

THINKING SKILLS

Paper 9694/21
Critical Thinking

Key message

Candidates and their teachers are encouraged to study the mark scheme for this and previous sessions, in order to understand the kind of answer which is expected in response to different kinds of question and how to access the higher marks.

General comments

Because the three questions are intended to test different skills, it is not surprising that – as on previous occasions – not many candidates performed equally well on all of them. However, a good number did well on at least one question.

Comments on specific questions

Question 1

The resources, the topic, the format of the questions and the level of candidates' performance were similar to previous sessions.

- (a) "Reliability" includes both credibility and plausibility. A fair number of candidates recognised that, if Duncan Dresden had given advice which was legally questionable, he had a vested interest not to admit it. Others focused on plausibility, and explained why Dresden was unlikely to have advised a client to break the law. Both approaches were valid. Claims that Dresden had a vested interest to tell the truth, in order to protect his professional reputation, were not credited, because admitting to advising a client to break the law would have done greater harm to his professional standing. Quite a lot of candidates appeared not to know what kind of answer was expected and summarised Dresden's evidence or explained that he knew only what Barry Brain had told him. Although many candidates appeared not to know that a solicitor is a lawyer, this did not appear to affect their answers.
- (b) Most candidates rightly judged that Emily's evidence was (very) useful, but some of them supported their judgment only by summarising its contents, without drawing any inference from it, which limited their mark to 1 at best. A good number recognised that she had a vested interest to lie in support of her husband, and some claimed that she had done so, even though she clearly implied that he was guilty. The best answers compared her vested interest to defend Barry with what she actually said, and recognised that in this case it strengthened her credibility. A few candidates interpreted the fact that Emily did not defend her husband as evidence of marital discord, and this was credited. Another good point was that Emily was uniquely well placed to know what had gone on.
- (c) Most candidates recognised that Barry was unlikely to admit to theft, whether he was guilty or not. A few gained the third mark by pointing out that by the nature of the case it would be difficult or impossible to tell whether he was telling the truth or not or by pointing out that his evidence might corroborate with or raise doubts about other evidence. Answers which judged that his evidence would be very useful, because he would be able to explain what had actually happened, were not credited.
- (d) Most candidates judged that Barry Brain did steal articles from his aunt's house, and a good proportion also mentioned the alternative scenario that Uncle Alf had given them to him while not being responsible for his own actions, although not many discussed the relative probability of these

alternative scenarios. As on previous occasions, not many achieved level 3 by using the sources critically as well as considering an alternative scenario. Many candidates who had correctly judged Dresden's evidence as unreliable when answering **Question 1(a)** nevertheless took it at face value in **part (d)**. Some candidates put forward very unlikely scenarios, such as that Barry Brain had removed the furniture in order to sell it in aid of charity, despite the fact that he claimed to the police that it was his property.

Question 2

The topic, the resources, the format of the questions and the level of candidates' performance were similar to previous sessions.

- (a) A wide range of answers to this question was accepted, and most candidates achieved 4 marks out of 4. Those who did not either suggested reasons for an increase in the number of patients suffering from depression (which was precisely not what the question asked for) or gave an answer which was too vague for full marks. The claim that patients might have become addicted to anti-depressant medication was credited, but the suggestion that people might be faking the symptoms in order to obtain drugs to sell to addicts was considered to be too speculative to credit. The most popular wrong answer was that the population might have grown, with the result that the number of people suffering from depression would have increased, although the proportion had not.
- (b) This question tested understanding both of the sources and of the technical term "contradict". A good number of candidates recognised that the two claims were complementary and therefore did not contradict one another. Some claimed that they were both true but also contradictory, which suggested that they did not understand the meaning of the term.
- (c) Most candidates gained 1 mark, by correctly identifying one probable effect of CBT on the number of anti-depressants used, and a few gained both marks by recognising that although in principle (and in the long term) the increased use of CBT should reduce the usage of medication, the current shortage of practitioners would increase, or at least not reduce, it in the short term. Candidates were not necessarily expected to distinguish explicitly between short and long term.
- (d) Most candidates obtained 3 marks by correctly deploying Sources A and B in support of the claim. Many candidates felt obliged to refer to Source C, even though it was not obviously relevant to the question. Some candidates attempted to bring in Source D, but not many succeeded in relating its evidence to the claims made in Sources A and B. Very few achieved level 3.

Question 3

The format of these questions was similar to previous sessions. Some candidates found it odd to be discussing newspapers, which they regarded as a relic from a former age, although the book on which the passage was based was current at the time the examination was set (published in 2009).

- (a) Most candidates correctly identified the main conclusion, although some scored 1 mark out of 2 by citing only part of it. A significant minority of candidates identified a different part of the argument. A few misunderstood the nature of the task, expressing the gist of the whole argument in their own words or devising an MC of their own because they thought the passage as printed lacked one.
- (b) In order to identify the reasons which directly support the main conclusion, candidates needed to analyse the mini-arguments in each paragraph. As always, some latitude was given to candidates who included a little more than an actual reason, but several answers were disallowed because they included too much extraneous material (e.g. the first two sentences in paragraph 2, which supported the intermediate conclusion by two reasons). A few candidates overlooked or ignored the instruction to quote from the passage rather than paraphrasing.
- (c) As indicated on the mark scheme, there were quite a few significant evaluative points available for comment. But – as in previous sessions – large numbers of candidates misunderstood the nature of the task, and offered a simple literary critique of the passage or expressed their agreement or disagreement with the opinions of the implied author. Many candidates criticised him for claiming or assuming that his strictures applied to all newspapers, despite his use of such expressions as "many", "some" and "probably", while others criticised him for using those words instead of being more definite. As on previous occasions, certain popular criticisms were not credited, including that the argument was one-sided or biased and the absence of examples and statistics. Once again,

very few candidates showed that they understood the meaning of the expression “unstated assumption”, most interpreting it as meaning “unsupported statement”.

- (d) A few candidates produced good arguments of their own, closely tied to supporting or challenging the statement provided. However, most of the further arguments focused on newspapers, although the statement they were meant to discuss was much more general; arguments which restricted their focus in this way were capped at level 2. A significant minority paraphrased or discussed the passage instead of providing their own argument, and were awarded 0 marks.

THINKING SKILLS

Paper 9694/22
Critical Thinking

Key messages

Some candidates need to understand that expressing opinions about the issues raised or showing further knowledge of them is not the focus of the paper and cannot receive much credit if any. Some candidates also spend too much of their time re-iterating what is in the sources and this also cannot receive any credit, apart from **Question 3(a)** and **(b)** where they are required to stick closely to the text. A significant minority of 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. Candidates should also realise that there is often a superficial response to a question, which will get some credit, but the higher marks are awarded to candidates who dig beneath the surface and question this immediate response. For example, in **Question 1(b)** below, at first sight it seems obvious that the bank statement is suggesting that Rickenbacker is claiming for holiday shirts on his business expenses but if one digs a bit deeper then this can be questioned – for instance how do we know that he spent his money on shirts in Tropicana Leisure Wear?

General comments

Most candidates seemed to respond to the issues raised by the questions and were able to cope with the content of the sources. Able candidates were able to use the material as a vehicle for illustrating their thinking skills.

Comments on specific questions

Question 1

- (a) This was generally done well with many candidates gaining at least 2 marks. Source B's 'inside knowledge' was the most popular point made. Many candidates attempted to talk about bias or neutrality but no grounds are given for commenting on this either way so these points were not credited. Candidates must stick to matters that the text gives definite grounds to conclude.
- (b) Some candidates were confused here and thought the fact that the expenses claim and the bank statement tallied was in Rickenbacker's favour. This overlooked the point that claiming for something illegitimate was as bad as claiming too much. Other candidates went beyond the amount for Tropicana Leisure Wear and discussed other items on the bank statement. To get full marks, candidates did have to consider both sides of the question here and, as explained above, go beyond obvious points and consider deeper points that question this immediate response.
- (c) This was done quite well with many candidates pointing out the vagueness of the statement 'at least C.J. Mole is helping'. Not many picked up on the point that, in an e-mail to a friend, he is likely to be candid and this increases the suspicion that this statement does refer to illegitimate expenses claims.
- (d) The issues raised seem to engage the candidates, most tending to argue that Rickenbacker was fiddling his expenses and often making the legitimate point that, if it is a widespread practice, it is likely that Rickenbacker is not an exception. Some candidates seemed to think that a recommendation as to what C.J. Mole's expenses policy should be was required and this tended to mean a loss of focus on the actual question. Rather more candidates were managing to consider both sides of the question and therefore satisfying the criteria for reaching Level 3.

