisoners in Eastshire, that Mr Curtis was involved in money-laundering or that Mr C's recommendation, reported in Source D, that no action be taken referred to the investigation into Mr G.

- (a) This question was not well done overall. Many candidates did not make the connection between the special audit and the subsequent allegation and suspension of Mr Anson. Some of them showed in their answer to **Question 1(d)** that they did think the allegation against Mr Anson was created in order to remove him from the inquiry into Eastshire Police, but they did not give this as an answer to **Question 1(a)**, which suggests that they may have answered **Question 1(a)** before reading the later sources and engaging with the story. Some candidates confused or conflated the two allegations against Mr A.
- (b) Many candidates were awarded 1 mark out of 4 for pointing out that the lawyers had "a vested interest to lie" in order to exonerate their client or to win their fee, but relatively few developed this answer more precisely or produced a second answer. Entirely generic answers were not credited. Popular answers which were not credited were that Source C was unreliable because it contradicted Source B and that the surveillance photographs showing Mr A and Mr G together proved that they were more than acquaintances.
- (c) Several valid answers to this question were available, and many candidates achieved 3 or 4 marks out of 4. Although most of the answers available and given reduced the reliability of Mr C's report, some candidates correctly pointed out that its reliability was enhanced by Mr C's ability to know what had been going on and where to look for evidence. Some answers referred to other aspects of Mr Curtis, such as his hopes for further promotion, but these were not credited because they were not based on his previous service in Eastshire.
- (d) The better answers judged that the allegations against Mr Guero were not based on genuine suspicion, but were trumped up in order to remove Mr A from the inquiry into alleged malpractice by Eastshire Police. It was harder to use the sources to argue that the suspicion was genuine, and the candidates who took that line tended to perform less well. Some who adopted this approach

mistakenly claimed that Mr G came under suspicion because he knew Mr A, who himself was being investigated for misconduct and conflict of interest. A significant number of candidates scored 0 or 1, because they discussed whether or not Mr Guero, Mr Anson or Mr Curtis was suspected of mistreating prisoners in Eastshire or whether Mr G was *guilty* of fraud and money-laundering rather than *suspected* of those offences.

Some candidates limited themselves to identifying relevant material from the sources and using it to support their conclusion, but a fair number accessed the higher marks by using appropriate evaluation of sources and inferential reasoning.

Question 2

Some basic information about saunas was provided in Source A for those who were unfamiliar with them, but candidates were not disadvantaged if they did not know such facts as that in Scandinavian countries (where saunas are part of the culture) it is normal to immerse oneself in cold water or snow after a sauna.

- (a) Most candidates achieved 2 marks out of 2 by recognising that, because Source A was identified as an advertising feature, its author(s) had a vested interest to promote the sale or use of saunas by emphasising their benefits and concealing any disadvantages. Candidates who were awarded 0 marks usually focused on the lack of information given about the origin of the article, rather than on its stated function.
- (b) Most candidates did not seem to understand what this question expected, although questions of this type have been asked on previous occasions. The expression “additional evidence” refers to possible information which has *not* been supplied in any of the sources. The main reason why candidates scored 0 marks was because they either quoted or paraphrased information supplied in Source C or D. In addition, criticisms of the evidence in Source B did not constitute an answer to the question unless they went on to identify further evidence which would reveal those shortcomings. Even answers which did identify possible additional evidence (such as a similar experiment involving female subjects or people from a different part of the world) were not credited unless they stated that the results would be inconsistent with the findings and claim in Source B, because the question specifically asked for additional evidence which would *challenge* the claim made by Source B.
- (c) Several correct answers were available, and most candidates identified at least one of them, but many achieved only 1 mark out of 2 for one or both of their answers. Broadly speaking, to achieve 2 marks it was necessary to identify a significant feature of Source D and draw an inference from it. A few candidates approached this question as if it was about the reliability of the source rather than its content. As on some previous occasions, some candidates showed unrealistic attitudes towards people over the age of 60, suggesting, for example, that a 64-year-old man who died following an accident in a sauna might have died of old age or should not have used a sauna without being accompanied by a nurse or at least using a walking stick.
- (d) As usual, some candidates were awarded 3 marks out of 6 for summarising the sources on both sides of the debate and concluding either in favour of the claim or against it. Many candidates, however, achieved higher marks, by including evaluation of sources and inferential reasoning. Quite a lot of candidates were awarded 2 marks for “nuanced” conclusions, such as that people who enjoy using saunas for relaxation should feel free to do so, but people with certain medical conditions should not use them. A number of candidates inferred incorrectly that Dr Linz’s assertion that there was no research support for health claims made by sauna manufacturers constituted disproof of those claims.

Question 3

In analysing and evaluating this argument, some candidates appeared to have been distracted by their own strongly-held opinions about gender inequality.

- (a) The most popular answer was the last sentence of the passage, but it should have been clear that this follows only from the reasoning in the final paragraph and not from any of the remainder of the passage: so it could not be the main conclusion of the passage as a whole. Some candidates offered all or part of the final sentence of the first paragraph as their answer, while a similar number correctly identified the first sentence as the main conclusion. Very few candidates were awarded 1 mark, usually because they paraphrased the correct answer instead of quoting it *verbatim*. The few

candidates who misunderstood the nature of the task, offering a precis of the argument instead of identifying its main conclusion, were awarded 0 marks.

- (b) Many candidates identified three correct answers to this question, while most of the others gave two correct answers. Only a few seemed not to understand the nature of this task.
- (c) Many candidates spotted the blatant *ad hominem* argument in the first paragraph, but some of those who explained the flaw rather than naming it scored only 1 mark, because they claimed that the author was attacking old people rather than people who disagreed with him.

