THINKING SKILLS

Paper 9694/21
Critical Thinking

Key messages

Candidates will use their time most efficiently if they read the sources and questions carefully and think about their answers before putting pen to paper. Thinking while writing wastes words and thereby time.

More candidates approached **question 3(c)** in the intended way than in previous series, resulting in fewer being awarded 0 marks. Other candidates, Centres and teachers should consult the markscheme to see what kinds of answers are expected.

General comments

Nearly all candidates attempted the whole paper, but a very few answered the early questions at such length that they were unable to attempt all or part of **question 3**.

Comments on specific questions

Question 1

Nearly all candidates understood the issue and the implication of the sources.

(a) Most candidates understood that the threat to the wardens' jobs constituted a motive for them to make false accusations. Many answers were awarded 2 marks out of 2, but some were incomplete and achieved only 1 mark. Answers which focused on the Town Council or Department of Environmental Services instead of the wardens were also awarded 1. Many candidates wrote answers to this question at significantly greater length than needed, which suggests they were writing as they thought, rather than thinking about the issue and identifying the key point, which could easily have been done in a single sentence.

(b) (i) Although several acceptable answers to this question were available, only a few candidates obtained 2 marks. Many candidates seemed to interpret the question as meaning, 'Identify part of Mrs Rush's evidence which supports her claim.' Probably for this reason, many of the answers were circular, using Mrs Rush's evidence to support its reliability. The most common result was 1 mark for a weak version of an answer concerning the plausibility of the evidence. Candidates who summarised all or part of Mrs Rush's evidence without commenting on it were awarded 0 marks. Some candidates claimed that Mrs Rush's evidence was, or could have been, corroborated by evidence from the friend who located Toby when he was lost, but this was not credited because the friend did not give evidence.

(b) (ii) Many candidates correctly identified one of the two possible correct answers to this question (based on vested interest and ability to see), but many of the explanations were incomplete and these answers were therefore awarded only 1 mark instead of 2. Some candidates who mentioned vested interest scored 1 or 0 instead of 2, because they did not state what Mrs Rush was motivated to do. Some appeared not to understand what kind of answer was expected to a question about 'reliability'.

(c) A few candidates wrongly judged that paying the fixed penalty implied that Mrs Rush was guilty, but most recognised that, although that might be the case, there were other possible motivations for her to pay in preference to risking a much heavier penalty. A complete range of marks was achieved. Many answers were given only 1 mark, because they correctly stated that Mrs Rush did

not want to risk paying the larger fine, but did not suggest why she might consider this to be likely (e.g. because she could not prove her innocence, or because she was not confident of receiving a fair trial). Claims that Mrs Rush would have to pay the higher fine if she fought the case, without any reference to risk or being found guilty, were not credited.

(d) Most candidates believed Mrs Rush's evidence and judged that she was not guilty of allowing her dog to foul the pavement, although a significant minority emphasised that she did not know where Toby went or what he did after he had run away. There were many instances of good inferential reasoning, mostly based on answers to parts **(a)** and **(c)**, but little evaluation of sources, even though two of the sources (C and D) were clearly influenced by vested interest. A few candidates put forward two possible judgments and declined to choose between them, even though the question asked them to make such a choice.

Question 2

Nearly all candidates understood that the sources established a link between being overweight and an increased risk of death in road accidents, but many struggled to understand Sources A and C. As on previous occasions, some candidates needed to understand that disapproving of the results of research does not constitute a valid criticism of the research or of the conclusions drawn from it.

(a) Not very many candidates succeeded in articulating the difference between the claims in the two sources, and few achieved 3 marks out of 3. Many answers were awarded 0 marks because they simply repeated information contained in the sources or in the question: it may be that some of these candidates did have the right answer in mind, but failed to articulate it. Nearly all candidates concentrated on the tentative hypothesis of sleep disorders in Source A instead of the increased statistical likelihood of being involved in a road traffic accident, but it was the latter which was significant. A few candidates expressed the key contrast succinctly by saying that Source A referred to the cause of accidents, while Source B referred to the effects. Despite the terminology of 'motorists', 'car crashes' and 'at the wheel', some candidates thought that Source A referred to motorcyclists rather than car drivers.

(b) Only a few candidates understood that the graph was of 'added' risk, by comparison with people of normal weight. Most thought the figures were of absolute risk, and some criticised the absence of a statistic for people of 'normal' weight. Many candidates claimed wrongly that because overweight and underweight people were of the same risk, they did not need to lose weight, but a few understood that overweight persons who lose weight reduce their risk, whereas underweight people who lose weight increase the risk.

(c) Many candidates achieved 3 marks out of 3 on this question, by suggesting that car manufacturers should re-design seatbelts, in order to make them suitable for a greater variety of body shapes and sizes. A few marginal answers were awarded 1, while answers which specifically contradicted the passage, or interpreted 'alternative' as meaning 'counter-factual' or 'in an alternative reality or universe', received 0 marks. A significant number of candidates began their answers by explaining why one could infer that overweight people who travel in cars should lose weight: presumably they had misread the first sentence as asking 'is it…' rather than stating 'it is…'.

(d) Most candidates saw that the evidence strongly supported the claim. Some rejected the claim by criticising the evidence on various spurious grounds, while others alleged that it was unfair or insulting to suggest that overweight people were at any greater risk than anyone else; the latter was not a valid approach. Some candidates rightly pointed out that the risk could be reduced in this way, but not eliminated, which was credited as a 'nuanced conclusion'. Other nuanced conclusions involved explaining that losing weight is not easy, or – following the hint in part **(c)** – suggesting that it would be better for car manufacturers to bear the needs of larger persons in mind.

Question 3

Candidates seemed familiar with the subject matter of this question, although few showed much sympathy with the views expressed.

(a) By far the most popular answer was the final sentence of paragraph 1; although that is often the location of the main conclusion of arguments in **question 3**, it was not so on this occasion. A significant minority of candidates correctly identified the main conclusion, and a few chose other wrong answers. A few candidates apparently did not understand what they were being asked to do,

and summarised what they took to be the gist of the argument, rather than quoting a single sentence from it.

(b) Many candidates identified 2 or 3 correct answers to this question. They may have been helped by the change in the wording of the question. Most candidates who identified the correct main conclusion in part **(a)** recognised the final sentence of paragraph 1 as being an IC. The first sentence of paragraph 3 was a popular wrong answer. A few candidates paraphrased paragraphs instead of identifying and quoting the intermediate conclusions.

(c) On this occasion, a fair number of candidates understood what was expected by this question, and gave at least one correct answer, although as in previous series some still argued against the reasoning instead of evaluating it. Some of those who were awarded 0 marks had attempted the correct task. A good number used technical terminology correctly, including 'assumption'/'assume', although some still wrongly interpreted the expression 'unstated assumption' as meaning 'unsupported statement': a few even claimed that 'All the statements are unstated assumptions' without apparently realising that they had contradicted themselves. Many candidates spotted the *argumentum ad hominem* in paragraph 5, and a good many of them achieved 2 marks, by correctly naming or explaining it. Some may have been gesturing in the direction of straw man when they criticised the author for attributing only one argument to opponents, but were not credited, because they missed the key point of this flaw, that the author misrepresented his opponents' reasoning in order to demolish it more easily. A number correctly identified or explained the appeal to ignorance in paragraph 2. Several candidates identified an appeal to authority in paragraph 3, but this was not credited as a flaw or weakness because this appeal was relevant to the issue. The criticism that 'a hundred thousand billion' is not the correct way to express a number of this magnitude was not credited, because it did not weaken the reasoning. Some candidates wasted time attempting to identify and explain strengths in the reasoning, even though the question made it clear that the overall strength should be assessed by identifying 'flaws, unstated assumptions and other weaknesses'. As on previous occasions, marks were not awarded for criticisms of the argument for being one-sided, for lacking statistical support or for failing to identify the sources of evidence. Fewer candidates than on previous occasions attacked the author of the passage for being ignorant or biased.