Question 2

- (a) A number of candidates did not focus on driver behaviour and/or discussed how drivers behave when there *are not* variable speed limits. The ideal answer here saw a logical sequence starting with slowing down meaning more time to react meaning less excessive braking.
- (b) A good number of candidates saw that visual and light pollution were unwelcome side effects that were *not* useful or relevant in assessing the actual effectiveness of variable speed limits in reducing congestion. However, many candidates tried to show the information was useful by attempting to relate the signs to driver behaviour. Even if some relevance to driver behaviour was shown, this still did not have any relevance to the question of congestion.
- (c) Most candidates saw that this information raised doubts about the effectiveness of variable speed limits. The best answers qualified this often by pointing out that the road could be particularly hilly etc. The very best answers pointed out that we would need to know figures from before variable speed limits were introduced on this particular road – the accident rate and average speed could have been even lower.
- (d) Candidates were somewhat less likely to deal with each of the sources in turn and engaged with the issues drawing on the sources to reinforce points made. As noted in the November report, this approach is more likely to lead to successful answers. This meant quite a few candidates managed to reach Level 2, at least.

Question 3

- (a) This question yielded a good spread of marks between 0 and 2, though many candidates did add the reason 'it is good for them' meaning they only got 1 mark.
- (b) This question was answered reasonably well, although many candidates thought that 'complaining brings results' was one of the reasons meaning they often only got 2 marks. In this question, it is important that candidates realise that what is usually required is a key point that is the main point made in a paragraph. So 'complaining brings results' led to the further point 'you should complain when anything is troubling you' which was the point being looked for in the mark scheme.
- (c) The crucial thing in this question is to *evaluate the reasoning* rather than to *challenge the propositions* that constitute that reasoning. There were still a substantial number of candidates doing the latter rather than the former, limiting their marks to a maximum of 2. However, many candidates did raise relevant points of evaluation. Few candidates explored the importance of the word 'more' in the conclusion or saw the importance of distinguishing between 'complaining' meaning expression of woe about the weather etc. and 'complaining' about the failure of goods or services.
- (d) Many candidates found it difficult to focus on health in this question and tended to get side-tracked into why it was good to complain. This was often accompanied by continuing the focus on restaurants in the passage. Such candidates were capped on 3 marks. This meant that rather fewer candidates were reaching Level 3 in this question than in the last examination.

THINKING SKILLS

Paper 9694/23
Critical Thinking

Key messages

Some candidates need to understand that expressing opinions about the issues raised or showing further knowledge of them is not the focus of the paper and cannot receive much credit if any. Some candidates also spend too much of their time re-iterating what is in the sources and this also cannot receive any credit, apart from **Question 3(a)** and **(b)** where they are required to stick closely to the text. A significant minority of 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. Candidates should also realise that there is often a superficial response to a question, which will get some credit, but the higher marks are awarded to candidates who dig beneath the surface and question this immediate response. For example, in **Question 1(b)** below, at first sight it seems obvious that the information must undermine the statement that building the bridge was a massive mistake. However, this assumes that Cragport has not got its own accident and emergency hospital or that there are not other ways to transfer emergencies e.g. helicopter.

Comments on specific questions

Question 1

- (a) This was generally done well with many candidates gaining at least 2 marks. The most usual point made was that the information showed that Smallpiece was committing an offence.
- (b) Many candidates only made the point that the runner was a colleague of Russ and therefore the evidence was biased and not very useful. This missed the point that much of the evidence actually confirms Brown's account and is not particularly on Russ's side.
- (c) Surprisingly few candidates commented that this evidence was from an expert and also that the points made rather reinforced the idea that Russ was underestimating the danger that his dog presented. Many candidates seized on the point that nobody had been bitten but the dog warden quickly qualifies this point. Candidates who argued that it was not useful because it did not relate to this particular incident were often more successful.
- (d) The issues raised seemed to engage the candidates, most tending to argue that the dog was not dangerously out of control. Many successfully focused on the 'dangerous' point arguing that, whilst out of control, it was not dangerously out of control. Such candidates seemed to make rather a lot of the points that the dog did not actually bite Brown and that Smallpiece would have not let his dog off the leash if it was dangerous. These points are not wholly convincing but they were given credit.

Question 2

- (a) Candidates found this question difficult and rarely distinguished between the two statements. Very few saw weaknesses in the statements. Some recognised bias but this did not, in itself, enable them to explore any weaknesses arising from this bias which is what the question required.
- (b) As noted in the preliminary remarks, most candidates confined themselves to the more obvious point that the bridge would not be a mistake if it allowed life-saving minutes to be cut from an emergency journey to hospital.
- (c) Many candidates successfully saw that this was not an argument and managed to secure full marks by saying it was a factual account with some explanation of the difficulties in building the bridge.

- (d) The best answers avoided dealing with each of the sources in turn and made out a case by referring to the sources to reinforce points made. Good candidates pointed out that the fact that building the bridge was difficult did not, in itself, mean building it was not worthwhile. Many candidates saw that the figures in Source E did not wholly support the contention that use had declined. However, able candidates went on to make the point that the increase in toll-free traffic could adversely impact on the financial viability of the bridge. Few, if any, candidates explored the implication of the decline in lorries. This could mean that the bridge was failing to live up to its economic promise but it could simply be because the lorries were getting bigger.

Question 3

- (a) This question discriminated reasonably well with a good spread of marks between 0 and 2. More candidates than usual were managing to express the 2 mark version and avoided adding the reason 'such meetings are essential to business'.
- (b) Again this series, more candidates than before were managing to identify 3 reasons. Taking the answers to **parts (a) and (b)** together, candidates seemed more successful at analysing the structure of this argument than some past examples.
- (c) The crucial thing in this question is to *evaluate the reasoning* rather than to *challenge the propositions* that constitute that reasoning. There were still a substantial number of candidates doing the latter rather than the former, limiting their marks to a maximum of 2. A substantial number of candidates spent too long on discussing strengths, making rather obvious points that the reasons supported the conclusion. Little credit, if any, could be given for this. However, many candidates did raise relevant points of evaluation. Good candidates pointed out the shift from 'business meetings' to other types of meeting as a weakness in the reasoning. The most popular point made was that it was unclear that a business meeting would require all five senses to be utilised.
- (d) This proved to be a conclusion that candidates could argue (usually) for with fluency and focus. A minority of candidates made the good point that the expression 'workplace' did not just mean the office and that e-mail probably did not mean one was a better waiter, for example. This was well-rewarded and is the sort of thinking that a critical thinking exam is looking for.

THINKING SKILLS

Paper 9694/31
Problem Analysis and Solution

Key message

Candidates should take care to make their working very clear. Many marks are available for clearly correct initial steps towards a solution, even if no solution is eventually obtained. Some candidates who take an approach of doing only very rough working whilst relying on successfully obtaining the correct final answers could score more highly by offering a clearer presentation of their thinking.

General comments

This paper invited candidates to use a variety of different problem-solving techniques to tackle the problems. 13 of the 50 marks available involved a search for a solution which was made substantially easier by an algebraic approach. 8 of the 50 marks involved considering a problem for which a spatial approach was beneficial (meaning that some diagrammatic representation of the problem's structure made it most accessible).

