THINKING SKILLS

Paper 9694/21
Critical Thinking

Key messages

Close study of the wording of questions and the number of marks allocated should enable candidates to know how far and in what direction to develop their answers.

General comments

This was the last occasion on which the old specification was examined. The range of performance was broadly similar to previous series. Most candidates attempted all questions, but a few omitted certain questions or apparently ran out of time before completing the exam.

Comments on specific questions

Question 1

The point of questions like this is to encourage young people to be sceptical about claims made by people in public life. Most candidates understood that, and judged correctly that there were good reasons for scepticism in relation to the claims made by Mr G during his election campaign.

Fictional scenarios like this will not appear in the new format of the exam, from June 2020 onwards, but the types of question which have occurred on this occasion and previously as **Questions 1(a)**, **1(b)** and **1(c)** will feature in the new **Question 1**. The equivalent of the current **Question 1(d)** will not occur in the new exam.

(a) In order to achieve full marks on this question, it was necessary to acknowledge that one member of Mr P's team was being investigated for a possible breach of election rules but to explain that for several reasons this fell far short of constituting evidence that Mr P's team was beginning to be exposed as corrupt. A fair number of candidates took this approach, although relatively few scored 3 marks out of 3. More judged wrongly that the document supported the headline well, because Mr G asserted that he had evidence against Mr P and his team.

(b) Because Source C contains several elements, there were potentially several evaluative points which could have been made about the document's credibility, relating to the report of Mr G's speech, his accusation against Mr P and the reception he received from his hearers. Few candidates if any responded in that much detail, most contenting themselves with identifying 'bias' or at best a vested interest to make Mr G look good and Mr P look bad.

(c) Most candidates realised that the reason why Mr G did not proceed with his threatened prosecution of Mr P for corruption was most probably that he had no evidence against him and had made false accusations in order to win the election. A few candidates gave answers based on the assumption that Mr G really did have evidence against Mr P and was being lenient by not referring it to the police: these were not credited, because they did not constitute 'alternative' explanations.

(d) Nearly all candidates, but not quite everyone, judged that Mr P was not guilty of corruption, and that Mr G had levelled false accusations as a way of influencing voters against him, but a few pointed out (either as their conclusion or as an alternative to be rejected) that his position as Vice-President doubtless gave him plenty of opportunities to benefit himself, his family and his friends. As in other recent series, a good proportion of candidates were awarded marks for their use of inferential reasoning and evaluation of sources, both of which will continue to be important in the new **Question 2**.

Question 2

Section A of the new exam will approximately resemble this question, although the new **Question 1** will have slightly more parts than the current **Questions 2(a)**, **2(b)** and **2(c)**. The new **Question 2** will resemble the current **Question 2(d)**, but with more marks attached to it.

(a) (i) Many candidates correctly identified the key point as being that 'girls mature earlier than boys', but very few completed their answer by drawing the inference that A Level grades are therefore not a good indicator of potential to succeed in adulthood. A few alternative inferences, such as that choosing applicants on the basis of A Level grades is unfair, were not credited.

(ii) Many candidates rightly proposed that a limitation on the choice of part-time working would follow from the author's reasoning, but most of these answers were awarded only 1 mark out of 2, because they were not realistic: for example, it would not be sufficient to favour candidates who *said* they intended to work full-time, because everyone would say that if they knew that doing so would gain them a place at medical school. A few candidates rightly identified creation of more places at medical school as another correct answer. Some candidates drew a conclusion *about* the source instead of *from* it, particularly inferring that the author was sexist, which was not credited. Others suggested alternative policies for admissions to medical school which did not follow from the reasoning in the source, or explained or supported the author's own proposal rather than suggesting an 'alternative' to it.

(b) Many candidates followed the first line of reasoning on the mark scheme, pointing out that the patients on whom the research was conducted were all over the age of 65, but not many completed the answer by suggesting that the findings might have been different if an alternative or a more inclusive age-range had been considered. A very few candidates followed the second line of thought, pointing out that the qualities of female doctors identified in the research were not the only elements of being a good doctor. Several wrong answers were not credited, including that the source was biased in favour of women, that the sample was too small, that no comparison was made with male doctors, that the claim committed a causal fallacy and that no explanation was offered as to why female doctors are better than male.