(d) As on previous occasions, a range of marks was achieved. Many candidates slightly missed the focus of this question, discussing space travel or exploration rather than the attempt to contact extra-terrestrials, which might be much less expensive than claimed by candidates. Quite a lot of candidates unrealistically gave as the motive for communicating with life in other parts of the universe that when Earth becomes over-crowded, polluted or depleted, all or part of the population will need to move to another planet. Others appeared not to realise that the topic of the further argument was (as always) significantly different from that of the remainder of **question 3**, and devoted all or most of their answers to a discussion of the ideas in the passage, which was not credited. Some candidates reduced their mark by presenting a balanced consideration of arguments on both sides of the question, instead of arguing a case, and some promising counter-assertions or counter-arguments were weakened by the absence of a response.

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. This is often the reason why the answers to 3 mark questions are over-long.
- Many candidates give answers to questions asking for inferences or assumptions by quoting something stated in a passage. The essential feature these two aspects of reasoning share is that they are not stated. Candidates also challenge statements when dealing with **3(c)** rather than looking at the reasoning which links these statements. Both of these features of some candidates' answers suggest a better grasp of the fundamental nature of critical thinking is needed.

General comments

Many candidates struggled with **questions 2(a)** and **(b)**. 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. However, this was less in evidence than in previous series. A significant minority of candidates spent too much time on **question 1**, meaning subsequent questions were rushed. In particular, they did not get on to **question 3(d)** where the marks are often more accessible than in other questions. Such candidates also offer over-long answers on the 3-mark parts of **questions 1 and 2**.

Comments on specific questions

Question 1

Some candidates did not grasp what the expression 'Alien Big Cats' was referring to – that is, the general phenomenon of people claiming to see animals like cougars and leopards in suburban neighbourhoods. Some candidates saw it as referring to a new species of big cat leading them to conclusions such as 'they were not alien big cats but exotic species of cat released by their owners.' A small minority seemed to think the expression referred to a new species of big cat from outer space.

(a) Most candidates scored at least some marks on this question, with the number of people claiming a sighting on the reliability side, and the possible poor eyesight of the elderly witnesses on the unreliability side, often being cited.

(b) Again, most candidates gained at least one mark on this question, usually by referring to the experimental and/or scientific nature of the evidence. The evidence regarding the eyes caused more problems. Those candidates who saw Alien Big Cats as a whole new species suggested they might have slitted eyes. The issue of cross-breeding was often mentioned as a possible reason for the slitted eyes, but the 'wild cat' referred to in Source A would not normally be regarded as a species of big cat.

(c) This was done reasonably well, with many candidates seeing the early promise of a convincing explanation having to be tempered with observations such as 'why are only cats sighted?'

(d) There were more examples of candidates effectively using the sources to construct an argument than in previous series, and an encouraging number of Level 3 answers. Those candidates who saw Sources C and D as casting severe doubt on the existence of big cats outside their normal

range were probably the most successful, but allowances were made for the particular interpretation candidates placed on the expression 'Alien Big Cats'.

Question 2

(a) (i) Only a small minority of candidates were able to correctly draw the conclusion. As stated above, many quoted something from the passage. Others drew the exact opposite of the correct inference or drew too broad a conclusion that 'dredging should be abandoned'.

(ii) There were very few candidates who successfully identified the assumption. This was partly due to the fact that these marks were only accessible if there was a correct answer to part **(i)**.

(b) A significant number of candidates did not understand analogies and therefore discussed (sometimes at great length) the differences between rivers and highways. The more able candidates were able to evaluate the analogy successfully. Some candidates observed that dredging was also a man-made activity, but this didn't really have relevance to evaluating the analogy. A small minority of candidates seemed to think a three-lane highway was something to do with flood prevention.

(c) Candidates performed much better on this question and many gained 2 marks if not 3. Some points were too similar to be credited separately.

(d) In spite of the difficulties with the first two parts, candidates were able to tackle this part effectively. Weaker candidates tended to sit on the fence in the face of the conflicting evidence. More able candidates successfully challenged the statement as being too sweeping. There was some good evaluation of the sources and the evidence in them. Few candidates made the distinction between effectiveness and damaging side effects, i.e. that dredging is effective but is so ecologically damaging that it should be discouraged on these grounds.

Question 3

(a) There was a wide range of answers to this question and an encouraging number of 2 mark answers.

(b) Again, there was a wide range of answers and an encouraging number of candidates identifying 3 ICs. Good performance on **3(a)** and **(b)** compensated in a significant number of cases for poor performance on **2(a)** and **(b)**.

(c) As in November, candidates who understood the nature of the exercise did reasonably 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. Whilst 5 mark answers were somewhat rare, there were a good number of 3 and 4 mark answers. Again, as in November some candidates seem to have knowledge of the correct expressions for flaws such as *ad hominem* and *post hoc* but did not really know how to actually identify these flaws.

(d) The vast majority of candidates argued against the proposition. Able candidates focused on the contribution to society as such, whereas weaker candidates tended to focus on the benefits to the individual or why painting was good in itself, leaving benefits to society somewhat implicit. The minority of candidates who interpreted 'painting' more prosaically as interior decoration were able to make a good case for its contribution to society and were not unduly penalised or hampered by pursuing this interpretation.

THINKING SKILLS

Paper 9694/23
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. This is often the reason why the answers to 3 mark questions are over-long.
- If a question refers to information in a source, this should not be interpreted as asking for an evaluation of the whole source. Such questions are looking for an assessment of the impact of the statement, and the reference to the source is simply to acknowledge where the information came from and has no significance beyond this.

General comments

Many candidates did well on **question 2** and performed significantly better on **question 3** in comparison to last year's paper. Most candidates seemed to respond well to the issues raised by the questions and were able to tackle them effectively. As in previous series, 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. However, there seemed fewer such candidates for this paper. It is still the case that some candidates who do well on the first three parts of **questions 1** and **2** often spend too little time on part **(d)**, where a fuller answer is required. However, again there seemed to be fewer such candidates.

Comments on specific questions

Question 1

(a) There were only a few 3 mark answers, as not many candidates saw the neutrality of tone as an asset, given the vested interest Coles and Son had in the case. Some candidates incorrectly assumed the source was automatically unreliable because of this vested interest. A reasonable number of candidates achieved 2 marks by saying the source was not useful because it gave no indication of who or what was to blame.

(b) As regards the second key message above, this question was a case in point. Many candidates discussed Platt's birthday lunch, which was not relevant as the question asked only for an analysis of the specific information about frequency of accidents. Other candidates tended to assume that this information showed Platt was a careless worker. Only a few candidates correctly saw that the significance of this information was seriously reduced because it was consistent with either side's account of what had happened.

(c) This question was also rather poorly answered, with only a small minority of candidates focusing on using the information to challenge Platt's lawyer's case. Again there was a tendency to just evaluate the information in Source E.

(d) Many candidates were able to compensate to some extent for rather poor performance in the previous questions. The sources could be used to argue for or against Coles and Son and answers split fairly evenly between these two approaches (though Coles's lawyers would have had some difficulty explaining away the e-mail). Many candidates did consider an alternative conclusion though not many went on to reject it; an alternative conclusion should be viewed in the same way as a counter-argument, i.e. in order to bolster one's case, one has to raise a possible objection *and* effectively reply to it.