Although 39 of the 50 marks could be won with a single numerical answer, there was a great incentive for candidates to show their working: there were 24 marks available for sensible working which led to an incorrect final solution to a part of a question. 11 of the marks available required an appropriately expressed explanation, or some explanatory working. Candidates' answers to **Question 4** tended to garner the most marks, and **Question 1** delivered the least, in general.

Many candidates are answering each question on separate sheets as requested on the front of the exam paper, and this allows for a more spacious expression of working, especially when candidates return to a question in the middle of the exam, as seems to happen quite frequently.

Comments on specific questions

Question 1

Successful attempts at this question depended on an analysis of how the different figures in the table related to the underlying data (being the individual prices of rooms and flights). The logical relations at work in the question were not obvious, and many candidates underestimated them (or misjudged the requirements placed upon them at the beginning of the question), and struggled as a result. This question was a prime example of how easy it is to misjudge the key relationships in such problems, and how important it is to check that a method or interpretation fits all the requirements.

- (a) The most common answer given to this question was \$110. This appeared to be based on the mistaken assumption that the outbound and inbound flights would cost the same for a given holiday. This is explicitly dealt with in the third bullet point: "The flight price changes frequently, but is the same in both directions on any date". Given this key aspect of the table, the most accessible way to approach the question is to consider the relationship between the "1 person 1 week" column and the "2 sharing 1 week" column: the difference between the two figures represents the shared room, which must therefore be \$100.
- (b) The correct approach to part (a) revealed that the price of a room could be deduced using the 2nd and 4th columns: and therefore the only week which is inaccessible is the second week of a two-week holiday starting on Dec 17th. This was appreciated by a small number of candidates. A few candidates introduced local considerations (such as the effect of the Thanksgiving weekend on the prices) – any need for such creative responses will be explicitly signposted in the question.

- (c) Candidates who approached (a) in the correct way simply had to apply the same logic to the other weeks, and identify the maximum (\$110).
- (d) This question involved a further unpicking of the relation between the underlying data and the prices in the table. Follow-through marks were available but these required candidates to use figures that were unambiguously expressed. Very few candidates managed to correctly deduce the flight prices from the table – as with part (a), the most common misconception appeared to be that inbound and outbound flights for a given holiday cost the same amount.
- (e) This question was possible to answer successfully without having answered (d), and it was successfully tackled by a number of candidates. As with (d), the follow-through marks were rarely achieved because candidates' solutions left the parts played by the different figures they were using ambiguous. Candidates should be encouraged to make all their calculations explicit, labelling the various numbers they are using (for instance "outbound flight Dec 17th = \$240", "room price for one person Dec 17th = \$110").

Question 2

The underlying logic of this question was simpler than that required for **Question 1**, and most of the question could be successfully tackled using diagrams and some basic trial and improvement methods. A way of representing the arrangements was given in the question. The relative costs of the tiles were slightly counter-intuitive (a few candidates seemed to assume that the larger tile would be more cost-effective), but this did not affect the strategies necessary to solve the problems. A few candidates assumed that the problem could be solved by reducing the tiles to their cost per square metre – which completely overlooked the need to avoid tiles lining up, and did not merit many marks overall.

- (a) (i) This question was fairly well answered by most candidates. The size of the area to be considered allowed for a detailed diagram to be drawn. Such care at the beginning of a question is to be commended, since it often allows subtleties in the logic to be made explicit (for instance, the need to start and finish each successive row with a different type of tile becomes apparent). It is often efficient in the long run to spend extra time on the very first part of a question. The most common errors here did seem to arise from candidates being too hasty (and concluding that 6 rows were needed, for instance), and not checking their methods. Those who drew diagrams on their answer sheets, but made simple errors, did tend to gain partial marks here. Those who drew extra lines on their question papers would not have benefited from this.
 - (ii) As with (a)(i), this could reasonably be tackled with a diagram. Those who made basic errors in the first part tended to repeat them here, and the question was completed less successfully on average than (a)(i). It was hoped that candidates would appreciate the key difference between (i) and (ii), and infer a general rule which would assist their approach to (iii).
 - (iii) This question was designed to exclude diagrammatic approaches, although it did not stop all candidates from attempting them. The generalisation of the case dealt with in (i) was completed successfully by very few candidates – some candidates clearly needed to address the relevant mathematical skill. The question did not require an algebraic representation of the linear relationship between the width and height of the roof and the number of tiles, but it did require some attempt to formulate the relevant rules: for example by considering that the top row is 30 cm high, and each row adds on a further 20 cm; so the number of rows can be found by subtracting 30 (top row) and dividing by 20 (giving the number of other rows needed).
- (b) This question invited consideration of an area that was small enough to draw, and diagrammatise – although it was not easy to do this and deal with the diagonal edge precisely. The symbolic arrangement recommended in the question (using S and L to represent the two types of tile) was intended to move candidates away from a scale drawing. Many candidates under-estimated the question, and attempted to answer to it by considering only the cost per square metre. Very few candidates offered descriptions of their arrangements, although this was explicitly asked for in the question.
 - (c) This question moved away from the difficulties of costing a complete covering of the roof, and focused on when such a covering was impossible. Most candidates appreciated that any such difficulties must result from the fractions of the 10 cm grid left by the diagonal edge, and attempted to identify where the tiling became impossible. To score two marks here, the description had to be correct and sufficiently precise – to the nearest square. Most descriptions were either ambiguous

(referring to rows, but not stating whether that meant rows of tiles, or rows of squares) or too vague (“in the middle on the left hand side”).

Question 3

This question took a fairly complex ‘continuous’ spatial problem, and modelled it as a ‘discrete’ problem (in which the entry points were limited to every 100 m, and the diagonal distances rounded). The time for a direct journey was given, calculated according to this model, in order to allay any misapprehensions that may have arisen. Candidates were required to apply the different speeds to the combinations of the three distances, and find optimal times for the journeys. As such most of the question could be tackled by careful calculation of the times, and exhaustive listing of the relevant combinations. A few candidates attempted to complete the question using more precise distances (using Pythagoras’ Theorem); but the explicit rules of the model required the use of the approximate distances given, and such rules must be adhered to in these questions. A few candidates considered routes which traversed the edge of the field/beach: these were always longer than the diagonal distances involved, and hence could not be optimal – so did not gain any credit from the mark scheme.

- (a) This question was tackled well by most candidates: the minimal working for a creditworthy demonstration included the three relevant times, and their explicit summation to give 1442 seconds. In providing such demonstrations, candidates are advised to make it explicit what any figures they use represent (e.g. “time to cross beach = $412/1 = 412$ seconds”).
- (b) Most candidates managed this correctly.
- (c) This question required candidates to consider what combination of terrains would optimise the time spent travelling – and the obvious insight was that time spent jogging (on the field) was better than time spent walking (on the beach). The answer which minimised the walking time (902 seconds) was not optimal however, because of the gains to be had from travelling shorter distances in total. This subtlety could only be appreciated by checking at least one other journey – and a small number of candidates did this, reaching the correct answer. It is certainly advisable to consider ‘neighbouring’ options when solving any optimisation problem, to confirm that the solution you have proposed is indeed optimal. A few candidates offered solutions which involved Sheila swimming more than 100 m, in strict contravention of the requirements in the question – these were not credited in the mark scheme.
- (d) This question involved considering journeys in which just two speeds were involved, and choosing a journey which reflected the benefits of travelling in a straight line – but this time there was no requirement that the river crossing be as short as possible, opening up more possibilities. Significantly, the question also asked candidates to justify their answer. The natural choice was to travel halfway up the river bank, cross 100 m of river, and then continue symmetrically on the other side – which yielded 1416 seconds. As with (c), this was not the optimal solution however, since the gains to be had from crossing the river diagonally outweighed the loss of speed: the optimal solution involved swimming 141 m of river.