Many candidates spotted that there was something wrong with the hypothetical example in paragraph 3, but most explained the flaw in terms of being an unfair comparison rather than the ineffectiveness of a single example as evidence against a generalisation. Many candidates claimed that the author was unfairly arguing that women were stronger than men, which is not correct: he was arguing that a single (albeit extreme) example disproves the widely held belief that men are stronger than women. If that belief had meant *all* men are stronger than *all* women, then this one example would have disproved it, but the natural interpretation is that overall, men *as a category* (or natural kind) are *typically* stronger than women as a category, and the existence of counter-examples does not disprove that statement. Some candidates wrongly identified the flaw as *ad hominem* (against the male in the comparison).

The other flaw which was recognised by a significant number of candidates was the contradiction or *non sequitur* in paragraph 5. Some candidates correctly identified significant unstated assumptions in paragraph 1, 2 or 4, but many continued to interpret the expression “unstated assumption” as if it meant “unsupported statement”.

Several candidates criticised the reasoning in paragraph 4 for being circular, but that claim is actually stated by the author, and it was therefore not credited. A few candidates misinterpreted the expression “vicious circle” as referring to a malign conspiracy against women.

Fewer candidates than on previous occasions misunderstood the nature of the task, although a few still explained why they disagreed with all or some of the opinions and claims in the passage instead of evaluating the reasoning; similarly, fewer criticised the argument for being one-sided, for expressing the opinion of the implied author (who many candidates assumed was a woman), or for lacking statistical support.

- (d) Many candidates produced coherent strands of reasoning and many made good use of intermediate conclusions or other argument elements, particularly examples. At the other end of the range, some candidates achieved only 1 mark, because their answer consisted entirely of explaining why sports stars are paid high salaries, without putting forward any reasons as to whether they deserve them or not. A few candidates discussed the gender pay gap in sport instead of the subject they had been given, and were awarded 0 marks.

THINKING SKILLS

<p>Paper 9694/22 Critical Thinking</p>
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General comments

Candidates seemed to respond well to the issues raised by the questions and were able to tackle them effectively. The trend in recent papers of most candidates understanding the nature of the examination continued. Such candidates realised that expressing opinions about the issues raised or showing further knowledge was not the key focus. However, there is still a minority of candidates who seem unprepared and struggle to reach a total mark in double figures.

Key messages

- Candidates need to develop a better understanding of what is required when a question asks for 'additional information'. See more on this below in discussion of **Question 2a**.
- A significant number of candidates have crossings out of answers which are then replaced with another, often after several lines. This wastes time and candidates are advised to start writing their answer only when they have planned it carefully.

Comments on specific questions

Question 1

- (a) Most candidates got at least 1 mark for this question usually by making the simple point that it did give Benji a motive for starting the fire. Many candidates then correctly modified this by pointing out that several people had been made redundant, thus reducing the usefulness of the information in the source.
- (b) Candidates did this question less well, often exaggerating the significance of the Twitter feed. Clearly one cannot infer responsibility for an action from someone's approval of it.
- (c) This question was done well with the vast majority of candidates making the simple point of his grandmother's bias towards Benji, though not always inferring from this that it made her account of his reason for buying the petrol (to mow her lawn) unreliable. A significant number of candidates went on to point out the reliability of her account of Benji's clumsiness supporting this either with her 'reversed' vested interest or the corroboration by the information in Source A.
- (d) Weaker answers tended to conclude that it was likely that Benji set fire to the supermarket, with stronger answers pointing to a number of features which compromised this conclusion. Good inferences were made from the information in Source B that an arsonist using sophisticated methods had been at work and that did not seem to fit with what we had been told about Benji and his clumsiness. No candidates questioned the reasonable assumption that it looked as if this fire was the work of this arsonist. A significant number of candidates also correctly inferred that he could not have bought the petrol with the purpose of setting fire to the supermarket as he bought it the day before he was made redundant.

Question 2

- (a) Very few candidates did well on this question, which is referenced in the first 'key message' above. Many candidates either used information in the source (this is not 'additional information') or offered explanations of why it would be expensive such as 'scientists would charge a high fee'. This is not 'additional information'. Candidates needed to see that the only evidence offered in Source A

for the process being expensive is that it costs \$300 dollars per pigment. To put this figure into context we need to know how many pigments there are in a painting, how many need to be tested and the cost of this testing relative to the price of the painting.

- (b) This question was done well by a significant number of candidates and was a good discriminator. Candidates getting only 1 or 2 marks were unable to move convincingly beyond the point that the method relied on forgery being done at a later date with pigments unavailable to the artist at the time.
- (c) The vast majority of candidates wrongly described this as an argument. This was a more difficult passage to analyse than usual, as there is an argument *within* the passage, but the passage overall is a series of statements from which no conclusion is drawn. As a further complication, the passage does use explanations. Candidates often revealed mistaken ideas of what constituted an argument with the ideas that an argument had to contain evidence or had to give both sides of an issue being common.
- (d) There were a variety of ways that one could approach this question and candidates' answers reflected this. The simplest starting point was Source D, which made the point that most people look at famous paintings in galleries that are not for sale and are unlikely to be forged. Strong responses were able to use Source E to cast some doubt on this, because it suggests that even some famous art might not be wholly the work of the artist. However, if nobody realised this it did not affect the appreciation of the image. Candidates found it more difficult to relate the other sources to the question but strong responses were able to make the distinction between forgery as a problem for art as an investment and the aesthetic appreciation of the image being viewed. Arguably the phrase 'enjoyment and appreciation of art' only applies to the latter.