Question 2

(a) Many candidates correctly answered that the information was not sufficient to draw the conclusion, although none challenged the assumption that faster cars were better.

(b) This question was also answered well, though weaker candidates tended to simply repeat the information in the passage without going on to say explicitly why taxi drivers would regret the development.

(c) This question was also answered reasonably well, though explanation of why the factor was relevant was not always clear and there was some overlap between factors.

(d) There were many Level 2 and 3 answers, the most successful arguing that there were insufficient grounds to make this prediction, given the rather mixed evidence for diesel cars. The sources were focused mainly on efficiency and cost. Candidates did stay focused on the material in the sources and were not side-tracked by recent controversies about diesel emissions and the efficiency of DPF's.

Question 3

(a) Most candidates achieved at least 1 mark and there were many 2 mark answers.

(b) There were many 3 mark answers, suggesting that most candidates had a good understanding of the structure of the argument.

(c) There were an encouraging number of 5 mark answers, possibly reflecting the good grasp of the structure of the argument revealed in answers to parts **(a)** and **(b)**. Many candidates saw the inconsistency between cruises being both boring and awash with entertainment, and also questioned why somebody arriving by car would be treated as a 'normal visitor'. However, even good answers often contained sections where propositions in the passage were being challenged rather than the reasoning being assessed.

(d) Only a few candidates argued that holidays were selfish and irresponsible. Some candidates distinguished between 'selfish' and 'irresponsible', usually to good effect. Typical lines of reasoning involved the need to recuperate from work, though this was sometimes combined with the somewhat contradictory point that, because of modern technology, you could carry on working whilst on holiday. As in previous series, the majority of candidates scored 3–5 marks for this question, so that minority of candidates who did not allow enough time for this question missed out on significant marks.

THINKING SKILLS

Paper 9694/31
Problem Analysis and Solution

Key messages

The disciplined demonstration of how candidates achieve an answer – leaving a publicly comprehensible trail on the page – was the most decisive feature of those who did well at this paper. As with previous papers, the questions developed and aimed to build on the insights established part by part; those who did not register the steps made as they approached their goal were highly likely to lose their way, make slip-ups in their calculations, and lose the partial marks that might be available in the process. This attitude was critical in tackling the harder parts of **Questions 1** and **3**.

As well as the formulation of such good habits, there is clearly a need for numerical competency – and this was critical in the approach to **Question 1** in this year's paper. Competence in proportional increase and decrease needed to be fluent and reliable for any efforts at solving the problems to be successful.

General comments

The paper required candidates to engage in the full range of problem-solving skills: the questions involved careful analysis of the text, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements.

Although only three of the questions explicitly asked for explanation or a reason for the answer given, full marks depended on clear supporting working in several other cases. In many other questions, where errors were made, clear working allowed for partial marks to be awarded.

Certain classic problem-solving techniques allowed for efficient solutions, and should be part of the well-prepared candidate's toolkit: the systematic listing of relevant outcomes (in **4(c)** for example), the parsing of a problem algebraically (in **1(c)** and **3(b)** for example), and the independent verification that answers conform to requirements (in **1(b)**, **2(a)**, and **2(d)**, for example).

Comments on specific questions

Question 1

This question explored the discounts that a business could offer to customers who bought multiple pizzas, given the costs of making them, and the cost of delivering them. Competence in answering the diverse questions that followed depended on clear distinctions being sustained between costs, prices and profit.

(a) Most candidates were able to select the appropriate cost from the table ($1.80), add the costs of delivering and then add 20%.

(b) This question required careful analysis of the options when offering a 20% discount on 3 pizzas: a **maximum** discount that **ensured** a 20% profit is actually a 'minimax' solution, and such cases require care and deserve 'double-checking' when completed. A small number of candidates managed to select the correct pizza (Large Luxury rather than Small Basic) and correctly work backwards from the 20% discount. This process was particularly difficult for candidates who were not well-versed in calculating percentage discounts. Partial marks were awarded to those who clearly stated which data they were using for their calculations – but only a few candidates did this. This question could be used as a good example of how candidates can offer a clear trail showing the decisions they have made and the ensuing calculations (and gain partial marks) or leave an unintelligible smudge of numbers (and gain nothing).

(c) This question did not require the sophisticated decision-making of **(b)** – in terms of choosing which type of pizza would give the appropriate maximum discount – but still depended on a robust sense of cost, price and profit. Few candidates established the pivotal figure of $5.64 (which was achieved through careful conformity to the costs required for the delivery of 2 pizzas, with a 20% profit). Those who left sufficiently clear working were awarded partial marks for inferring what price would produce **any** cost under the 'buy one get one half price' deal – but such clarity was rare.

(d) This question was could be stated algebraically without any great need for improvisation, but few candidates did this. Alternatively, partial marks were awarded for any clear attempt to calculate the discounted prices for a proposed third pizza and then amend the proposal – but this required thorough working that was rarely seen. Few candidates managed this question correctly.

(e) This question was more straightforward than **(b)**, **(c)** and **(d)**, and was answered correctly by about a third of those who attempted it. The main mistake made was to add a delivery cost to the price. About 1/5 of the cohort did not attempt this question.

Question 2

This question required candidates to track how the string of cars coming from their car parks integrated at each junction. The question built on this process, probing what proportions of cars emerged if the network or the junctions themselves changed. Most candidates approached these with insufficient detail (reluctant to list the strings of cars that emerged in the different cases) and struggled as a result.

(a) (i) Success at this question required careful listing – dependent on mentally tracking what had occurred at the previous two junctions – and scrutiny of the result. Because the mental processing burden was high, the use of a checking process was decisive for many candidates. It was fairly easy to do – considering whether alternate letters in the list come from D/E for instance – but was clearly not done by many. Few candidates managed all 7 correctly.

(ii) Only about half of those who managed **(a)(i)** made the correct inference here – which could be 'seen' fairly easily in the proportions of each letter in the list. The most common error was to omit A.

(b) A good number of candidates appreciated that the cars passing out of the single exit at a constant rate made any re-arrangement of the tracks futile. Subsidiary explanations were ignored.

(c) Most candidates appeared able to process the double optimisation required in making the 'earliest emptying of any car park as late as possible'. Almost half the responses identified the correct pair of junctions and the correct prioritisation of the tracks at these. Of those who did not manage this, many suffered from ambiguous references to which tracks were to deliver 2 cars and which were to deliver 1. Answers such as 'Junction Y should be 2 to 1, because B and C have twice as many cars' did not manage to explicitly state which branch was which. The third mark (explaining what happens at Z) required careful analysis of what happened with or without a 2 : 1 junction, and an explanation of the findings. Very few candidates managed this.

(d) (i) A successful answer to this question depended on the checking process as much as the creative process – most of those who were unsuccessful accidentally produced a network that was homeomorphic to the one given. Some offered three-way junctions, which were explicitly forbidden in the question.

(ii) This question returned to the precise analysis of what strings of cars leave the exit, and what can be inferred from the different proportions. A large number of candidates appeared to miss the vital information: that it takes one hour for all five car parks to empty. Of those who used this information, a few managed to make the initial inference that each would empty in 12 minutes if given sole access to the exit. Very few candidates managed to apply this understanding to their network.

Question 3

This question involved the allocation of roles to 20 volunteers, subject to different requirements, varying according to the time of day. Dependable means of presenting the relevant working was necessary for candidates to ensure what resources were available – most of the questions were straightforward

developments of the scenario, with few obscure abstractions, double optimisations or cases of 'reverse logic'.