In order to justify an optimal solution here, candidates needed to consider at least two journeys (and reasonably could have offered three, to confirm that the two neighbouring solutions were slower – but this was not required by the mark scheme). Whenever a justification is asked for, candidates can expect there to be marks allocated for that very purpose in the mark scheme – and if an optimum value is being sought candidates should offer a consideration of the neighbouring values, or a consideration of the underlying cause of the changes in the data (which was not easy here, there being two conflicting factors affecting the times). Very few candidates attempted to offer a justification here.

- (e) This question was most easily tackled by phrasing the relationship given in the question as an inequality: the time taken by Brett when swimming < the time taken by Brett when not swimming. A small number of candidates did manage to express the times algebraically, and solve the resulting inequality. A common error by those attempting this was to phrase the relevant times as (distance × speed), rather than (distance/speed). Those who attempted to tackle the problem by trial and improvement were credited for calculating times for a swimming and a non-swimming route, for a chosen jogging speed – but such attempts tended to offer insufficient guidance for the Examiner (failing to state which journeys the times calculated represented), and gained few marks as a result.

Question 4

Success at this question involved navigating a fairly complex intersection of data, concentrated in the table given, and the instructions following it. It was not expected that candidates would have had any experience in performing such calculations before, although a sense of when sunrise and sunset occurred around the globe helped in checking the plausibility of some of the solutions. The question basically involved a directed exploration of how the times of sunrise and sunset could be calculated, given a location's latitude and longitude – followed by a question in which the logic was precisely reversed.

- (a)(i) and (ii)** Answers to these questions were treated together, enabling candidates to gain marks for their working in either part. The majority of candidates selected the correct figures from the table (07:17 and 16:41), but had trouble in applying the rule relating to the longitude – sometimes subtracting it rather than adding it, and sometimes compounding this by then adding 3 hours (“UT–3”). An appreciation of what “the local time of sunrise” meant helped a few candidates rectify errors such as these.
- (b)** This question was fairly well answered, depending only on the longitude rule (4 minutes per degree West).
- (c)(i) and (ii)** This question was successfully answered by most of those who managed **(a)**. A few candidates failed to appreciate that local times were needed; and a number misread the latitude as 40 degrees South. Otherwise there were few problems for those who had appreciated how the table was to be used.
- (d)** This question was independent of all the other sections, and required candidates to read carefully from a graph: a surprising number had trouble with this. Errors were almost all due to misapprehension of the scales. Some appeared to treat each vertical unit as being worth one minute, and a few treated each horizontal unit as being worth 0.1 degrees of latitude.
- (e)** This question depended on a careful reversal of the processes encountered in **(c)** and **(d)**. Very few candidates achieved this without error, and this may have been partly due to the likely time limitations in the exam. Most managed to establish the relevant number of daylight hours (14 hours 38 minutes) – although many had trouble converting this into an appropriate latitude using the graph, for the same reasons as those mentioned in **(d)**. The interpolation required to calculate UT sunrise/sunset at 37 degrees North defeated many candidates (although there was some flexibility given for this in the mark scheme). The underlying mathematical skills appeared to be a little rusty for many candidates here. Finally, the combination of the local time differences and UT differences due to longitude required high levels of care. A tough final question.

THINKING SKILLS

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

Candidates should take care to make their working very clear. Many marks are available for clearly correct initial steps towards a solution, even if no solution is eventually obtained. Some candidates who take an approach of doing only very rough working whilst relying on successfully obtaining the correct final answers could score more highly by offering a clearer presentation of their thinking.

General comments

This paper required candidates to engage in the full range of problem-solving skills: the questions involved careful reading of the text laying out the problem's structure, some experimental investigation of the options, and considered reflection on what best fitted the questions' requirements. Although 41 of the 50 marks could be won with a single numerical answer, there was a great incentive for candidates to show their working: there were 14 marks available for sensible working which led to an incorrect final solution to a part of a question. 9 of the marks available required an appropriately expressed explanation, or some explanatory working. Although some candidates clearly suffered because they misallocated their time, most attempted all four questions. Candidates' answers to **Question 4** tended to garner the most marks, and **Question 1** delivered the least, in general.

Comments on specific questions

Question 1

This question required an appreciation of the symmetrical nature of the way the lasers rebounded, as illustrated by the examples given. The question also required a firm grasp of elementary coordinates – those who wrote their coordinates in reverse order ran into trouble.

- (a) Although this question could be approached by trial and improvement, it was hoped that candidates would appreciate that the direction of the questions could be reversed without altering the logic (i.e. "suggest two places that could be hit by a player at (0, 4)"). This was most easily tackled using a ruler and pencil on the question paper – although it must be remembered that any working on the question paper itself will not be marked.
- (b) As with part (a), this could be tackled by trial and improvement (there are only 20 possible positions on the grid that can rebound off the mirror). Consideration of the extreme cases (at an oblique angle to the mirror, such as (0, 3), and being more directly in front of it, such as (0, 0)) showed that being in front of it was beneficial. Very few responses showed evidence of appreciating this – most seemed to choose a position that offered a range of targets (such as (0, 0)), and not subject it to critical scrutiny.
- (c) This question involved a series of simple optimisation problems – the optimal values being the answer to the question, "what is the greatest number of rebounds that can be achieved on the way to each of the targets?". Most candidates who engaged with this question showed their working clearly and thus availed themselves of the partial marks (where needed). The question does explicitly ask for the scores for each target; but it is also good practice to record relevant working in case of numerical errors. A minority of candidates appeared to offer the number of rebounds rather than the number of points scored ($2 + 2 + 1 + 1 + 0 = 6$), but did not score because their working was not explicit.

- (d) This question involved the introduction of an extra mirror, a re-positioning of the player and the movement of the targets. This adds a level of complexity to the problem, but the question is not structurally different to (a). However, very few candidates managed to tackle it successfully. The main misconception appeared to refer to the positioning of the mirrors: many candidates assumed that they were in the same places as in Level 2, and ignored the fact that they were asked to consider positions “along the top wall”. Such questions frequently evolve in this way, and candidates must be particularly alert to which aspects are constant for the entire question (such as the condition that the coordinates of the player and the targets are integers), and which vary from part to part (such as the player’s and the targets’ positioning).
- (e) This question required consideration of the four places which could be reached by moving one unit, and optimisation of the possible scores from each of these. Most candidates clearly found this too demanding, given the time constraints.
- (f) Success at this question was independent of (d) and (e), and a number of candidates managed to locate the position successfully. It was possible to narrow the possibilities down substantially by appreciating that such a position had to be in one of the two left-hand columns if it was to involve a rebound off the top mirror.

Question 2

Success at this question depended on a robust sense of how medians and means are calculated, combined with careful extraction of data from the graph. The questions required candidates to consider a range of values, and rarely asked for unique logically-identified solutions. Success at the question therefore demanded a balance of tentative exploration (considering possible solutions, without being too concerned about all the restrictions), and refinement.

- (a) This did not depend upon a correct reading of the graph: just an appreciation of the possible speeds at which trucks and cars travelled, and a familiarity with the relation between a median and its data. About half the candidates managed this successfully.
- (b) This question allowed for candidates to speculate as to what conditions might lead to an accident (with or without reference to the graph). Many candidates saw the quantity of traffic in the middle of the day as the most likely cause, and a proportion of these also referred to the traffic half an hour later as being consistent with this. Explanations which referred to the accident being more likely at night (because of reduced visibility) were not credited, because the question did ask for the *most plausible* point, and four of the points were equally nocturnal.
- (c) This question required a carefully-defined interval, stating precisely what values of the median were possible for the inference to be drawn. A number of candidates appeared to realise that values below 60 km/h implied congestion, but very few phrased this correctly: a strict inequality sign was needed to gain a mark here. The subtleties required for the second mark evaded almost all the candidates.
- (d) This required consideration of what possible medians could result from a speed of 60 km/h and a speed in between 70 km/h and 80 km/h, and the confidence to conclude that there were no such values in between 01:00 and 05:00. Viable explanations mostly referred to the minimum value being 65 km/h.
- (e) The final question introduced the interaction of the mean and the median, in relation to the possible underlying data. The easiest way to tackle this was to consider a limited set (for instance three speeds) and the extreme values which these produced. A further step was needed to then conclude what interval was possible as the data set increased (appreciating the relative insignificance of the middle value). Only a few candidates engaged in this search for optimal values.