Question 3

Good performance on this question often compensated for the difficulties candidates experienced in **Question 2**.

- (a) There were many 2 mark answers here. Popular wrong answers were the first and last ICs.
- (b) Many candidates scored 3 marks here, even some who had not correctly identified the main conclusion part (a).
- (c) Candidates found this question relatively easy compared to other questions in the past and many gained at least 2 marks by seeing hasty generalisations in paragraphs 3 and/or 4. Candidates did less well in handling the content of paragraphs 2 and 5, often incorrectly identifying a slippery slope in the latter. What is going on in paragraph 5 is a version of the 'all cats have four legs; all dogs have four legs; therefore all cats are dogs' problem. Candidates who got 0 marks were either engaged in the wrong exercise (e.g. complaining about the lack of evidence) or deploying a variety of technical expressions for flaws but not in a correct manner.
- (d) The majority of candidates argued for the proposition. Apart from having a somewhat optimistic view of the chances of sport super-stardom, such arguments tended to veer off into why sport was good for people rather than why they should take it up professionally. Few, if any, candidates explored a possible more modest interpretation of 'professional sport' as meaning teaching or training. Some candidates tended to dwell on the question of the freedom of choice for the child but this was not the key focus here. Candidates who chose to argue against the proposition were often on firmer ground with clearer, more focused and coherent arguments.

THINKING SKILLS

Paper 9694/23
Critical Thinking

General comments

A significant number of candidates found this paper difficult, especially **Question 3**. This was partly to do with the subject matter but candidates with a good grasp of critical thinking did manage to produce answers that warranted high marks.

Key messages

- A number of candidates offer answers which they then cross out and replace with another. This is rather time wasting – candidates would be well-advised to prepare their answer in rough before committing it to their scripts.
- Candidates often challenge statements when a question is asking them to evaluate critically the impact of a statement if it is true. Whilst this has often been a problem with **Question 3c** there were other questions in this paper where candidates did not score marks because of this misapprehension.

Comments on specific questions

Question 1

Some candidates misunderstood Albert's situation and thought he was in some sort of enclosure.

- (a) Many candidates saw that this made it more likely that the killings were the act of big game hunters or poachers but often failed to develop their answers, either by not offering a judgement or by not going on to explain that the villagers would be unlikely to possess sophisticated firearms.
- (b) Whilst most candidates explored either why it lacked significance (consistency with a lion attack does not rule out other predators) or why it lacked reliability (evidence came from Nambutian government who might want to shift blame on to villagers) very few did both. Some candidates discussed why it was useful.
- (c) A large number of candidates assumed that this was definitive evidence of collusion between the government and big game hunters. This could not be credited as the question was intended to elicit the answer that, whilst suspicious, the content of the email is consistent with legitimate hunting. More candidates, including some who wrongly assumed the email definitely showed collusion, were able to gain marks by questioning whether 'the beast' was a reference to Albert.
- (d) Virtually all candidates concluded that it was likely that Albert was killed by a big game hunter and certainly the evidence points to this conclusion. Few candidates considered why it was big game hunters rather than poachers. Strong responses were able to make interesting inferences from the information in Source E that conservation patrols were diverted to another part of the region. Less good responses tended to rely rather heavily on the idea that Source D proved that there was collusion between the Nambutian government and the big game hunters.

Question 2

- (a) Many candidates got at least 1 mark in this question, usually making the point that the vaccine only protected against two types of cat flu.

- (b) Only a minority of candidates succeeded in answering this question correctly and it was the key example of the problem raised in the second key message above. Many candidates suggested that cats could still catch the flu, but this either ignored the fact that a low risk is still acknowledged in the statement or challenged the point that the risk was extremely low. The question required candidates to see the problems in using the information, assuming it was true, not to question whether it was true.
- (c) This question was done quite well, with a significant number of candidates seeing the data for the USA as being the key to answering the first part.
- (d) A significant number of candidates were able to produce reasonable answers here, with many suggesting the claim was too broad, especially if one intended to put a cat in a boarding home. Opportunities for evaluating the sources were taken, especially Source A, though there was a tendency to focus on expertise and neglect the vested interest.

Question 3

- (a) Only a minority of candidates successfully identified the main conclusion. There was a wider variety of wrong answers than usual, although 'They are a superior type of engine' proved popular.
- (b) Whilst in past papers candidates who wrongly identified the main conclusion still succeeded in identifying intermediate conclusions this was not the case here. Many candidates scored zero for parts (a) and (b) and this was a major contributor to low marks for the paper overall in many cases.
- (c) Given the confusion over the structure of the argument, not surprisingly the poor performance on parts (a) and (b) often continued into this part of the question. Surprisingly few identified the *tu quoque* in paragraph 2. Able candidates saw the inconsistency in this paragraph and the restriction of the options in paragraph 4. There are fewer cases of candidates engaging in the wrong exercise of challenging the propositions in this question but many answers deployed technical expressions for flaws incorrectly.
- (d) Candidates were on safer ground in this part of the question and were fairly evenly divided between for and against. Those arguing for the proposition needed to deploy a reasonably restricted definition of 'problem-free motoring', usually confining it to better road safety and easing congestion. A minority of candidates seemed to see the driverless car as a new form of public transport, with a vehicle taking several passengers, making it rather like a bus.