(a) (i) This question was answered well – most candidates appreciated that 7 volunteers were effectively constant, and that the remaining 13 determined how many could take part. A small number of candidates mistakenly assumed that the director of the fun run could perform other jobs. A few candidates took **(a)** to be asking what **(b)** was asking.

(ii) Although almost all candidates approached this question correctly (diving their answer to (a) by 20), less than half were awarded the mark, because the question asked how many **more** would be needed (i.e. 13 not 33): many overlooked the need to subtract 20 from their answer.

(b) This question required some experimentation – the need for integer answers preventing a purely mechanical approach. Most candidates used an informal 'trial and improvement' approach, often settling on 150 runners (having established that 200 was not possible). A large minority of candidates appreciated that 180 was possible.

(c) This question asked for a decision (yes or no), but supporting working was needed to gain any marks (a reminder of the instruction on the front cover of the question paper). Most of those who offered a justification (appealing to the total number there would be in the cafe, or comparing the number involved in the two activities during the race) were awarded both marks.

(d) (i) The introduction of the three time intervals added an extra need for candidates to lay out their working carefully. The extreme case considered here was not answered well: many candidates made erroneous assumptions about how many competitors were taking part in the race.

(ii) This question required candidates to combine their insights from **(b)** and the requirements of the different times in the day to offer a maximum number of 'person–hours'. Follow-through marks were given for those who made mistakes in **(b)**, and a generous approach was taken to those who made small mistakes in one of the constituent calculations; but these marks could only be given when the working was decipherable.

(e) The final part of the question involved a combination of three constituent parts (the total number of hours required of each person, the number of hours unallocated, the total number of visitors), with substantial marks 'following through' from previous answers. Establishing the required process required some thought, and about a quarter of the candidates did not attempt the question. Of those who did, many left incomprehensible working. This was a problem if their answers were following through from incorrect previous parts.

Question 4

This question required candidates to appreciate and apply a set of rules to the scoreboard, and then infer what the actual scores must have been (inviting creative inferences from what was given). As is often the case in these complex data questions, the rules were overlapping and required efficient and systematic checking.

(a) Candidates performed well on this question. Those who did not score full marks tended to offer only the names of the judges (and not the numbers of the rules broken).

(b) Most candidates accomplished this well, appreciating that {26, 3, 1} allowed for the highest score.

(c) (i) This question was answered adequately by a relatively small number of candidates: most did not appreciate that no individual instruction was the source of the problem – relaxing any of them apart from 2 would allow the award of points to all seven bands. A precise explanation was needed here, with a commentary. As a rule, candidates' explanations (when required) should involve precise, relevant details/examples. In this case, some explanation as to **why** a particular example was decisive was needed too. A substantial number of candidates were awarded 1 mark for the list 1, 2, 3, 4, 5, 7, 10 – but were not awarded 2 marks because there was no explanation of why this example was critical (i.e. it is the lowest possible collection of scores that fits rules 3, 4 and 5, and yet it still breaks rule 1).

(ii) A systematic list was required here to ensure that all cases were included. Many candidates were awarded partial marks for managing a couple of answers – but, without an explicit process for

working through all possible lists, candidates were unlikely to manage all seven. There were a number of ways this could be done – and this skill is one that candidates should definitely practise in preparation for the exam, in as many diverse situations as possible.

(d) This question attracted the most success of any in the paper.

(e) (i) and **(ii)** The intention of the first part was to prompt candidates to look at the final scores first, in order to identify where Michael's scores must go. Only a quarter of the candidates appreciated that the scores of the Elbees, Ashwin and The Urn were already on the board, and so had to be involved in Michael's score (if the fact about repeated scores was to be accomplished). Many candidates scored partial marks for appropriate selection of some scores, and their sensible allocation to some bands. This question was omitted by the greatest number of candidates, even though it was fairly easy to 'have a go', suggesting that some candidates are still mismanaging their time.

THINKING SKILLS

Paper 9694/32
Problem Analysis and Solution

Key messages

The most useful technique that candidates can practise in the face of unknown, tricky problems, such as those faced in this paper, is that of articulating a single concrete example as a basis for further understanding. As the parts of a question become more subtle, abstract or general, it is often difficult to work out a strategy to find the optimal answer. In this case, it is always worth writing down what can be established – even if it is just a small piece of the jigsaw – and then trying to improve upon it. This need not conform to a strict 'trial and improvement' method: it is a general tool for moving towards a solution. In this year's paper it was invaluable in the final parts of **Questions** 1, 3 and 4.

As well as the practice of such meta-skills, there is clearly a need for numerical competency.

General comments

The paper required candidates to engage in the full range of problem-solving skills: the questions involved careful analysis of the text, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements.

Although only three of the questions explicitly asked for explanation or a reason for the answer given, full marks depended on clear supporting working in several other cases. This reflects the overarching principle of the Problem Solving paper, stated on the front sheet, that candidates should endeavour to leave a public record of their reasoning at all times. As well exemplifying good habits in the presentation of complex solutions generally, the visible trace of a candidate's working allows them (and the Examiner) to identify where minor errors have crept in (and thus allow for partial marks to be awarded).

Certain classic problem-solving techniques allowed for efficient solutions, and should be part of the well-prepared candidate's toolkit: the systematic listing of relevant outcomes (in **1(c)(ii)**, **2(c)**, and **3(c)** for example), the parsing of a problem algebraically (in **3(b)** and **4(e)** for example), and the consideration of extreme cases (in **1(c)(ii)**, **3(d)** and **4(f)** for example).

Comments on specific questions

Question 1

This question depended on sensitive use of the compact table of distances, followed by a systematic approach to the delivery problems that followed. The introductory section included an example of how the table encoded the relevant information, and most candidates were able to engage with the combination of the key distances. The interaction of the relevant variables – distance, number of boxes, choice of van and price of travel – was not obscure, and most candidates were able to construct appropriate strategies for tackling the problems.

(a) The vast majority were able to answer this question correctly, and leave their answers in an accessible format. A few candidates offered the total distance needed to make all three trips. Most candidates seemed to have used the example given (20 km for the first trip) to confirm their understanding of the table.

(b) This question built on the answers delivered in part **(a)**, requiring a small amendment to the distances, as well as an appropriate selection of which combinations were possible – in particular, the shortest journey (33 km) was not feasible, because of the number of boxes required. The

awarding of partial marks was generous here, and any solution which offered correct total distances for any of the three options gained some marks. The most common error was to select the 33 km journey.

(c) This question required candidates to infer the necessary journeys for the two vans, and apply the costs per kilometre. Careful working ensured that more than half the candidates did this correctly.

(d) The final part of this question required candidates to perform a systematic search of the options, and to find the critical point where the larger van first became the cheaper means of transport. This task was initially quite daunting, since it required the analysis done in part **(c)**, applied to a limitless problem space, composed of increasingly convoluted cases. A good number of candidates homed in on 7/8/9 boxes as being likely critical values, appreciating that that was the first time when the small van would be unable to deliver certain loads which the large van could cope with. Of those who did this, many were awarded 2 marks for finding appropriate costs for the relevant numbers of boxes carried by each van; very few candidates appreciated that the smaller van could deliver the loads at a cost of $234, and so the award of 3 marks was rare. The most common error on this question was to begin the discriminating search at around 25 boxes – which allowed for some partial marks, if clear working was shown, but was unlikely to lead to an appropriate judgment.