Question 3

Three independent logical structures were at play in this question: limiting which digits could be reached from other digits by punching extra holes; which combinations of four numbers produced valid times; and which check digit was needed to produce a multiple of 10. Most candidates clearly found the combination of these limitations quite disorientating. As with many such questions, experimentation with simple cases was often the best way to get a feel for what was possible.

- (a)** This question focused on the relations between the individual digits, and the positioning of the holes punched. The question can be tackled by carefully eliminating all those which can be amended to another number with an extra punched hole. A few candidates appeared to confuse the word 'digit' with 'number' and attempted to offer 5-digit numbers which could not be changed – the precise use of terminology here is often critical to such questions, and so needs to be stressed in preparation for the exam.
- (b)(i)** The simplest way of tackling this question was to attempt to keep the check-digit the same, and find two numbers which could be amended, with the combined difference adding up to 10. In investigating which numbers are possible in such questions, it is advisable for candidates to list their attempts clearly, even if none of them manages to fit all the requirements. The mark scheme often offers partial marks to solutions which fulfil some but not all the requirements – but rarely offers marks to incomplete solutions (such as “11378 changed to 17....”).
- (ii)** Given the trouble that candidates had with **(b)(i)**, it was not surprising that very few candidates managed a creditworthy answer to this. However, a number of those who managed **(b)(i)** did appreciate that a 20-hour increase gained the most with a single hole – and that this was possible with an 8 minute gain, leaving the check-digit unchanged.
- (c)** This question required a highly disciplined listing of the possible cases, and was successfully completed by very few candidates. The 9 times which could be reached starting at 00:00 were the obvious starting point, and encouraged grouping times by check-digit.
- (d)(i)** This question depended on no previous answers, or insights gained about the logical structures. Many candidates saw that reversing the holes punched and unpunched yielded a more efficient process. The single mark available here should have encouraged candidates to seek a simple unified solution, rather than a digit-by-digit reallocation of codes.
- (ii)** This allowed for answers which drew a correct inference from any (well-defined) answer to **(d)(i)**.
- (e)(i)** This question required a re-appraisal of 5-hole code, which was (once again) achievable independent of previous experiences with the question. The needlessness of the first and last hole for the first digit was appreciated by a small number of candidates.
- (ii)** This was successfully answered by very few candidates – partly due its dependence on understanding what was needed in **(e)(i)**, and partly due to inevitable time constraints of the exam paper.

Question 4

This question involved careful application of a point-scoring algorithm to a fairly complex table of match results. All 15 of the marks available were won by identifying unique answers to precisely described requirements, drawn from the two tables. Almost half the candidates did better on this question than on the other three questions put together.

- (a)(i) and (ii)** Careful extraction of the data from the table yielded the Taipans (to be played in Week 15) and the Mambas (to be played in Week 13). Most candidates performed this correctly.
- (b)(i) and (ii)** This question required candidates to ensure that they read the rows of scores and the columns of scores appropriately – it was easy to make a mistake, but it was also easy to see the danger of reading the scores the wrong way round. Most candidates showed appropriate care and were rewarded for it.
- (iii)** The survey of the score table required to perform this task benefitted from systematic scrutiny, and elimination of those which scored zero at any point. As with the previous parts, it was easy to misread the scores in the columns; but most candidates performed the search correctly.
- (c)** A correct solution to this question required a careful listing of the five weeks, and pairing with the right team. In order to fit the time constraints of the exam, candidates needed to find efficient ways of identifying those weeks which did not appear in any pair of rows and columns (avoiding five comprehensive searches of the entire table). This was most easily done by identifying the weeks team by team (rather than identifying the teams week by week).

- (d) A thorough and explicit listing of all the eight categories was needed for full marks here, and a surprising number of candidates omitted at least one. The calculation of the number of points scored required careful application of the points system, and this appeared to tax all but the most assiduous candidates.
- (e) This question required a careful assessment of how to efficiently recalculate the scores, without loss of accuracy. The time constraints may well have affected candidates' success with this. As with all such questions worth more than one mark, it paid to attempt at least one subsidiary calculation and state the conclusion clearly, even if there was not time to complete the entire process.

THINKING SKILLS

Paper 9694/33
Problem Analysis and Solution

Key message

Candidates should take care to make their working very clear. Many marks are available for clearly correct initial steps towards a solution, even if no solution is eventually obtained. Some candidates who take an approach of doing only very rough working whilst relying on successfully obtaining the correct final answers could score more highly by offering a clearer presentation of their thinking.

General comments

This paper invited candidates to use a variety of different problem-solving techniques to tackle the problems. 13 of the 50 marks available involved a search for a solution which was made substantially easier by an algebraic approach. 8 of the 50 marks involved considering a problem for which a spatial approach was beneficial (meaning that some diagrammatic representation of the problem's structure made it most accessible).

Although 39 of the 50 marks could be won with a single numerical answer, there was a great incentive for candidates to show their working: there were 24 marks available for sensible working which led to an incorrect final solution to a part of a question. 11 of the marks available required an appropriately expressed explanation, or some explanatory working. Candidates' answers to **Question 4** tended to garner the most marks, and **Question 1** delivered the least, in general.

Many candidates are answering each question on separate sheets as requested on the front of the exam paper, and this allows for a more spacious expression of working, especially when candidates return to a question in the middle of the exam, as seems to happen quite frequently.

Comments on specific questions

Question 1

Successful attempts at this question depended on an analysis of how the different figures in the table related to the underlying data (being the individual prices of rooms and flights). The logical relations at work in the question were not obvious, and many candidates underestimated them (or misjudged the requirements placed upon them at the beginning of the question), and struggled as a result. This question was a prime example of how easy it is to misjudge the key relationships in such problems, and how important it is to check that a method or interpretation fits all the requirements.

- (a) The most common answer given to this question was \$110. This appeared to be based on the mistaken assumption that the outbound and inbound flights would cost the same for a given holiday. This is explicitly dealt with in the third bullet point: "The flight price changes frequently, but is the same in both directions on any date". Given this key aspect of the table, the most accessible way to approach the question is to consider the relationship between the "1 person 1 week" column and the "2 sharing 1 week" column: the difference between the two figures represents the shared room, which must therefore be \$100.
- (b) The correct approach to part (a) revealed that the price of a room could be deduced using the 2nd and 4th columns: and therefore the only week which is inaccessible is the second week of a two-week holiday starting on Dec 17th. This was appreciated by a small number of candidates. A few candidates introduced local considerations (such as the effect of the Thanksgiving weekend on the prices) – any need for such creative responses will be explicitly signposted in the question.

- (c) Candidates who approached (a) in the correct way simply had to apply the same logic to the other weeks, and identify the maximum (\$110).
- (d) This question involved a further unpicking of the relation between the underlying data and the prices in the table. Follow-through marks were available but these required candidates to use figures that were unambiguously expressed. Very few candidates managed to correctly deduce the flight prices from the table – as with part (a), the most common misconception appeared to be that inbound and outbound flights for a given holiday cost the same amount.
- (e) This question was possible to answer successfully without having answered (d), and it was successfully tackled by a number of candidates. As with (d), the follow-through marks were rarely achieved because candidates' solutions left the parts played by the different figures they were using ambiguous. Candidates should be encouraged to make all their calculations explicit, labelling the various numbers they are using (for instance "outbound flight Dec 17th = \$240", "room price for one person Dec 17th = \$110").

Question 2

The underlying logic of this question was simpler than that required for **Question 1**, and most of the question could be successfully tackled using diagrams and some basic trial and improvement methods. A way of representing the arrangements was given in the question. The relative costs of the tiles were slightly counter-intuitive (a few candidates seemed to assume that the larger tile would be more cost-effective), but this did not affect the strategies necessary to solve the problems. A few candidates assumed that the problem could be solved by reducing the tiles to their cost per square metre – which completely overlooked the need to avoid tiles lining up, and did not merit many marks overall.