(c) Many candidates correctly observed that the higher proportion of female doctors under the age of 30 corroborated the claim in Source C that more women were now qualifying than men and that the data in Source D also supported the claim that more women than men chose to work in general practice. The most popular judgement, therefore, was that Source D supported the claims from Source C well; however, this judgement was not correct and was not credited. Far fewer candidates observed that certain claims – especially that many female doctors work part-time – were not supported by Source D and rightly made a more nuanced judgement. A significant minority of candidates missed the point of the question, by focusing on Dr Schwarz's proposal rather than his factual claims and recognising that Source D is irrelevant to that proposal. Some others thought Source D did not support Source C at all because the total number of male doctors is higher than female: they did not realise that the number of doctors under the age of 30 is a better indication of recent trends.

(d) Most candidates supported the claim. Some misunderstood it, thinking it was a recommendation that the number of female doctors *should* increase, rather than evaluating the *actual* increase. Another misunderstanding was that an increase in the number of female doctors would increase the overall number, rather than being a change in the *proportions* of the genders within the profession. Some candidates wrongly inferred from Source A that women remain more mature than men and are therefore better doctors.

Question 3

Section B of the new exam will approximately resemble this question, although the new **Question 3** will normally ask about more argument elements than just main and intermediate conclusions and the new **Question 4** will be significantly different in format from the current **3(c)**. The new **Question 5** will closely resemble the current **3(d)**, but more marks will be allocated to it.

(a) Most candidates correctly identified the main conclusion of the argument, even though it was not in a prominent or predictable position. Several wrong answers were also offered, none of which was more popular than the others. Some candidates cited the whole of the final paragraph as the main conclusion of the passage, but they were awarded 0 marks because this answer includes three additional elements. A small number of candidates appeared not to understand what the question was asking them to do, because they responded with an attempted précis of the whole argument instead of identifying and quoting a single clause.

(b) A fair number of candidates correctly identified three intermediate conclusions, while others spotted two, one or none. Popular wrong answers were the first two clauses of paragraph 2 and the claim 'Knowledge evolves over time' from paragraph 3.

(c) As on many previous occasions, many candidates disagreed so strongly with the ideas expressed in the passage that they could not evaluate its reasoning coolly. Almost all candidates believed that the knowledge they were currently gaining (or had recently gained) at high school would remain of value to them throughout their lives. Few candidates achieved more than 1 mark out of 5 for this question, and most scored 0. As on previous occasions, no credit was given for counter-arguments or for criticisms that the argument expressed the opinions of the (implied) author, failed to give a balanced view or lacked statistical support. Literary critiques and comments about alleged strengths in the reasoning were also not credited. Such misunderstandings of the nature of the task will be less likely to occur in the new format of the exam, but candidates will need to be familiar with the flaws and weaknesses identified in the specification. Another popular approach which was not credited was to identify various quotations from the passage as 'unstated assumptions'.

The most popular answers to receive credit criticised the generalisations in paragraphs 2 and 3, where claims which are arguably true of certain subjects studied at school have been broadened to apply to the whole curriculum. Some candidates criticised the passage for claiming that all textbooks were old, but that was a misunderstanding: the argument actually claimed that the knowledge in textbooks was out of date, even if they were recently published.

(d) On this occasion, most candidates chose to challenge the claim, arguing either that it was unfair or unrealistic to restrict the age-range of teachers or that young teachers had certain advantages over the older generation in relation to up-to-date subject knowledge, ability to use modern educational technology or relationships with candidates. A fair number of candidates achieved 5 marks out of 5, by providing developed arguments including one or more intermediate conclusions or other argument elements.

THINKING SKILLS

Paper 9694/22
Critical Thinking

Key messages

- Some candidates identify the content of the source(s) that allows an inference to be made (which is often the answer to a question) but simply repeat it without making the inference. The effect of this is that they tend to repeat what the source says leaving the significance still implicit and therefore fail to answer the question effectively. This was particularly in evidence on **Questions 1(a)** and **(b)**.