THINKING SKILLS

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

As with previous sessions, candidates who performed well often left clearly-signposted answers designed for public comprehension – such an approach allows for errors to be noticed (and eliminated), complex calculations to be completed, and partial marks to be gained (if the question is unfinished).

When offering explanations, candidates must always consider what is the maximum amount of detail that can be brought to bear on the problem – in this paper an explanation or justification almost always requires explicit quotation of data, or precise calculation.

Candidates are encouraged to interact with the exam paper, highlighting/underlining all relevant information – it is often the case that the omission of one key fact leads to a series of misjudgements and fruitless analysis in candidates' working. Writing on the exam paper is encouraged as a means of extracting all relevant information, but candidates must remember that the Question Papers are not submitted to examiners, so all strategic steps and calculations must be recorded in the Answer Booklet.

Candidates must be tactical about how they use their time: it is not strategically advisable to leave calculations which are intricate (but not conceptually tough) to the final few minutes of the exam.

General comments

Candidates found **Question 4** the hardest, and **Question 1** the easiest. Eight marks depended on offering precise and carefully expressed explanations and these were accomplished quite well by most candidates. The key to these questions is to consider what precise piece of data determines the correct answer. As a rule, candidates should offer numerical justification if it possible to do so. A few candidates crossed out their working, or made it illegible, and this is not recommended as a rule: working that supports an answer can gain the candidate partial marks if their final answer is wrong; the best mantra is 'you should only cross something out if you have something better to replace it with.'

Comments on specific questions

Question 1

This question required candidates to consider the optimal ways that four question types can be combined, to fit a varying collection of requirements. The order that the requirements applied and interacted was carefully delineated in the question; common misconceptions with regard to these are dealt with below. Candidates were generally allowed to refer to the different questions by any clear-cut identifier (e.g. Short/S/2).

- (a) This was not completed with adequate precision by most candidates. The most efficient answers identified that the minimum total score for a paper with 4 Long questions $((4 \times 10) + (6 \times 2))$ was greater than 50. The two most common misconceptions were those who did not read the word 'more' in the question, and attempted to show that a paper involving 3 Long questions was impossible; and those who thought that the restriction that followed (about there being one of each type) applied here.
- (b) Most candidates managed this fairly well. Candidates who forgot one of the four restrictions were awarded 1 mark. The most common error was to forget about the 1 Long question when totalling up the questions used.

- (c) Those who succeeded at (b) tended to succeed at (c). Some explicitly considered the average mark for the remaining 8 questions ($30/8 = 3.75$), in order to guide their choices. But most answers showed a diverse collection of wrong attempts, followed by the correct answer in a box.
- (d) A two-mark explanation needed some reference to the constitution of the exam paper (there being only one possibility involving 3 Long questions), as well as a clear statement that the Short questions were the limiting factor. Many candidates did not appreciate that this level of detail was possible, and offered vague or incomplete solutions.
- (e) This optimisation question was the culmination of the previous questions' research; few candidates managed it successfully without gaining most of the previous marks. Although many candidates favoured the answer '6', this was awarded no marks unless there was some supporting working.

Question 2

This question was divided into two separate parts, based on the same stem. Many candidates completed the first part, satisfactorily deducing what was intended by the printer ink company's instructions. The explanations required precise references to the data and careful explanation for full marks. The second part of the question proved to be too tough for most candidates.

- (a) The calculation that was required here, with appropriate rounding, was clearly but compactly stated in the question: a large number of candidates underestimated what was being asked, and gave the total price for those pages (\$2, \$2, \$3) or the number of pages per dollar (16, 21.5, 18), or the prices per page with inconsistent rounding. The difficulties experienced by many candidates with this question may reflect the inherent troubles students have with compound units, and their double nature (as 'units' and as 'calculations').
- (b) Most candidates appreciated the relevant distinction here, but many did not describe Clarissa's deductive method clearly, or offered an explanation which was entirely general ('If Clarissa printed off 50 pages next month, she could deduce which meaning applied according to the price charged...'). A two-mark answer required clear identification of the relevant datum (the \$3 charge in January) and an explanation of why it was relevant.
- (c) As with (b), the identification of the relevant data was accomplished by most candidates, but the clear explanation was not.
- (d)(i) The additional restrictions and the relevant hypothetical reasoning challenged most candidates, with only 20% offering a correct response here. A common wrong answer was 18, which may have been derived from misreading the question, and making inferences from the printing of 36 pages in June, not July.
 - (ii) Very few candidates appreciated the relationship between the size of a document (with an odd number of pages) and Clarissa's charges. In order to succeed in this question, candidates needed to consider how many three-page documents were possible – for instance 18 three-page documents (yielding the 18 blank pages given in (d)(i)) would lead to $(18 \times 4) = 72$ pages printed, far exceeding what the charges implied. This leads to the conclusion that some of the documents must be one page long, and the investigation of this leads to the optimal value.

Question 3

This question required candidates to investigate how simple discrete modelling of houses and gardens, for architectural purposes, conformed to certain restrictions. The modelling process was intended to be intuitively easy to grasp (2×1 bricks, assembled into houses without roofs), and led to fairly simple linear combinations. Technical difficulties were introduced by the discrete numbers of bricks that could be bought, and the need to convert between units.

- (a) This introductory question required candidates to offer a 'model' of the house, without an example to follow. The correct answer was given, as a confirming instance. Some familiarity with the use of plans and elevations in representing three dimensional objects was useful, but not vital here. Many candidates struggled to make the numbers conform to preconceived rules of how the dimensions could be combined (often based on the volume or the surface area of the house), rather than beginning with the bricks laid out on the page.