- (a) (i) This question was fairly well answered by most candidates. The size of the area to be considered allowed for a detailed diagram to be drawn. Such care at the beginning of a question is to be commended, since it often allows subtleties in the logic to be made explicit (for instance, the need to start and finish each successive row with a different type of tile becomes apparent). It is often efficient in the long run to spend extra time on the very first part of a question. The most common errors here did seem to arise from candidates being too hasty (and concluding that 6 rows were needed, for instance), and not checking their methods. Those who drew diagrams on their answer sheets, but made simple errors, did tend to gain partial marks here. Those who drew extra lines on their question papers would not have benefited from this.
- (ii) As with (a)(i), this could reasonably be tackled with a diagram. Those who made basic errors in the first part tended to repeat them here, and the question was completed less successfully on average than (a)(i). It was hoped that candidates would appreciate the key difference between (i) and (ii), and infer a general rule which would assist their approach to (iii).
- (iii) This question was designed to exclude diagrammatic approaches, although it did not stop all candidates from attempting them. The generalisation of the case dealt with in (i) was completed successfully by very few candidates – some candidates clearly needed to address the relevant mathematical skill. The question did not require an algebraic representation of the linear relationship between the width and height of the roof and the number of tiles, but it did require some attempt to formulate the relevant rules: for example by considering that the top row is 30 cm high, and each row adds on a further 20 cm; so the number of rows can be found by subtracting 30 (top row) and dividing by 20 (giving the number of other rows needed).
- (b) This question invited consideration of an area that was small enough to draw, and diagrammatise – although it was not easy to do this and deal with the diagonal edge precisely. The symbolic arrangement recommended in the question (using S and L to represent the two types of tile) was intended to move candidates away from a scale drawing. Many candidates under-estimated the question, and attempted to answer to it by considering only the cost per square metre. Very few candidates offered descriptions of their arrangements, although this was explicitly asked for in the question.
- (c) This question moved away from the difficulties of costing a complete covering of the roof, and focused on when such a covering was impossible. Most candidates appreciated that any such difficulties must result from the fractions of the 10 cm grid left by the diagonal edge, and attempted to identify where the tiling became impossible. To score two marks here, the description had to be correct and sufficiently precise – to the nearest square. Most descriptions were either ambiguous

(referring to rows, but not stating whether that meant rows of tiles, or rows of squares) or too vague (“in the middle on the left hand side”).

Question 3

This question took a fairly complex ‘continuous’ spatial problem, and modelled it as a ‘discrete’ problem (in which the entry points were limited to every 100 m, and the diagonal distances rounded). The time for a direct journey was given, calculated according to this model, in order to allay any misapprehensions that may have arisen. Candidates were required to apply the different speeds to the combinations of the three distances, and find optimal times for the journeys. As such most of the question could be tackled by careful calculation of the times, and exhaustive listing of the relevant combinations. A few candidates attempted to complete the question using more precise distances (using Pythagoras’ Theorem); but the explicit rules of the model required the use of the approximate distances given, and such rules must be adhered to in these questions. A few candidates considered routes which traversed the edge of the field/beach: these were always longer than the diagonal distances involved, and hence could not be optimal – so did not gain any credit from the mark scheme.

- (a) This question was tackled well by most candidates: the minimal working for a creditworthy demonstration included the three relevant times, and their explicit summation to give 1442 seconds. In providing such demonstrations, candidates are advised to make it explicit what any figures they use represent (e.g. “time to cross beach = $412/1 = 412$ seconds”).
- (b) Most candidates managed this correctly.
- (c) This question required candidates to consider what combination of terrains would optimise the time spent travelling – and the obvious insight was that time spent jogging (on the field) was better than time spent walking (on the beach). The answer which minimised the walking time (902 seconds) was not optimal however, because of the gains to be had from travelling shorter distances in total. This subtlety could only be appreciated by checking at least one other journey – and a small number of candidates did this, reaching the correct answer. It is certainly advisable to consider ‘neighbouring’ options when solving any optimisation problem, to confirm that the solution you have proposed is indeed optimal. A few candidates offered solutions which involved Sheila swimming more than 100 m, in strict contravention of the requirements in the question – these were not credited in the mark scheme.
- (d) This question involved considering journeys in which just two speeds were involved, and choosing a journey which reflected the benefits of travelling in a straight line – but this time there was no requirement that the river crossing be as short as possible, opening up more possibilities. Significantly, the question also asked candidates to justify their answer. The natural choice was to travel halfway up the river bank, cross 100 m of river, and then continue symmetrically on the other side – which yielded 1416 seconds. As with (c), this was not the optimal solution however, since the gains to be had from crossing the river diagonally outweighed the loss of speed: the optimal solution involved swimming 141 m of river.

In order to justify an optimal solution here, candidates needed to consider at least two journeys (and reasonably could have offered three, to confirm that the two neighbouring solutions were slower – but this was not required by the mark scheme). Whenever a justification is asked for, candidates can expect there to be marks allocated for that very purpose in the mark scheme – and if an optimum value is being sought candidates should offer a consideration of the neighbouring values, or a consideration of the underlying cause of the changes in the data (which was not easy here, there being two conflicting factors affecting the times). Very few candidates attempted to offer a justification here.

- (e) This question was most easily tackled by phrasing the relationship given in the question as an inequality: the time taken by Brett when swimming < the time taken by Brett when not swimming. A small number of candidates did manage to express the times algebraically, and solve the resulting inequality. A common error by those attempting this was to phrase the relevant times as (distance × speed), rather than (distance/speed). Those who attempted to tackle the problem by trial and improvement were credited for calculating times for a swimming and a non-swimming route, for a chosen jogging speed – but such attempts tended to offer insufficient guidance for the Examiner (failing to state which journeys the times calculated represented), and gained few marks as a result.

Question 4

Success at this question involved navigating a fairly complex intersection of data, concentrated in the table given, and the instructions following it. It was not expected that candidates would have had any experience in performing such calculations before, although a sense of when sunrise and sunset occurred around the globe helped in checking the plausibility of some of the solutions. The question basically involved a directed exploration of how the times of sunrise and sunset could be calculated, given a location's latitude and longitude – followed by a question in which the logic was precisely reversed.

- (a)(i) and (ii)** Answers to these questions were treated together, enabling candidates to gain marks for their working in either part. The majority of candidates selected the correct figures from the table (07:17 and 16:41), but had trouble in applying the rule relating to the longitude – sometimes subtracting it rather than adding it, and sometimes compounding this by then adding 3 hours (“UT–3”). An appreciation of what “the local time of sunrise” meant helped a few candidates rectify errors such as these.
- (b)** This question was fairly well answered, depending only on the longitude rule (4 minutes per degree West).
- (c)(i) and (ii)** This question was successfully answered by most of those who managed **(a)**. A few candidates failed to appreciate that local times were needed; and a number misread the latitude as 40 degrees South. Otherwise there were few problems for those who had appreciated how the table was to be used.
- (d)** This question was independent of all the other sections, and required candidates to read carefully from a graph: a surprising number had trouble with this. Errors were almost all due to misapprehension of the scales. Some appeared to treat each vertical unit as being worth one minute, and a few treated each horizontal unit as being worth 0.1 degrees of latitude.
- (e)** This question depended on a careful reversal of the processes encountered in **(c)** and **(d)**. Very few candidates achieved this without error, and this may have been partly due to the likely time limitations in the exam. Most managed to establish the relevant number of daylight hours (14 hours 38 minutes) – although many had trouble converting this into an appropriate latitude using the graph, for the same reasons as those mentioned in **(d)**. The interpolation required to calculate UT sunrise/sunset at 37 degrees North defeated many candidates (although there was some flexibility given for this in the mark scheme). The underlying mathematical skills appeared to be a little rusty for many candidates here. Finally, the combination of the local time differences and UT differences due to longitude required high levels of care. A tough final question.