Question 2

Success at this question did depend upon a basic appreciation of how the independent variables in an arrangement can be combined: essentially, that the number of options for each element in the arrangement can be multiplied together to give a total number of arrangements. Candidates who did not use this key mathematical insight were limited to 3 or 4 marks (available in parts **(b), (c)** and possibly **(d)(i)**). This abstraction from the key problem-solving skill of 'systematic listing' is important for a number of problem-solving scenarios, and it is expected that candidates be aware of the basic principle. The candidates who were most successful on this question made good use of the key problem-solving skill of 'systematic listing', and were able to understand the effect of combining possibilities (effectively, multiplication).

(a) Partial marks were awarded for the most common minor errors here, but only a minority of candidates were able to gain marks. The most common errors were to add the options (yielding 25/24 in total) or to attempt to use factorials.

(b) This question was well answered by most candidates: a complete list was needed, and it appeared to be only the careless or hasty few who did not manage this.

(c) Many candidates appreciated that the left-hand zeros in the answers to **(b)** were what allowed the key to be partially withdrawn – and that any key with one or two zeros on the right would allow for this. A key and a complete list of locks was needed to gain full marks here; many candidates achieved this.

(d) (i) Few candidates gained a mark here. A correct solution had to specify the position of the forbidden zero; many candidates offered insufficient detail ("a zero is not permitted in one of the positions") or confused the lock with the key ("a zero at the right hand end is not permitted").

(ii) A correct answer to this question depended on an understanding of how the number of the individual options were to be combined (as in part **(a)**), and the impact of the limitation found in **(d)(i)**. Given the trouble that candidates had with both **(a)**, and **(d)(i)**, it was unsurprising that correct answers were rare. Follow-through marks were available for viable answers to **(d)(i)**, but these were rarely expressed clearly enough to qualify.

(e) This question also depended upon an understanding of the need to find a product, combined with an appreciation of the impact of the symmetry restriction – less than a quarter of the candidates managed this.

(f) The application of the three steps developed in the questions so far (5 independent cases, limited to low security cases, and symmetrical), confirmed by the number given in the question ($4 \times 5 \times 5 = 100$) was designed to lead directly to the 7-digit case. The interaction of the restrictions (or non-interaction, as was the case with 00000 being subsumed by the low-security concerns) clearly perplexed even those candidates who had succeeded in **(e)**, and this question attracted the least total marks on the paper.

Question 3

This question invited candidates to investigate the values of two coins which were limited by a small collection of overlapping rules. The critical rule reflected the logic of the base system – but without the need to use the same value for every 'column'. Candidates did not need to be practised in the use of non-decimal bases. This limitation was stated in terms of how prices were given – "when writing a price, the bigger coins are always used where possible" – and it was critical that candidates articulated the implications of this with care.

The problems themselves came from the limited information given about certain prices of goods, from which the possible values of the coins could be inferred. The vast majority of candidates were able to tackle the first questions well, but very few were able to offer mark-winning answers to the final parts.

(a) This question directed candidates to combine the coins with given values, to achieve a sum of 30; almost all candidates managed this.

(b) This question could be tackled as a thinly veiled linear equation, and many candidates tackled it using orthodox algebraic techniques. Most were able to exercise their 'degree of freedom' sensibly in choosing a value for M (or L) and deducing the value of the other coin. Those who stalled on this question seemed to do so because they failed to use the fact that S = 1, or because they appeared to expect a unique answer and were destabilised by the choice that needed to be made. A very small number chose values of M greater than 10.

(c) This question was the first to test candidates understanding of what could be inferred from the prices. It depended on the appreciation that, if '6S' is given in the price, then M must be worth more than6. Only about a third of the candidates answered this correctly. The most common mistake was to think that M could have the value 6, 7, 8 or 9. But the majority of candidates who did not score 2 marks here appeared to miss the vital limitation that could be inferred from the '6S', and were therefore forced to guess four values for M.

(d) The possible values of the necklace formed the basis of the next 10 marks – they were unlikely to be attained by those who had struggled with **(c)**.

(i) This question depended solely on the upper limit that resulted from the fourth bullet point in the question. If no price ever required more than 9, then the maximum value of any coin must be 10. Many candidates expected the restriction to result from the given price, and so pursued unfruitful lines of enquiry. A minority of candidates who did not appreciate the limitation caused by the fourth bullet point concluded that there was no limit (or 'infinite value'). Very few managed this question correctly.

(ii) This question followed the model offered by **(c)**, requiring candidates to infer the minimum values of M and L, given the price. Most of those who were awarded some marks on **(c)** appreciated that the minimum value for M was 8 (given the '7S' in the price); and many made the further deduction that L could not be 55 ($8 \times 6 + 7$) or less. This yielded the answer 111.

(iii) This question did not explicitly depend on the limitations defined by the price, and was accessible to any candidates who attempted to find values for M and the accompanying value for L. Many candidates selected values for M which could have paid for a necklace worth 118, but did not fit the price requirements (i.e. 9 or 10).

(iv) and **(v)** These two questions depended on an organised search of the possible values, accompanied by a firm sense of when multiple values were possible. The challenge was too great for the vast majority of candidates.

Question 4

There were a number of different strands to the data in this question – the weekly prize money, the types of question, the 'best 10' selection of scores – and most candidates seemed able to apply these in simple cases. No candidates omitted the question, and a small number clearly did it first (before 1, 2 and 3).

(a) This question could be answered after a reading the introductory paragraph, and most candidates accomplished it without problems. The most common error seemed to stem either from ignoring the $250 overall prize money, or some confusion over whether the weekly prize money was altered if there was a tie break.

(b) A selective scan of the weekly results table was all that was required to identify the right answer here – this qualifies as an informal problem-solving technique in itself, and it may benefit candidates to practice selective data search under timed conditions. This question was answered correctly by almost all candidates.

(c) This was the first question in the paper to ask for an explanation – and a minority of candidates offered a commentary which included sufficient detail. The mantra for Thinking Skills papers should be, "give precise numerical detail if possible, when explaining/justifying/showing something is the case". A small number of candidates offered the answer 'Baker' with little explanation and were awarded only 1 mark. The majority of incorrect answers resulted from an incorrect approach, however, rather an incomplete approach. Those who did not appreciate the significance of the handicap column in the first table were left with the task of trying to deduce which of the three teams had won by analysing their final scores (in the second table). Although this was possible, it was very difficult to do correctly (because of the handicaps).

(d) Another 'selective scan' question, which most candidates managed successfully.

(e) Most candidates showed a disciplined approach to their working here: although the question did not demand justification, the mark scheme required it. As stated in the front page of the exam paper, "marks may be lost if working needed to support an answer is not shown". Questions to which there is small pool of possible answers (as is the case here) are more likely to require supporting working – but the principle applies throughout the paper, and candidates should be encouraged to leave a publicly accessible trail showing the logic that leads to their answer in all cases.

Most candidates forgot to apply the handicap, and concluded that 4 picture cards would yield the 89 points in the table. This was awarded 1 mark. When the handicap was included, Hartnell scored 91 and hence 2 picture questions must have been answered incorrectly.

(f) This required a selective scan of the table, and a brief explanation as to why Week 9 looked the hardest – the most common answer was that it was the only week in which no-one scored 80 or more. Some candidates calculated a mean score for each week, and offered this as evidence, which also gained a mark.

(g) (i) A correct solution to this question needed to carefully distinguish the three different cases amongst the teams (those with less than 10 scores so far, those with 10 scores so far, and those with 11 scores so far) and apply the appropriate algorithms to calculate their cumulative scores. Those who did not appreciate the need to replace one score with another (in the second and third cases described) were only likely to score 2 marks. Quite a few candidates lost marks due to minor calculation errors (e.g. entering the wrong digits into their calculator). This may have reflected time pressures.