The question could not be completed successfully without some demonstration of how the bricks fitted round the rectangle 'at ground level'. Only 20% of candidates managed this.

- (b) The diagrams drawn in (a) enabled candidates to deduce the number of bricks for the Type B house: almost all of those who performed (a) correctly also managed to complete (b) correctly. A minority of candidates did not offer a clear diagram in (a), but demonstrated that they understood the process by answering (b) correctly.
- (c) This question required careful 'tracking' of the different colours, as well as willingness to engage with the discrete combinations 'puzzle' posed by the packets. Full follow-through marks were available for those who had offered a wrong number of bricks for type B houses in (b). Most candidates were able to calculate the minimal price for a given number of bricks, but only a minority were able to find the correct number of bricks for all three colours. The problem with this often arose from hasty working relating to the two types of house and their gardens, thereby conflating type with colour.
- (d) The problems created by house types and colours overlapping (in (c)) did not occur here, and the question was answered correctly by far more candidates. This seems surprising on the face of it, since the optimisation problem was reversed ('what is the least cost for these bricks?' becoming 'what is the greatest number of bricks for this price?'). But all sensible combinations led to the same answer (1800) and so the potential difficulties (of reaching a definite maximum) did not arise.
- (e) This question looked like a very straightforward area problem – but it required additional care, since the areas of the houses had not been calculated, or used, thus far. Many candidates mistakenly used the number of blocks rather than the area of the base. Those who signposted their solutions carefully (referring to the units in the answers) made this mistake far less often.
- (f) (i) Correct analysis of this question required careful lay-out. Candidates who did not clearly identify the area of a block of 10 houses, and give the appropriate units, before attempting to calculate how many blocks could be fitted in, tended to make errors (most often regarding the conversion between units). Generous 'follow-through' marks were awarded – but some sign-posting by the candidate was needed for these to be awarded.
- (ii) The solution to this final problem was delivered unproblematically by a careful approach to the previous question. Follow-through marks were awarded, but they depended on explicit areas given in (f)(i), with units where appropriate.

Question 4

This question involved the analysis of two largely independent variables (the times of the trains, and the costs of the tickets). The complexity of the times (derived from the number of points on the network, the intersections, and the dependence of the journey times on both of these) challenged most candidates. The calculation of the costs was completed with much greater success, but still defeated many candidates. Many of the difficulties may have been compounded by the pressure of time, if this question was tackled at the end of the exam.

- (a) The manipulation of three pieces of information was needed to accomplish this question correctly: the time that the last train left the end station, the number of stations, and the amount of time taken to travel from one station to the next. Many candidates did not appreciate that the final departures (at 23:10 and 23:15) were just the **start** times of their final journeys. And some struggled with the times taken to move from station to station – which often led to partial credit, if misconceptions were applied consistently. Very few managed to reach a correct final answer.
- (b) Many candidates struggled with finding an efficient approach to this question: a common approach was to attempt to list the trains' start and end times, from the beginning of the day onwards. Although this would lead to a correct answer, with an appropriate filtering process, it was time consuming and prone to errors. The more efficient approach involved starting at 11:05 and working backwards: trains leaving Jabber & Wock at 11:00, 10:50, 10:40 etc., and those leaving Bander and Snatch at 11:00, 10:45 and 10:30...
- (c) (i) This question was independent of (a) and (b), and depended upon careful reading of how the Discount Cards worked – ideally with a confirming calculation applied to the Lobster Card example

to check that all the parts fitted together as expected. The most common error here was to omit the \$1 charge applied each day – which tended to attract only 1 mark of 3.

- (ii) This question followed on from **(c)(i)**, and marks were awarded for those who managed this successfully from an incorrect answer to **(i)**.
- (d)(i)** As with **(c)**, a correct approach to this question did require application of the daily \$1, which defeated many candidates. Many candidates also managed to process their percentage discounts incorrectly (some reading '40% off' as '40% of'). Careful, articulated working was required and most candidates found this difficult to accomplish against the pressures of time.
- (d)(ii),(iii)** This question reverted to the analysis of timings and intersections – and was not completed successfully by most candidates. As with **(b)**, candidates struggled to find an efficient way of tracking the relevant trains: it was necessary to consider the times of potentially relevant trains at Wock and Snatch, and trace their journeys to Vorpah and Uffish – a task which may have been partially completed on the question paper. Candidates should endeavour to leave as much relevant working as possible in the Answer Booklet (Question Papers are not sent to Examiners).

Some candidates misunderstood the 2 minute timings at the end of the line – which were not intended to represent shorter journeys, but merely the fact that every train arrived at the following station 2 minutes after it departed. Such an approach was considered for follow-through marks throughout the question.

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

If one part of a question has more marks than one mark it is usually an indication that there is more than one step in getting to the answer.

When the answer is given and the question is to explain how it is derived, responses challenging the answer given and offering alternatives are not likely to gain marks.

The end of the last question had few responses, suggesting that some candidates ran out of time. There is no obligation to do the questions in the order given, and some candidates would benefit from looking through the paper first in order to prioritise their work.

General comments

Some candidates added their own extra constraints, occasionally noting that the task was then impossible. Many also wasted time by carrying on past the answer required, for example going on to convert an amount of profit in dollars to a percentage figure.

Several candidates made use of algebra in their responses. This can provide a useful alternative method for finding a solution, but in questions like these it is important to retain clarity about precisely what it is that expressions and equations are representing. Habitual use of x as a generic 'something not known' caused some candidates to get confused about the meaning of the values they were obtaining. If using algebra in problem solving questions like these, it pays to make clear notes about the letter used, e.g. 'let x be the number of people on the train on arrival at F', to help avoid errors in setting up equations and interpreting findings.