THINKING SKILLS

Paper 9694/41
Applied Reasoning

Key message

Candidates need to read the questions carefully, so that they understand completely the requirements of each question. Candidates should manage their time properly, responding to each question proportionally to the marks allocated; in particular, **Question 1** carries only 5 marks and responses should be very brief, whereas **Question 4** carries the 30 marks and requires an extended piece of writing.

General comments

The overall performance of **Question 1** has been poor. Candidates need to be clear in their minds that this question usually requires them to identify erroneous or misleading aspects of the data as presented, and/or assess the validity of any inferences drawn from those data. Speculations about whether the figures are in fact correct or whether they come from a reliable source miss the point entirely and will not score any marks. The skill candidates have to develop is a *sceptical* approach to the presentation of statistics and to claims based on them. There is much room for improvement in this area.

Overall the performance in **Question 2** was satisfactory, but many candidates would have done better by keeping precisely to the wording in the stimulus passage. The performance in **Question 3** was poor overall, with many candidates demonstrating little competence in CT4 and CT6. **Question 4** was tackled appropriately by a substantial number. There were good attempts on the whole at selecting, comparing and contrasting material and forging chain reasoning. Overall, though, most candidates did not meet the requirements for scoring higher marks by presenting a clear, coherent and convincing argument that addresses possible counter-arguments.

Comments on specific questions

Question 1

The majority of candidates scored no more than 2 marks in **Question 1**. Many candidates wrote far too much for a question worth only 5 marks in total.

- (a) Many candidates ignored the statistics and instead criticised the claims being made. Common non-creditworthy responses were “*they don’t explain how they are going to reduce CO₂ emissions*”, “*there is no source quoted*”, “*it doesn’t say where they got these figures*” and “*it appears biased*”. There was also considerable confusion about what constituted the “annual savings”. Few appreciated the point that work that costs \$350 to a homeowner will not cost the contractor \$350 to carry out.

Of those candidates who were more aware of what they were being asked to do, several appeared not to understand the use of averages. Some candidates seemed to think that the very inclusion of an average in the passage was inherently wrong. Non-creditworthy answers such as “*some houses will cost less than average to insulate*” were common. It might be useful in teaching to focus on the use of averages in data. In this question it was not the use of averages *per se* that was at fault but the fact that the E4U average might, for a number of reasons, be different from the Government’s average.

The most common correct answers questioned the use of “as much as \$500”, highlighted the potential need for replacing the free light bulbs, or questioned the frequency of the \$170 payment from the Government. Very few candidates gave the other points on the mark scheme.

- (b) A significant minority decided the claim could be inferred on the basis that the figures added up. Slightly fewer decided the claim could not be inferred because the figures did not add up. The only frequently-seen creditworthy response highlighted the inclusion of the one-off installation saving as part of a claim about potential annual savings, but candidates rarely expressed this well enough to achieve both marks. Some candidates also hinted at the conflated use of 'taxpayer' and 'homeowner' but this was never expressed well enough to achieve both marks. The generalisation from E4U to the whole of the REUS was noted by a handful of candidates.

Question 2

A small majority of candidates understood the requirements of this question and made a good attempt to analyse the passage and identify the structural elements underlying the argument. Of those who demonstrated competence, credit was often lost due to imprecision when identifying the important statements from the passage, especially with regard to the main conclusion. Important parts were often omitted, and irrelevant parts or additional commentary were sometimes included.

Question 3

This question tests the essential skills of evaluation, CT4 and CT6 which lie at the heart of critical thinking activity. It is very apparent that a fair number of candidates are confused in their minds about the difference between 'literary criticism' and 'critical thinking'. **Question 3** requires candidates to identify and explain flaws and other weaknesses in the reasoning of an argument in order to assess the degree to which the main conclusion is supported. This becomes more difficult if candidates have not mastered the fundamental skill of identifying the main conclusion of an argument, as required in **Question 2**. The term 'implicit assumption' is still not understood by many, with many responses such as "*it assumes that obese people consume food to excess without thinking of others*" seen. Candidates need to understand this term properly, and should realise that merely challenging all the author's claims, offering counter-assertions or saying that there is no evidence to support them does not demonstrate any skill at evaluating the reasoning of arguments, and hence will gain no credit.

Some over-reacted to the author's remarks about 'obese' people and attacked the author vehemently, dismissing the whole argument.

It is noteworthy that a fair number of candidates made a good attempt at giving an overall evaluation, and where this was well explained and had relevant bearing on the main conclusion they accessed two marks.

Question 4

Many candidates addressed this question only partly, coming to misplaced or incomplete conclusions – e.g. that food wastage was wrong, that food-wasters should be held accountable, or that starvation is the problem of the developing nations and developed countries should not be held accountable – thereby failing to address the moral angle of the question. The best responses were able to: focus on the key phrases in the question ("waste food...moral accountability...hunger of others"); judiciously select arguments across the given sources, with critical commentary; integrate inferences with their own viewpoints; build a clear and cogent case encompassing all three dimensions of the question, supporting a clear conclusion.

It is evident that a considerable number of candidates are not planning their responses. There were many digressions from the prompt, some candidates taking issue with the prompt as pointing a finger at developed nations; although there were some impressive responses where the definition of 'waste' was examined in context of moral accountability towards the hungry.

It is noted that those who did well in **Question 3** and those who tackled the content of Document 2 to form part of their answer generally produced the best responses. Candidates are in a better position to meet the assessment objectives if they ensure that they have understood the question and they plan their argument before starting to write it. Almost all of the best-performing candidates could have improved their answers further if they had anticipated counter-arguments to their own position.

THINKING SKILLS

Paper 9694/42
Applied Reasoning

Key message

Candidates are writing disproportionately long answers for **Question 1**. They need be able to identify the main conclusion of the stimulus document for **Question 2**; being unable to do so can impact on their evaluation in **Question 3**. **Questions 3** and **4** carry nearly 80% of the marks; this calls for good planning and time management.

General comments

In general candidates are writing far more for **Question 1** than they need to. Overall the performance was just satisfactory with a fair number of candidates getting at least 3 marks. The majority of candidates scored 2 marks or fewer on **Question 1**, as they did not precisely explain identified flaws in the data presented. Performance on **Question 2** was satisfactory. There is much room for improvement in **Question 3**: the majority of candidates tended to give non-creditworthy counter-assertions rather than valid critical evaluations. There was better performance in **Question 4** as candidates approached the question from various critically relevant angles and provided an explicit conclusion. The best answers were those that gave equal attention to both the tasks demanded by the question, i.e. critically commenting on the source materials and in doing so building up their own further arguments.

Comments on specific questions

Question 1

The skill assessed in **Question 1** requires candidates to adopt a *sceptical* approach to the use of statistics and any claims based on them. Candidates needed to read both parts together in the light of each other in order to understand clearly the requirements of each part. Candidates were less precise in part **(a)** and a good number lost credit by not explaining the significance of their criticism, e.g. “*There are unequal gaps between the years*” is not sufficient to get a mark unless the significance is also explained, i.e. that this accentuates the apparent acceleration of costs. Others were prone to introduce other irrelevant factors, e.g. “*Other universities and their fee structures should also be also brought into comparison*” or “*There was an economic crisis in 2008 causing inflation to soar*”; and several mistakenly commented on the reliability of the evidence, e.g. “*The data is collected by student reporters so maybe exaggerated*”, or “*The source of the data is not mentioned*”. Such generic responses do not address the assessment objectives.

Performance in part **(b)** was much better, and more candidates were able to explain adequately how it was possible for the ‘cost’ of studying not to have changed for ‘most’ candidates rather than the average candidate after inflation was factored in. Candidates did not need to write more than a couple of sentences clearly explaining their answer; several wasted time in elaborating up to a page or more.

Question 2

Most candidates understood the requirements of the question, identifying and labelling each element. A good number of candidates identified elements correctly, but some lost marks by omitting key phrases or supplementing the elements with additional explanations. Many candidates misidentified the main conclusion.