(ii) The distinctions between the three cases ensured that the tempting answer (Pertwee) was not the correct answer here. Only about one quarter of those who answered this question made a correct judgment, and offered some evidence of having reached it with due care. No marks were awarded for a team name with no supporting evidence.

THINKING SKILLS

Paper 9694/33
Problem Analysis and Solution

Key messages

The most useful technique that candidates can practise in the face of unknown, tricky problems, such as those faced in this paper, is that of articulating a single concrete example as a basis for further understanding. As the parts of a question become more subtle, abstract or general, it is often difficult to work out a strategy to find the optimal answer. In this case, it is always worth writing down what can be established – even if it is just a small piece of the jigsaw – and then trying to improve upon it. This need not conform to a strict 'trial and improvement' method: it is a general tool for moving towards a solution. In this year's paper it was invaluable in the final parts of **Questions** 1, 3 and 4.

As well as the practice of such meta-skills, there is clearly a need for numerical competency.

General comments

The paper required candidates to engage in the full range of problem-solving skills: the questions involved careful analysis of the text, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements.

Although only three of the questions explicitly asked for explanation or a reason for the answer given, full marks depended on clear supporting working in several other cases. This reflects the overarching principle of the Problem Solving paper, stated on the front sheet, that candidates should endeavour to leave a public record of their reasoning at all times. As well exemplifying good habits in the presentation of complex solutions generally, the visible trace of a candidate's working allows them (and the Examiner) to identify where minor errors have crept in (and thus allow for partial marks to be awarded).

Certain classic problem-solving techniques allowed for efficient solutions, and should be part of the well-prepared candidate's toolkit: the systematic listing of relevant outcomes (in **1(c)(ii)**, **2(c)**, and **3(c)** for example), the parsing of a problem algebraically (in **3(b)** and **4(e)** for example), and the consideration of extreme cases (in **1(c)(ii)**, **3(d)** and **4(f)** for example).

Comments on specific questions

Question 1

This question depended on sensitive use of the compact table of distances, followed by a systematic approach to the delivery problems that followed. The introductory section included an example of how the table encoded the relevant information, and most candidates were able to engage with the combination of the key distances. The interaction of the relevant variables – distance, number of boxes, choice of van and price of travel – was not obscure, and most candidates were able to construct appropriate strategies for tackling the problems.

(a) The vast majority were able to answer this question correctly, and leave their answers in an accessible format. A few candidates offered the total distance needed to make all three trips. Most candidates seemed to have used the example given (20 km for the first trip) to confirm their understanding of the table.

(b) This question built on the answers delivered in part **(a)**, requiring a small amendment to the distances, as well as an appropriate selection of which combinations were possible – in particular, the shortest journey (33 km) was not feasible, because of the number of boxes required. The

awarding of partial marks was generous here, and any solution which offered correct total distances for any of the three options gained some marks. The most common error was to select the 33 km journey.

(c) This question required candidates to infer the necessary journeys for the two vans, and apply the costs per kilometre. Careful working ensured that more than half the candidates did this correctly.

(d) The final part of this question required candidates to perform a systematic search of the options, and to find the critical point where the larger van first became the cheaper means of transport. This task was initially quite daunting, since it required the analysis done in part **(c)**, applied to a limitless problem space, composed of increasingly convoluted cases. A good number of candidates homed in on 7/8/9 boxes as being likely critical values, appreciating that that was the first time when the small van would be unable to deliver certain loads which the large van could cope with. Of those who did this, many were awarded 2 marks for finding appropriate costs for the relevant numbers of boxes carried by each van; very few candidates appreciated that the smaller van could deliver the loads at a cost of $234, and so the award of 3 marks was rare. The most common error on this question was to begin the discriminating search at around 25 boxes – which allowed for some partial marks, if clear working was shown, but was unlikely to lead to an appropriate judgment.

Question 2

Success at this question did depend upon a basic appreciation of how the independent variables in an arrangement can be combined: essentially, that the number of options for each element in the arrangement can be multiplied together to give a total number of arrangements. Candidates who did not use this key mathematical insight were limited to 3 or 4 marks (available in parts **(b), (c)** and possibly **(d)(i)**). This abstraction from the key problem-solving skill of 'systematic listing' is important for a number of problem-solving scenarios, and it is expected that candidates be aware of the basic principle. The candidates who were most successful on this question made good use of the key problem-solving skill of 'systematic listing', and were able to understand the effect of combining possibilities (effectively, multiplication).

(a) Partial marks were awarded for the most common minor errors here, but only a minority of candidates were able to gain marks. The most common errors were to add the options (yielding 25/24 in total) or to attempt to use factorials.

(b) This question was well answered by most candidates: a complete list was needed, and it appeared to be only the careless or hasty few who did not manage this.

(c) Many candidates appreciated that the left-hand zeros in the answers to **(b)** were what allowed the key to be partially withdrawn – and that any key with one or two zeros on the right would allow for this. A key and a complete list of locks was needed to gain full marks here; many candidates achieved this.

(d) (i) Few candidates gained a mark here. A correct solution had to specify the position of the forbidden zero; many candidates offered insufficient detail ("a zero is not permitted in one of the positions") or confused the lock with the key ("a zero at the right hand end is not permitted").

(ii) A correct answer to this question depended on an understanding of how the number of the individual options were to be combined (as in part **(a)**), and the impact of the limitation found in **(d)(i)**. Given the trouble that candidates had with both **(a)**, and **(d)(i)**, it was unsurprising that correct answers were rare. Follow-through marks were available for viable answers to **(d)(i)**, but these were rarely expressed clearly enough to qualify.

(e) This question also depended upon an understanding of the need to find a product, combined with an appreciation of the impact of the symmetry restriction – less than a quarter of the candidates managed this.

(f) The application of the three steps developed in the questions so far (5 independent cases, limited to low security cases, and symmetrical), confirmed by the number given in the question ($4 \times 5 \times 5 = 100$) was designed to lead directly to the 7-digit case. The interaction of the restrictions (or non-interaction, as was the case with 00000 being subsumed by the low-security concerns) clearly perplexed even those candidates who had succeeded in **(e)**, and this question attracted the least total marks on the paper.

Question 3

This question invited candidates to investigate the values of two coins which were limited by a small collection of overlapping rules. The critical rule reflected the logic of the base system – but without the need to use the same value for every 'column'. Candidates did not need to be practised in the use of non-decimal bases. This limitation was stated in terms of how prices were given – "when writing a price, the bigger coins are always used where possible" – and it was critical that candidates articulated the implications of this with care.

The problems themselves came from the limited information given about certain prices of goods, from which the possible values of the coins could be inferred. The vast majority of candidates were able to tackle the first questions well, but very few were able to offer mark-winning answers to the final parts.

(a) This question directed candidates to combine the coins with given values, to achieve a sum of 30; almost all candidates managed this.

(b) This question could be tackled as a thinly veiled linear equation, and many candidates tackled it using orthodox algebraic techniques. Most were able to exercise their 'degree of freedom' sensibly in choosing a value for M (or L) and deducing the value of the other coin. Those who stalled on this question seemed to do so because they failed to use the fact that S = 1, or because they appeared to expect a unique answer and were destabilised by the choice that needed to be made. A very small number chose values of M greater than 10.

(c) This question was the first to test candidates understanding of what could be inferred from the prices. It depended on the appreciation that, if '6S' is given in the price, then M must be worth more than6. Only about a third of the candidates answered this correctly. The most common mistake was to think that M could have the value 6, 7, 8 or 9. But the majority of candidates who did not score 2 marks here appeared to miss the vital limitation that could be inferred from the '6S', and were therefore forced to guess four values for M.