- Some candidates are looking for answers from information in the sources where the question requires the application of their own thinking, for example **Question 2(c)**.

General comments

There was a broad range of performance, although only a minority of candidates achieved a mark over 30. At the other end of the mark range there was, as usual, quite a long 'tail' of candidates who were poorly prepared for the paper and who struggled, and frequently failed, to reach a mark in double-figures. Well-prepared candidates seemed to respond well to the issues raised by the questions and were able to tackle them effectively.

Comments on specific questions

Question 1

Fictional scenarios like this will not appear in the new format of the exam, from June 2020 onwards, but the types of question which have occurred on this occasion and previously as **Questions 1(a)**, **1(b)** and **1(c)** will feature in the new **Question 1**. The equivalent of the current **Question 1(d)** will not occur in the new exam.

(a) (i) This question was not done well with many candidates simply repeating points already made relating to general disorganisation. They key emphasis in the question was on the numbers and the correct answer should have made the point that the screening authorities should have known the numbers expected as an aircraft has a specific number of passengers on take-off.

(a) (ii) This was answered more successfully, although a number of candidates simply quoted the point that the enquiry found the airport was 'busy, disorganised and chaotic'. This is simply a re-statement of the claim that is stated at the start of the question and could not be treated as evidence for that claim.

(b) A reasonable number of candidates saw that the significance was that the screening authorities would have a motive to find a scapegoat for the failure of the screening process.

(c) This question was done quite well with a reasonable number of candidates seeing the significance of the information as regards implicating Patel in the subverting of the screening process. Some candidates spent too long on the credibility of the witness with speculative comments on bias (or lack of it) and inability to hear, which could not be allowed because they were speculative. The only thing we are told is that this is what the witness heard, which does allow one to make the simple point that credibility is increased by being an eye-witness with ability to see/hear.

(d) Candidates were fairly evenly split between those who saw Patel to blame for the failure and those who did not. Some candidates tried to sit on the fence and say it was a mixture of both but it is important in this question to come to a definite judgement, ideally rejecting the alternative. A complicating factor was the fact that the misconduct enquiry was against the colleague who took Patel's temperature, not Patel, and some candidates got rather 'bogged down' in this issue. The key question (that has no definite answer) is, 'would a medical professional returning from an area where she had been treating victims with a deadly virus ignore symptoms consistent with having contracted that virus?'

Question 2

Section A of the new exam will approximately resemble this question, although the new **Question 1** will have slightly more parts than the current **Questions 2(a)**, **2(b)** and **2(c)**. The new **Question 2** will resemble the current **Question 2(d)**, but with more marks attached to it.

(a) This question was done well with many candidates identifying at least two reasons. The best answers were brief, making the most obvious points about expense and many people being outside when the earthquake occurred.

(b) This was also done quite well though most candidates tended to confine themselves to the first point about concrete with steel bars seeming to be acceptable, as the evidence was about older buildings without this feature. Only a minority of candidates made the point that the evidence was only relevant to areas of the world that suffered from earthquakes.

(c) Most candidates tackled this question effectively, with increased population or frequency of earthquakes being popular answers. As mentioned in the key comments, some candidates tried to use the material in the other sources (e.g. about 'base isolation devices') and this was not usually successful.

(d) Most candidates agreed with the proposition but only a minority showed good critical thinking skills by questioning the generalisation to the whole of nature. A significant number of candidates disagreed with the proposition on the grounds that nature could not be tamed, presumably on the grounds that one cannot fail if the task one is asked to accomplish is impossible. Whilst an interesting philosophical point, a more straightforward position is to see earthquakes as a key example of the inability of humans to tame nature, supporting the proposition in the question. Many candidates were able to make good use of the sources to show that technologies mitigating the effects of earthquakes had been developed but this hardly amounted to 'taming the forces of nature'.