Question 3

On the whole candidate performance was mediocre here. The most common mistake, once again, was misunderstanding of the term ‘implicit assumptions’, with many candidates listing claims in the text and saying they were implicit assumptions, e.g. “*The statement that genes only contain potential for happiness and do not control free will is merely an implicit assumption*”. Candidates need to understand this term properly, and should realise that merely challenging all the author’s claims does not demonstrate any skill at evaluating the reasoning of arguments, and hence will gain no credit. Similarly, lack of evidence was commonly cited as a flaw and gained no marks, e.g. “*there is no evidence showing DNA won’t affect people’s happiness*”. The most common correctly explained flaw was the contradiction in paragraph 6 that the author’s suggestion of organ donation did not sit well with his earlier assertions about solely doing things for oneself in order to be happy.

Because a majority had misidentified the main conclusion there were fewer overall evaluations that accessed the two marks available for this. Some of the better candidates made an accurate overall evaluation but did not express it precisely enough and could only get 1 mark.

Question 4

Most candidates were able to respond appropriately to this open prompt, accessing credit in varying degrees across the marks range. There was an array of impressively creative and philosophical arguments as to why the pursuit of happiness should or should not be abandoned. Some took the view that happiness is not something that can be pursued but comes through the discipline of contentment. A few argued that pursuit of happiness should be given up with further arguments to show how humans are genetically conditioned and are better off seeking shortcuts through modern discoveries. Better candidates examined the complexities, coming to the conclusion that giving up the pursuit of happiness is not an option for human beings, as human lives cannot thrive on misery, whilst acknowledging the conundrum that not everyone would see happiness as needing an ethical basis, and one individual’s or group’s pursuit of happiness can bring misery to another.

Those who planned their main conclusion and selected and organised material did better. Those who evidently had less planning tended to provide good further arguments but with scant reference to sources, or forge a strong chain of reasoning with precise critical references to the sources but lose sight of the purpose of their argument, or do several things well but neglect the other side of the argument, i.e. they did not explicitly make a case for why it would be better to pursue happiness than not to.

The best responses had planned a clear response which embraced both the prompt and the stimulus sources. They organised the available information, critically compared and contrasted material from the sources, drew inferences, highlighted complexities and integrated them with their own viewpoints in order to construct further arguments supporting a clear conclusion. However, only very few were able to consider objections or counter-positions to their own arguments in order to achieve the highest marks.

THINKING SKILLS

Paper 9694/43
Applied Reasoning

Key message

Candidates need to read the questions carefully, so that they understand completely the requirements of each question. Candidates should manage their time properly, responding to each question proportionally to the marks allocated; in particular, **Question 1** carries only 5 marks and responses should be very brief, whereas **Question 4** carries the 30 marks and requires an extended piece of writing.

General comments

The overall performance of **Question 1** has been poor. Candidates need to be clear in their minds that this question usually requires them to identify erroneous or misleading aspects of the data as presented, and/or assess the validity of any inferences drawn from those data. Speculations about whether the figures are in fact correct or whether they come from a reliable source miss the point entirely and will not score any marks. The skill candidates have to develop is a *sceptical* approach to the presentation of statistics and to claims based on them. There is much room for improvement in this area.

Overall the performance in **Question 2** was satisfactory, but many candidates would have done better by keeping precisely to the wording in the stimulus passage. The performance in **Question 3** was poor overall, with many candidates demonstrating little competence in CT4 and CT6. **Question 4** was tackled appropriately by a substantial number. There were good attempts on the whole at selecting, comparing and contrasting material and forging chain reasoning. Overall, though, most candidates did not meet the requirements for scoring higher marks by presenting a clear, coherent and convincing argument that addresses possible counter-arguments.

Comments on specific questions

Question 1

The majority of candidates scored no more than 2 marks in **Question 1**. Many candidates wrote far too much for a question worth only 5 marks in total.

- (a) Many candidates ignored the statistics and instead criticised the claims being made. Common non-creditworthy responses were “*they don’t explain how they are going to reduce CO₂ emissions*”, “*there is no source quoted*”, “*it doesn’t say where they got these figures*” and “*it appears biased*”. There was also considerable confusion about what constituted the “annual savings”. Few appreciated the point that work that costs \$350 to a homeowner will not cost the contractor \$350 to carry out.

Of those candidates who were more aware of what they were being asked to do, several appeared not to understand the use of averages. Some candidates seemed to think that the very inclusion of an average in the passage was inherently wrong. Non-creditworthy answers such as “*some houses will cost less than average to insulate*” were common. It might be useful in teaching to focus on the use of averages in data. In this question it was not the use of averages *per se* that was at fault but the fact that the E4U average might, for a number of reasons, be different from the Government’s average.

The most common correct answers questioned the use of “as much as \$500”, highlighted the potential need for replacing the free light bulbs, or questioned the frequency of the \$170 payment from the Government. Very few candidates gave the other points on the mark scheme.

- (b) A significant minority decided the claim could be inferred on the basis that the figures added up. Slightly fewer decided the claim could not be inferred because the figures did not add up. The only frequently-seen creditworthy response highlighted the inclusion of the one-off installation saving as part of a claim about potential annual savings, but candidates rarely expressed this well enough to achieve both marks. Some candidates also hinted at the conflated use of 'taxpayer' and 'homeowner' but this was never expressed well enough to achieve both marks. The generalisation from E4U to the whole of the REUS was noted by a handful of candidates.

Question 2

A small majority of candidates understood the requirements of this question and made a good attempt to analyse the passage and identify the structural elements underlying the argument. Of those who demonstrated competence, credit was often lost due to imprecision when identifying the important statements from the passage, especially with regard to the main conclusion. Important parts were often omitted, and irrelevant parts or additional commentary were sometimes included.

Question 3

This question tests the essential skills of evaluation, CT4 and CT6 which lie at the heart of critical thinking activity. It is very apparent that a fair number of candidates are confused in their minds about the difference between 'literary criticism' and 'critical thinking'. **Question 3** requires candidates to identify and explain flaws and other weaknesses in the reasoning of an argument in order to assess the degree to which the main conclusion is supported. This becomes more difficult if candidates have not mastered the fundamental skill of identifying the main conclusion of an argument, as required in **Question 2**. The term 'implicit assumption' is still not understood by many, with many responses such as "*it assumes that obese people consume food to excess without thinking of others*" seen. Candidates need to understand this term properly, and should realise that merely challenging all the author's claims, offering counter-assertions or saying that there is no evidence to support them does not demonstrate any skill at evaluating the reasoning of arguments, and hence will gain no credit.

Some over-reacted to the author's remarks about 'obese' people and attacked the author vehemently, dismissing the whole argument.

It is noteworthy that a fair number of candidates made a good attempt at giving an overall evaluation, and where this was well explained and had relevant bearing on the main conclusion they accessed two marks.

Question 4

Many candidates addressed this question only partly, coming to misplaced or incomplete conclusions – e.g. that food wastage was wrong, that food-wasters should be held accountable, or that starvation is the problem of the developing nations and developed countries should not be held accountable – thereby failing to address the moral angle of the question. The best responses were able to: focus on the key phrases in the question ("waste food...moral accountability...hunger of others"); judiciously select arguments across the given sources, with critical commentary; integrate inferences with their own viewpoints; build a clear and cogent case encompassing all three dimensions of the question, supporting a clear conclusion.

It is evident that a considerable number of candidates are not planning their responses. There were many digressions from the prompt, some candidates taking issue with the prompt as pointing a finger at developed nations; although there were some impressive responses where the definition of 'waste' was examined in context of moral accountability towards the hungry.

It is noted that those who did well in **Question 3** and those who tackled the content of Document 2 to form part of their answer generally produced the best responses. Candidates are in a better position to meet the assessment objectives if they ensure that they have understood the question and they plan their argument before starting to write it. Almost all of the best-performing candidates could have improved their answers further if they had anticipated counter-arguments to their own position.