Comments on specific questions

Question 1

This question involved considering options given an assumption, and then explored a slightly more complicated model for the arrangement of the dots. It called for spatial reasoning using the data provided (and not knowledge of any particular standard for dice nor of anything probabilistic).

- (a) (i) This part needed the one piece of information given in the text: that opposite sides add to a constant, and rotation of one die to match another. Better responses identified which die was being considered.
- (ii) The task here was to explain a method for getting to the given answer. Some candidates simply offered the answer, maybe with a box drawn around it. A surprising number offered methods leading to a wrong answer.
- (b) This asked for both of two answers, and partial credit was available for one of the two, but offering three should have rung warning bells. It should have been clear in this case that the two answers were expected to be distinct.
- (c) For the two dice, this only required the addition of 6 one-digit numbers and division by 3. It provided a reminder of useful information that would be needed in (d).

- (d) (i) This part required elimination of the two dice that could not be non-standard and deduction that the other two must be the ones of interest.
- (ii) This part required selection of the smallest number in two cases, and then adding those together.

Question 2

A simple numerical model for the numbers getting on and off a train was provided, and various limits were explored.

Care was needed to distinguish the numbers getting on and off with the change in numbers on the train, as well as the number on arrival and on departure. Using the same letter for both often introduced errors.

A few candidates added their own constraints, such as there being one driver who needed to stay on the train. Some offered fractional passengers despite the context involving whole numbers.

- (a) Although the numbers were mostly correct, there was often confusion between when to add and when to subtract.
- (b) (i) Many candidates calculated the total number who had at some stage boarded this train, rather than the number on it at the given occasion.
- (ii) Some candidates may instinctively have tried to avoid giving the correct least number of zero; but there was mention of empty trains within the question.
- (c) This required working forwards from one end and back from the other, remembering the distinction between the number boarding and the increase in the number on board. A rash of algebra was rarely beneficial, with errors often resulting in unfeasible solutions, generally involving negative numbers of passengers.
- (d) This part involved finding the case when there is equality, and then stepping through the given process to the end. Better responses included the working of the equal case so partial marks were available.

Question 3

This question involved the sale of whole numbers of cakes with a given pricing structure. The pricing was described by what would make one extra customer buy one cake, but some candidates took it upon themselves to only consider multiples of 10.

- (a) This part asked to show that the cost of a specified number of cakes (40) was a given amount. It was not sufficient to divide the given number by 40 and then multiply by 40. Arithmetic errors were seen despite the answer being given. Premature rounding was also noted, but that was possibly from misreading the constraint that the sale price (not costs) must be a multiple of 5¢.
- (b) This question looked for the smallest number that would result in an increase, and required care with the jumps in pricing.
- (c) This required the profit on one cake to be calculated; this is not the same as the sale price.
- (d) The fact there were four marks should have been a hint that some non-trivial work was needed. The maximum profit was asked for, but many candidates only calculated the total sales and did not subtract the costs. Those using calculus to look for integer solutions needed to check the integer both above and below a non-integer answer, not just the nearest one.
- (e) (i) For full marks the distinction between profit and total sales needed to be known. Some took their dollar figure and wasted time offering it as a percentage of something or other.
- (ii) Three marks should have been a flag that there would be at least three steps in getting the answer, not just a simple ratio. Few candidates identified the extra money that was required, which was a necessary first step.

Question 4

This question involved players using a grid of scores and a sequence of button-presses. Many candidates found it difficult.

- (a) (i) This part asked for two letters, and, for full marks, two letters were needed.
- (ii) This part called for the points from a path to be summed, not just identified.
- (b) All of the constraints needed to be observed for full marks, and care was needed to distinguish between what was entered and what was seen, since the starting position was given and not entered.
- (c) (i) There were $4 \times 6!$ ways, but a wide range of irrelevant formulae were proffered, including 6C_4 and 6^4 .
- (ii) To obtain the six digits required, the grid needed to be rotated and then the numbers substituted for the letter in the top row.
- (iii) Codes involved a letter (P–S) and a permutation of the digits 0–5, but responses included A423105, T341502, P13520, and even 2PTURSQ and 0SUPRTQ. Better responses offered codes compliant with the rules given.
- (d) One point was scored in a game with two transitions that appeared twice and one once. Most responses picked up that this meant the point was for the singleton, and no points for the others, and many correctly entered this on the grid, but for full marks a valid example that gave all the other numbers was needed. This could be due to lack of confidence in offering an arbitrary choice, expecting other constraints to lead to some unique answer.

THINKING SKILLS

<p>Paper 9694/33 Problem Analysis and Solution</p>
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Key messages

If one part of a question has more marks than one mark it is usually an indication that there is more than one step in getting to the answer.

When the answer is given and the question is to explain how it is derived, responses challenging the answer given and offering alternatives are not likely to gain marks.

The end of the last question had few responses, suggesting that some candidates ran out of time. There is no obligation to do the questions in the order given, and some candidates would benefit from looking through the paper first in order to prioritise their work.

General comments

Some candidates added their own extra constraints, occasionally noting that the task was then impossible. Many also wasted time by carrying on past the answer required, for example going on to convert an amount of profit in dollars to a percentage figure.