Question 3

Section B of the new exam will approximately resemble this question, although the new **Question 3** will normally ask about more argument elements than just main and intermediate conclusions and the new **Question 4** will be significantly different in format from the current **3(c)**. The new **Question 5** will closely resemble the current **3(d)**, but more marks will be allocated to it.

(a) A sizeable minority correctly identified the main conclusion. The intermediate conclusion 'dogs are an essential part of the cultural development of human society' was equally popular.

(b) Many candidates identified at least one intermediate conclusion, and failure to identify the main conclusion does not seem to have hampered candidates in answering this part of **Question 3**.

(c) Very few candidates identified a sufficient number of assumptions or flaws to gain five marks. Those who did usually identified the appeal to history in paragraph 1 and/or the contradiction about small/large dogs and old people in paragraphs 4 and 5. A number of candidates got bogged down in the points in paragraph 2, either challenging what was said or wrongly identifying assumptions. Easier evaluation points could be made about the other paragraphs. The nature of the topic seemed to encourage a great deal of counter-argument, which is not what is being looked for in answering this question.

(d) There was a reasonably even split between those arguing for and against the proposition. Arguments against frequently cited over or in-breeding, with pugs often being mentioned as an example of the resulting deformities. Arguments for tended to dwell on the constant supply of food

and warm bedding that dogs enjoy as opposed to them surviving in the wild. It is important that candidates pursue a consistent line of argument in answering this question, either for or against the proposition, with any points raised against the line of argument firmly countered. Some candidates reviewed points for and against the proposition and this more 'essay-style' of approach is not appropriate. A minority of candidates argued why humans had benefited from their association with dogs and such answers could not receive credit.

THINKING SKILLS

Paper 9694/23
Critical Thinking

Key messages

Close study of the wording of questions and the number of marks allocated should enable candidates to know how far and in what direction to develop their answers.

General comments

This was the last occasion on which the old specification was examined. As in previous series, there was a wide range of performance.

A few candidates omitted **Question 3(c)**, but everyone seemed to have time to finish the paper.

Comments on specific questions

Question 1

Fictional scenarios like this will not appear in the new format of the exam, from June 2020 onwards, but the types of question which have occurred on this occasion and previously as **Questions 1(a)**, **1(b)** and **1(c)** will feature in the new **Question 1**. The equivalent of the current **Question 1(d)** will not occur in the new exam.

(a) The most popular answer was that the newspaper had vested interest to publish whatever the Government wanted, but a fair number of candidates also recognised that HB's confession was unreliable because it was almost certainly obtained by torture. A few candidates made comments unrelated to reliability, which were not credited.

(b) Many candidates recognised that the obvious alternative to suicide was that AJ was killed, although not many gained the second mark by suggesting a motive behind such an action. Some candidates misunderstood the question and tried to think of alternative motives for AJ to have committed suicide.

(c) Most candidates came up with at least one valid suggestion for the Chief of Staff's motivation in announcing that the President's unborn son would be declared heir to the Presidency, but not many thought of three answers. The most popular answers referred to the Chief of Staff's desire to benefit himself, his daughter and his grandson. Some answers were not credited because they did not focus specifically on the suggestion that the President's unborn son would be declared Heir to the Presidency.

(d) Most candidates thought that AJ was not guilty of adultery or treason, and that she had been framed and murdered on the orders of the Chief of Staff for the sake of political stability in the country and for the benefit of his own family. Some of the minority who thought AJ was guilty suggested that because she was pregnant before she married the President, the baby might have been HB's rather than the President's. Many candidates made good use of evaluation of sources and inferential reasoning, some of them exceeding the requirements for full marks.

Question 2

Section A of the new exam will approximately resemble this question, although the new **Question 1** will have slightly more parts than the current **Questions 2(a)**, **2(b)** and **2(c)**. The new **Question 2** will resemble the current **2(d)**, but with more marks attached to it.