(d) The possible values of the necklace formed the basis of the next 10 marks – they were unlikely to be attained by those who had struggled with **(c)**.

(i) This question depended solely on the upper limit that resulted from the fourth bullet point in the question. If no price ever required more than 9, then the maximum value of any coin must be 10. Many candidates expected the restriction to result from the given price, and so pursued unfruitful lines of enquiry. A minority of candidates who did not appreciate the limitation caused by the fourth bullet point concluded that there was no limit (or 'infinite value'). Very few managed this question correctly.

(ii) This question followed the model offered by **(c)**, requiring candidates to infer the minimum values of M and L, given the price. Most of those who were awarded some marks on **(c)** appreciated that the minimum value for M was 8 (given the '7S' in the price); and many made the further deduction that L could not be 55 ($8 \times 6 + 7$) or less. This yielded the answer 111.

(iii) This question did not explicitly depend on the limitations defined by the price, and was accessible to any candidates who attempted to find values for M and the accompanying value for L. Many candidates selected values for M which could have paid for a necklace worth 118, but did not fit the price requirements (i.e. 9 or 10).

(iv) and **(v)** These two questions depended on an organised search of the possible values, accompanied by a firm sense of when multiple values were possible. The challenge was too great for the vast majority of candidates.

Question 4

There were a number of different strands to the data in this question – the weekly prize money, the types of question, the 'best 10' selection of scores – and most candidates seemed able to apply these in simple cases. No candidates omitted the question, and a small number clearly did it first (before 1, 2 and 3).

(a) This question could be answered after a reading the introductory paragraph, and most candidates accomplished it without problems. The most common error seemed to stem either from ignoring the $250 overall prize money, or some confusion over whether the weekly prize money was altered if there was a tie break.

(b) A selective scan of the weekly results table was all that was required to identify the right answer here – this qualifies as an informal problem-solving technique in itself, and it may benefit candidates to practice selective data search under timed conditions. This question was answered correctly by almost all candidates.

(c) This was the first question in the paper to ask for an explanation – and a minority of candidates offered a commentary which included sufficient detail. The mantra for Thinking Skills papers should be, "give precise numerical detail if possible, when explaining/justifying/showing something is the case". A small number of candidates offered the answer 'Baker' with little explanation and were awarded only 1 mark. The majority of incorrect answers resulted from an incorrect approach, however, rather an incomplete approach. Those who did not appreciate the significance of the handicap column in the first table were left with the task of trying to deduce which of the three teams had won by analysing their final scores (in the second table). Although this was possible, it was very difficult to do correctly (because of the handicaps).

(d) Another 'selective scan' question, which most candidates managed successfully.

(e) Most candidates showed a disciplined approach to their working here: although the question did not demand justification, the mark scheme required it. As stated in the front page of the exam paper, "marks may be lost if working needed to support an answer is not shown". Questions to which there is small pool of possible answers (as is the case here) are more likely to require supporting working – but the principle applies throughout the paper, and candidates should be encouraged to leave a publicly accessible trail showing the logic that leads to their answer in all cases.

Most candidates forgot to apply the handicap, and concluded that 4 picture cards would yield the 89 points in the table. This was awarded 1 mark. When the handicap was included, Hartnell scored 91 and hence 2 picture questions must have been answered incorrectly.

(f) This required a selective scan of the table, and a brief explanation as to why Week 9 looked the hardest – the most common answer was that it was the only week in which no-one scored 80 or more. Some candidates calculated a mean score for each week, and offered this as evidence, which also gained a mark.

(g) (i) A correct solution to this question needed to carefully distinguish the three different cases amongst the teams (those with less than 10 scores so far, those with 10 scores so far, and those with 11 scores so far) and apply the appropriate algorithms to calculate their cumulative scores. Those who did not appreciate the need to replace one score with another (in the second and third cases described) were only likely to score 2 marks. Quite a few candidates lost marks due to minor calculation errors (e.g. entering the wrong digits into their calculator). This may have reflected time pressures.

(ii) The distinctions between the three cases ensured that the tempting answer (Pertwee) was not the correct answer here. Only about one quarter of those who answered this question made a correct judgment, and offered some evidence of having reached it with due care. No marks were awarded for a team name with no supporting evidence.

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 reasoned argument.
- In **question 3** candidates only gained marks if they identified weaknesses in 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 little evidence of candidates running out of time on this paper. There is still a significant proportion of candidates writing answers whose length does not reflect the mark allocation – responses to **question 1**, worth 5 marks, should be considerably shorter than those to **question 4**, worth 30 marks. The handwriting of some candidates was so poor that it was sometimes difficult to award marks because of uncertainty about what the candidate had written.

The standard of candidates varied. 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. While there are merits to this strategy, it is often useful to tackle **questions 2** and **3** before **question 4** in order to develop a deeper understanding of the topic, and the structure and shortcomings of Document 1.

Comments on specific questions

Question 1

Some candidates were aware that they were expected to critically evaluate the statistics in the advertisement and the inference drawn from it. However, some still wasted time on criticising the source of the information, while others criticised the design, or indeed name, of the product. A very small number attempted to explain how the statistics supported the claim, contrary to the question set. Of the candidates who understood the task, most got at least one mark and many achieved two. It was very rare to award more than four marks. The most common creditworthy points seen were suggesting the remaining 0.1% of bacteria might be harmful, conflating bacteria with 'all germs' and the uncertainty about effective cleaning procedure. Most other points were seen, albeit rarely. No candidate wondered what proportion of bacteria would be killed by normal cleaning without ExGerminate.

Question 2

Candidates who had been prepared for the examination found getting marks in this question relatively straightforward. As always, some candidates did not understand what was required of the task and attempted to paraphrase, summarise or criticise the argument. Often candidates came close to achieving a mark but wrote more than the single argument element required; for example, many candidates quoted a counter-assertion and the corresponding response. Despite the question not mentioning reasons, several candidates included reasons in their analysis to no further credit. Successful candidates identified parts of the text, copied them out and labelled them as MC, IC or CA.

Question 3

It was relatively straightforward to achieve some evaluative marks, and well-prepared candidates often scored 4 or more. Some of the points on offer were harder to spot or express well and so it was rare to award more than 5 marks. Where marks were awarded it was usually for identifying the loaded language in paragraph 1, the *ad hominem* in paragraph 5, and either or both of the weak comparisons. The assumptions about technological similarity and Neil Armstrong's motives were often alluded to but rarely expressed well enough to get 2 marks. Few candidates spotted the inherent contradictions in the passage and, surprisingly, the glaringly misleading statistic about the percentage success of shuttles. As ever, many candidates simply stated a series of counter-assertions to the claims made in the document and received no credit. It was clear that a large number of candidates had no idea what was meant by the word 'assumption'.

Question 4

The majority of candidates found the topic accessible and hence were able to produce coherent arguments that argued for or against the given conclusion. The majority of candidates secured between 10 and 15 marks, on the strength of their having presented an argument towards a conclusion supported by reasons largely lifted from the documents. However, more candidates than usual gained more than half of the available marks. It was pleasing to see some candidates attempt to structure their arguments using strands of reasoning and intermediate conclusions, but some are still failing to state the conclusion of their argument, which limits the marks available for the 'Structure' skill.

Although the subject matter, conspiracy theories, was accessible and interesting to most candidates, surprisingly few were able to use ideas beyond those presented in the documents. A number of (usually low-scoring) candidates did not appreciate the significance of the word 'spread' in the conclusion and either argued for a conclusion that was not the one given in the question, or interpreted 'we should not be concerned with' as 'we should not take any notice of'. It was difficult to award marks in the 'Quality of Argument' skill to these candidates.