Several candidates made use of algebra in their responses. This can provide a useful alternative method for finding a solution, but in questions like these it is important to retain clarity about precisely what it is that expressions and equations are representing. Habitual use of x as a generic 'something not known' caused some candidates to get confused about the meaning of the values they were obtaining. If using algebra in problem solving questions like these, it pays to make clear notes about the letter used, e.g. 'let x be the number of people on the train on arrival at F', to help avoid errors in setting up equations and interpreting findings.

Comments on specific questions

Question 1

This question involved considering options given an assumption, and then explored a slightly more complicated model for the arrangement of the dots. It called for spatial reasoning using the data provided (and not knowledge of any particular standard for dice nor of anything probabilistic).

- (a) (i) This part needed the one piece of information given in the text: that opposite sides add to a constant, and rotation of one die to match another. Better responses identified which die was being considered.
- (ii) The task here was to explain a method for getting to the given answer. Some candidates simply offered the answer, maybe with a box drawn around it. A surprising number offered methods leading to a wrong answer.
- (b) This asked for both of two answers, and partial credit was available for one of the two, but offering three should have rung warning bells. It should have been clear in this case that the two answers were expected to be distinct.
- (c) For the two dice, this only required the addition of 6 one-digit numbers and division by 3. It provided a reminder of useful information that would be needed in (d).

- (d) (i) This part required elimination of the two dice that could not be non-standard and deduction that the other two must be the ones of interest.
- (ii) This part required selection of the smallest number in two cases, and then adding those together.

Question 2

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- (ii) Some candidates may instinctively have tried to avoid giving the correct least number of zero; but there was mention of empty trains within the question.
- (c) This required working forwards from one end and back from the other, remembering the distinction between the number boarding and the increase in the number on board. A rash of algebra was rarely beneficial, with errors often resulting in unfeasible solutions, generally involving negative numbers of passengers.
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Question 3

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Question 4

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- (a) (i) This part asked for two letters, and, for full marks, two letters were needed.
- (ii) This part called for the points from a path to be summed, not just identified.
- (b) All of the constraints needed to be observed for full marks, and care was needed to distinguish between what was entered and what was seen, since the starting position was given and not entered.
- (c) (i) There were $4 \times 6!$ ways, but a wide range of irrelevant formulae were proffered, including 6C_4 and 6^4 .
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- (d) One point was scored in a game with two transitions that appeared twice and one once. Most responses picked up that this meant the point was for the singleton, and no points for the others, and many correctly entered this on the grid, but for full marks a valid example that gave all the other numbers was needed. This could be due to lack of confidence in offering an arbitrary choice, expecting other constraints to lead to some unique answer.

THINKING SKILLS

Paper 9694/41
Applied Reasoning

Key messages

- In **Question 2** many candidates are paraphrasing the argument elements or evaluating the argument. Marks are awarded only for precise identification of argument elements.
- In **Question 3** many candidates are still gaining 0 marks because they are attempting the wrong task. They are asked to evaluate the reasoning, not to argue against it or to write their own opinions on the topic. Study of previous mark schemes should reveal the kinds of answers that are credited.
- In **Question 4**, candidates can only achieve the highest marks if they engage critically with the documents provided.

General comments

Most candidates appeared to have had enough time to finish the paper. It was good to see that more candidates than in previous years were writing answers whose length reflected the mark allocation more closely. As a result, there was little evidence of candidates running out of time during **Question 4**.

The standard of responses varied but there was evidence that fewer candidates than in previous sessions had not been prepared for the examination. A higher proportion of candidates than in previous sessions did seem to know what they were expected to do in most questions.

Comments on specific questions

Question 1

Almost all candidates attempted to criticise the data or the inferences drawn from it but very few were able to achieve more than 1 or 2 marks. Commonly seen creditworthy responses included questioning the significance of the size of 300 000, either in comparison to total number of users or in comparison to status changes on other days. All other points on the mark scheme were seen and credited by Examiners but less frequently. A major reason for candidates not scoring marks was that responses often expressed ideas in an ambiguous or insufficiently clear manner. For example, a candidate who wrote "*We don't know how many of these people are actually married*" was perhaps heading in the direction of the penultimate point on the mark scheme but, at A-Level, without further clarification the point could not be awarded. Some candidates merely listed a series of questions, e.g. "*How many were from countries that do not celebrate Valentine's Day?*". Again, such responses often hinted at the right idea but, without further explanation, the mark could not be awarded. As ever, some responses discussed the lack of a source or sources given and achieved no credit.

Question 2

This question was a little easier than in some previous sessions and rewarded the well prepared candidate. Those who knew what was expected and attempted an analysis of the argument usually gained five or six marks easily. However, many candidates provided a non-creditworthy summary or gist. Some seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. A small minority attempted to evaluate the reasoning, as they were invited to do in **Question 3**.

Question 3

The better prepared candidates attempted to evaluate the passage, but many are still listing a series of counters to points in the passage. Those candidates who had been taught some critical evaluation were able to identify a number of weaknesses relatively easily. Full credit was most commonly awarded for identifying

the contradictions in paragraphs 3 and 5, the generalisation in paragraph 5 and the *argumentum ad hominem* in paragraph 6. Many candidates' responses touched on several of the other points, in particular the assumptions regarding dinosaurs and Mars but these were rarely expressed well enough to be awarded both of the available marks. Some candidates appeared to be able to see where there was a weakness but, without understanding the task, they merely copied out the 'weak' section rather than explaining what was weak about it. Many candidates still do not understand the technical term 'implicit assumption', i.e. one that is unstated, and label any opinion-based claim in the text as such. If it has been stated in the text it *cannot* be an unstated assumption. A small minority of candidates attempted to criticise the literary style of the author, and received no credit.