(a) A lot of answers were available for this question, and some candidates identified two of them, but many answers were generic or speculative instead of being based on the stated methodology of the experiment. Very few candidates spotted the most significant (and arguably most obvious) weakness in the experiment, namely that the researcher showed participants only the list of attributes which should have applied to them, according to the theory, instead of offering them a choice between the three lists. The most popular answer, which was not credited, was that the number of respondents may have been small, even though the question stated that it was 'large'. Some candidates evaluated Adler's theory instead of the student's experiment, particularly criticising it for having been written about a century ago, but this was not credited, because it was not what the question asked.

(b) Nearly all candidates achieved at least 1 mark for this question, by recognising the challenge which some atypical families presented to Adler's theory. Some candidates judged wrongly that the information did contradict the theory, but others recognised that the additional evidence supported the theory, while requiring it to be modified to take account of some unusual families.

(c) A fair number of candidates realised that the key points were high-risk behaviour during pregnancy and lack of mental stimulation, but fewer used this information to suggest both that pregnant women could avoid high-risk behaviour and that families could provide more mental stimulation to younger children. Some candidates misinterpreted the passage and thought children of one age were being compared with siblings who were younger at the time.

(d) Nearly all candidates disagreed with the claim, but many of them found it difficult to make use of the sources in defence of their opinion. Since all the sources were consistent with the claim, in order to challenge the claim it was necessary to emphasise the speculative nature of Source A and the provisional nature of Sources C and D. Candidates should be advised that in responding to questions of this kind they do not necessarily have to argue in support of their own opinion.

Question 3

Section B of the new exam will approximately resemble this question, although the new **Question 3** will normally ask about more argument elements than just main and intermediate conclusions and the new **Question 4** will be significantly different in format from the current **3(c)**. The new **Question 5** will closely resemble the current **3(d)**, but more marks will be allocated to it.

(a) Many candidates correctly identified the main conclusion of the argument, but some of them scored 1 mark out of 2 because they quoted the whole sentence instead of only the second half. The last clause of the first paragraph was a popular wrong answer.

(b) Fewer candidates than in other series scored 3 marks out of 3 on this question. Many correctly identified the first sentence of paragraph 2 and the final sentence of paragraph 5 as intermediate conclusions, but fewer identified the other ICs and many wrong answers were offered. The last clause of paragraph 3 was a popular wrong answer, despite being introduced by the conjunction 'since', which should have indicated that the first half of the sentence, not the second, is an intermediate conclusion. The counter-claims in paragraphs 3 and 4 were also wrongly identified as intermediate conclusions by a significant number of candidates.

(c) A few candidates performed well in this question, achieving 4 or 5 marks out of 5. Many candidates challenged the claim in paragraph 3 that 'all forms of punishment are themselves acts of violence', but few if any explained that this claim relied on a very broad implicit definition of violence. Many candidates correctly identified the Personal Attack (*ad hominem*) flaw in paragraph 4, but few if any observed that it was not very flawed because it was supported by reasoning. A fair number of candidates recognised that the intermediate conclusion in paragraph 5 was stronger than the reasoning justified.

Some candidates thought the author had contradicted himself when he quoted a counter and then responded to it.

As on previous occasions, no credit was given for counter-arguments or for criticisms that the argument expressed the opinions of the (implied) author, failed to give a balanced view or lacked statistical support. Literary critiques and comments about alleged strengths in the reasoning were also not credited. Such misunderstandings of the nature of the task will be less likely to occur in the new format of the exam, but candidates will need to be familiar with the flaws and weaknesses identified in the specification. Another popular approach which was not credited was to identify various quotations from the passage as 'unstated assumptions'.

(d) The claim to be discussed on this occasion was quite difficult, but some candidates achieved 5 marks out of 5, by providing developed arguments including one or more intermediate conclusions or other argument elements. A significant minority achieved only 1 or 2 marks for stating various opinions loosely related to the topic of peace, without embodying them in an argument supporting or challenging the specific claim stated. Some candidates interpreted 'peace' as the opposite of 'crime', which is not its core meaning.