With respect to the use of documents themselves, well-prepared candidates attempted to combine or evaluate sources, but in most cases the evaluation did not go further than the consideration of bias. Compared with previous series, fewer candidates than usual simply described the contribution made by each document to the debate, which was pleasing. Some Centres seem to have acted upon advice, given in previous report,s 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 relevant alternative viewpoints.

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 reasoned argument.
- In **question 3** candidates only gained marks if they identified weaknesses in 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 little evidence of candidates running out of time on this paper. There is still a significant proportion of candidates writing answers whose length does not reflect the mark allocation – responses to **question 1**, worth 5 marks, should be considerably shorter than those to **question 4**, worth 30 marks.

The standard of candidates varied but there was evidence that many candidates had been well prepared. Indeed, some candidates answered **question 4** first, attempting to ensure that the most creditworthy question was not rushed. While there are merits to this strategy, it is often useful to tackle **questions 2** and **3** before **question 4** in order to develop a deeper understanding of the topic, and the structure and shortcomings of Document 1.

Comments on specific questions

Question 1

Many candidates found this question more accessible than previous question 1s and most candidates seemed to be aware that they were expected to criticise the statistics. Fewer candidates wasted time on criticising the source of the information. A very small number did not understand the task and attempted to explain how the statistics supported the claim. Most candidates got at least one mark, usually for reference to the comparison with only 3 competitors or the data collection from only one month. It was very rare for anyone to score less than two marks. All other points on the mark scheme were frequently seen and a sizeable minority of candidates achieved 3 or more marks.

Question 2

The majority of candidates knew what was expected and attempted an analysis of the argument, which is a clear indication that many Centres had been preparing candidates well for the examination. Fewer candidates than usual provided a non-creditworthy summary or gist. A few candidates still seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. The question differentiated well between candidates, usually rewarding the well-prepared. The full range of marks was seen and all elements were correctly identified by some candidates. The most common incorrect suggestion for the main conclusion was "the future is vegetarian".

Question 3

Again, it was pleasing to see more candidates attempting to evaluate the passage, but many are still listing a series of counter-arguments to points in the passage. Those candidates who did attempt to apply their evaluation skills were often able to gain some marks. Well-prepared candidates, who made up almost half

the cohort, tended to score between three and five marks; candidates who achieved higher marks were in a minority but were more than in previous sessions. One candidate achieved the maximum 9 marks. Common weaknesses identified by a number of candidates were generalising from a single mummy, questioning the understanding of the terms morality and intelligence, and the appeal to fictitious celebrity. Other marking points were seen less frequently and the inherent contradictions seemed to pass candidates by, unnoticed. Few candidates pointed out the major weakness that most of the reasoning supported a reduction in meat consumption rather than the stated conclusion that we should cut meat from our diets completely.

Question 4

The majority of candidates found the topic accessible and hence were able to produce coherent arguments that argued for or against the given conclusion – most arguing the latter. Most candidates secured between 10 and 15 marks, on the strength of their having presented an argument towards a conclusion supported by reasons largely lifted from the documents. However, more candidates than usual gained more than half of the available marks. It was pleasing to see some candidates attempt to structure their arguments using strands of reasoning and intermediate conclusions, but some are still failing to state the conclusion of their argument, which limits the marks available for the 'Structure' skill. As the subject matter, vegetarianism, was familiar to most candidates, many were able to use ideas beyond those presented in the documents and many felt comfortable in directly challenging the information provided in some of the documents. This meant that marks awarded for the skills of 'Quality of Argument' and 'Treatment of Counter- positions' were a little higher than usual. With respect to the use of documents themselves, well-prepared candidates attempted to combine or evaluate sources, but in most cases the evaluation did not go further than the consideration of bias. Compared with previous series, fewer candidates than usual simply described the contribution made by each document to the debate, which was also pleasing. Centres seem to have acted upon advice, given in previous reports, 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 relevant alternative viewpoints.

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 reasoned argument.
- In **question 3** candidates only gained marks if they identified weaknesses in 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 little evidence of candidates running out of time on this paper. There is still a significant proportion of candidates writing answers whose length does not reflect the mark allocation – responses to **question 1**, worth 5 marks, should be considerably shorter than those to **question 4**, worth 30 marks.

The standard of candidates varied but there was evidence that many candidates had been well prepared. Indeed, some candidates answered **question 4** first, attempting to ensure that the most creditworthy question was not rushed. While there are merits to this strategy, it is often useful to tackle **questions 2** and **3** before **question 4** in order to develop a deeper understanding of the topic, and the structure and shortcomings of Document 1.

Comments on specific questions

Question 1

Many candidates found this question more accessible than previous question 1s and most candidates seemed to be aware that they were expected to criticise the statistics. Fewer candidates wasted time on criticising the source of the information. A very small number did not understand the task and attempted to explain how the statistics supported the claim. Most candidates got at least one mark, usually for reference to the comparison with only 3 competitors or the data collection from only one month. It was very rare for anyone to score less than two marks. All other points on the mark scheme were frequently seen and a sizeable minority of candidates achieved 3 or more marks.

Question 2

The majority of candidates knew what was expected and attempted an analysis of the argument, which is a clear indication that many Centres had been preparing candidates well for the examination. Fewer candidates than usual provided a non-creditworthy summary or gist. A few candidates still seemed unaware that quoting from the text is an appropriate, indeed a required, way to answer this question. The question differentiated well between candidates, usually rewarding the well-prepared. The full range of marks was seen and all elements were correctly identified by some candidates. The most common incorrect suggestion for the main conclusion was "the future is vegetarian".

Question 3

Again, it was pleasing to see more candidates attempting to evaluate the passage, but many are still listing a series of counter-arguments to points in the passage. Those candidates who did attempt to apply their evaluation skills were often able to gain some marks. Well-prepared candidates, who made up almost half

the cohort, tended to score between three and five marks; candidates who achieved higher marks were in a minority but were more than in previous sessions. One candidate achieved the maximum 9 marks. Common weaknesses identified by a number of candidates were generalising from a single mummy, questioning the understanding of the terms morality and intelligence, and the appeal to fictitious celebrity. Other marking points were seen less frequently and the inherent contradictions seemed to pass candidates by, unnoticed. Few candidates pointed out the major weakness that most of the reasoning supported a reduction in meat consumption rather than the stated conclusion that we should cut meat from our diets completely.

Question 4

The majority of candidates found the topic accessible and hence were able to produce coherent arguments that argued for or against the given conclusion – most arguing the latter. Most candidates secured between 10 and 15 marks, on the strength of their having presented an argument towards a conclusion supported by reasons largely lifted from the documents. However, more candidates than usual gained more than half of the available marks. It was pleasing to see some candidates attempt to structure their arguments using strands of reasoning and intermediate conclusions, but some are still failing to state the conclusion of their argument, which limits the marks available for the 'Structure' skill. As the subject matter, vegetarianism, was familiar to most candidates, many were able to use ideas beyond those presented in the documents and many felt comfortable in directly challenging the information provided in some of the documents. This meant that marks awarded for the skills of 'Quality of Argument' and 'Treatment of Counter- positions' were a little higher than usual. With respect to the use of documents themselves, well-prepared candidates attempted to combine or evaluate sources, but in most cases the evaluation did not go further than the consideration of bias. Compared with previous series, fewer candidates than usual simply described the contribution made by each document to the debate, which was also pleasing. Centres seem to have acted upon advice, given in previous reports, 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 relevant alternative viewpoints.