Question 4

Candidates were required to use the documents and their own ideas to construct a reasoned case to support or challenge the conclusion that we should be worried about global climate change. The vast majority of candidates correctly focused their entire argument on supporting or challenging the conclusion. Fewer candidates than in previous sessions considered both sides equally and then decided on a conclusion at the last minute, an approach which tends to limit marks in both the Structure and Quality skill sections.

Responses this session were discernibly better than previous **Question 4s**. The majority of candidates understood the topic and were able to bring in ideas of their own that strengthened their argument. They were also able to consider and respond to a range of counter-positions. A sizeable minority of candidates could produce a thoughtful and reasoned case that achieved higher marks. It was good to see more candidates attempt to structure their arguments using strands of reasoning and intermediate conclusions; only a very few neglected to state any conclusion at all. A very small number of candidates simply described the contribution made by each document to the debate. In previous reports it has been stated that what is likely to get high marks is a persuasive argument with a clear structure that is supported by thoughtful, particularly critical, use of the documents and that thoughtfully considers and refutes relevant alternative viewpoints. There were signs this session that some Centres have begun to act on this advice.

THINKING SKILLS

<p>Paper 9694/42 Applied Reasoning</p>
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Key messages

- In **Question 2** many candidates are paraphrasing the argument elements or evaluating the argument. Marks are awarded only for precise identification of argument elements.
- In **Question 3** many candidates are still gaining 0 marks because they are attempting the wrong task. They are asked to evaluate the reasoning, not to argue against it or to write their own opinions on the topic. Study of previous mark schemes should reveal the kinds of answers that are credited.
- In **Question 4**, candidates can only achieve the highest marks if they engage critically with the documents provided.

General comments

Most candidates appeared to have enough time to finish the paper. Those who appeared to be rushing on **Question 4** had often spent a long time on **Questions 1** or **3**, achieving very few marks, where marks would have been achieved more easily on **Question 4**. It was pleasing to note that more candidates than in previous years were writing answers whose length reflected the mark allocation more closely.

The standard of responses varied but there was evidence that many candidates had not been well prepared. Many did not know what they were being asked to do, particularly in **Questions 2** and **3**.

Comments on specific questions

Question 1

Both parts of the question invited candidates to question the strength of a claim based on the information given. Many responses focused on the fact that the data presented were consistent with the stated claims in both parts **(a)** and **(b)**. This approach tended to gain 1 mark in each section, as long as the data was referenced. Some candidates did not reference the data sufficiently well, or at all, and were not credited with the support mark in part **(a)**. It was rarer for candidates to discuss why the claims might not be supported but it was essential to do this for more than 1 mark. In part **(a)**, some responses did reference the paucity of countries sampled or the apparent anomaly of Country F. Only a handful of responses addressed the idea that the data showed no ages below 15 and did not resolve the 15–19 data into individual years. A number of candidates discerned a trend of decreasing births within Countries A to C. Such responses were not credited as some variation in data like these is to be expected and the small differences involved are unlikely to be significant.

Question 2

This question rewarded the well prepared candidate. Those who knew what was expected and attempted an analysis of the argument usually gained at least half the marks, and often more, easily. However, many candidates provided a non-creditworthy summary or gist. Some seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. A small minority attempted to evaluate the reasoning, as they were invited to do in **Question 3**.

Question 3

The better prepared candidates attempted to evaluate the passage, but many are still listing a series of counters to points in the passage. Those candidates who did attempt to apply their evaluation skills were often able to gain some marks. The most frequently credited weakness identified was the assumption of

similarity between mice and humans. Other weaknesses commonly identified were the assumption of a continuing trend in life expectancy, the inconsistency in length of predicted life expectancy and the hypothetical nature of the some of the reasoning. Other points were picked up by candidates but rarely expressed well enough to achieve more than 1 mark.

Question 4

Candidates were required to use the documents and their own ideas to construct a reasoned case to support or challenge the conclusion that extending life expectancy would do more harm than good. The most successful focused their entire argument on supporting or, rarely, challenging the conclusion. However, some candidates considered both sides equally and then decided on a conclusion at the last minute. This latter approach meant it was difficult to achieve higher level marks in both the Structure and Quality skill sections.

The majority of candidates scored below 12 marks because, apart from some occasional discussion of overpopulation, their reasons rarely went beyond what was written in the documents and the information given in the documents was used uncritically. A minority of candidates were able to produce a thoughtful and reasoned case that achieved higher marks. It was good to see some candidates attempt to structure their arguments using strands of reasoning and intermediate conclusions and only a very few did not state any conclusion at all. A small number of candidates simply described the contribution made by each document to the debate. As stated in previous reports, what is likely to get high marks is a persuasive argument with a clear structure that is supported by thoughtful, particularly critical, use of the documents and that thoughtfully considers and refutes relevant alternative viewpoints.

THINKING SKILLS

Paper 9694/43
Applied Reasoning

Key messages

- In **Question 2** many candidates are paraphrasing the argument elements or evaluating the argument. Marks are awarded only for precise identification of argument elements.
- In **Question 3** many candidates are still gaining 0 marks because they are attempting the wrong task. They are asked to evaluate the reasoning, not to argue against it or to write their own opinions on the topic. Study of previous mark schemes should reveal the kinds of answers that are credited.
- In **Question 4**, candidates can only achieve the highest marks if they engage critically with the documents provided.

General comments

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The standard of responses varied but there was evidence that many candidates had not been well prepared. Many did not know what they were being asked to do, particularly in **Questions 2** and **3**.

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Question 2

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