THINKING SKILLS

Paper 9694/31
Problem Analysis and Solution

Key messages

Questions 1, **2** and **4** attracted gratifying amounts of supporting working, which allowed many candidates to gain partial credit for their attempts even if the final answer was incorrect. Candidates' efforts to present answers to **Question 3** were often too sparsely presented or disorganised to gain marks for method – this may have been partly due to the fact that it was less obvious how to refer to the different journey distances, times and directions required, and so many of the worked solutions were unaccompanied by the brief commentary that would enable a marker to establish what process the candidate was using.

General comments

All of the scenarios offered here required candidates to initially take in a logical structure and a collection of numerical details: the correct assimilation of these parts, and in particular the logical relations between the parts, was vital for an attempt at the questions to be fruitful. The number of candidate solutions which depended upon hasty simplifications of what was given on the Question Paper showed how easy it is to omit or misread what is given. Examples in this exam paper included: assuming that the pieces of ribbon used in **Question 1** started at the beginning of a new coloured section each time; assuming that one country could trust another's policies whether they were secret or not in **Question 2**; forgetting that everyone else walking on the path knew how far away the hostels were in **Question 3**; appreciating that the times it took the ferries to travel were not the same as the times in between departures in **Question 4**. Misjudging any of these logical insights derailed candidate approaches to much of the question. Candidates must be encouraged to be alert to such nuances and details, and to highlight/underline all key information.

As always, a number of questions required explanations as well as numerical answers, and candidates should consider what level of detail is needed to show that they have understood the essential logic. Sometimes a single, carefully chosen calculation can demonstrate understanding (as in **1(a)**); sometimes it is required to make precise claims about the problem's mechanism not given in the question, in order to demonstrate understanding (as in **1(c)(ii)**).

Comments on specific questions

Question 1

This question involved a procession of related problems, stemming from a simple repeating pattern applied to a simple three-dimensional problem. The problem solving elements arose from the fact that the decision points of the problem were sufficiently deep into the pattern to require short-cuts, changes of focus and generalisations to answer correctly under time pressure.

(a) This question allowed candidates to check that they understood the basic wrapping process – by confirming that the length of string was 124 cm. Fairly low expectations were set as to what was expected for the demonstration: any sum that included the appropriate multiples of 20s, 10s and 12s was awarded a mark.

(b) (i) Focusing on the critical values at which the red sections began (0, 30, 60, 90, 120) allowed candidates to deduce that 44 cm were needed. The most common wrong answer here was 40 cm, but there was normally very little working shown.

(ii) Candidates needed to track the critical values for the red sections and the critical values for each new ribbon (0, 124, 248, 372, …) in order to answer this. As with **(a)(i)** there was often little working shown on the answer sheet, and less than half the candidates offered a correct answer to this.

(iii) This required candidates to continue the process initiated in **(i)** and **(ii)**, and track their answers. There was no need to look for deeper patterns, and any detailed organised approach was likely to yield the correct answer. It is likely that the size of the investigation may have put off some candidates who then hypothesised patterns and predictions from the answers to **(i)** and **(ii)**, often wrongly.

(c) (i) This question returned to the analysis of the wrapping process, and how that would be affected by a change of design. No diagram was offered, and so candidates needed to find a way of modelling the effect of the change – with a sketch or a list of the component pieces – and then for comparing the two total lengths. Many candidates took hasty short-cuts here (such as multiplying all three dimensions by 3, or forgetting about the bow), and a substantial minority offered an answer for how much ribbon would be used to wrap a stack (but forgetting to compare with the amount needed to wrap all three separately).

(ii) The standard of explanation required here was higher than that for **part (a)**: the candidate had to demonstrate that they were not just 'working backwards from the answer'. As an example, an answer which said, *'The height affects both the wrapping methods in the same way, so the difference would be the same'* is an answer which is not wrong, but which could have been offered as a deduction based on what was said in the question, rather than by consideration of the problem itself. So it would have scored no marks. When candidates are considering whether they have given enough information they need to consider whether they have offered detail which could only be delivered by someone who understands the mechanics of the problem.

Question 2

This question involved the analysis of trust networks: a simple extension of a network diagram, about which candidates were not expected to have any prior knowledge.

(a) (i) The correct answer involved a loop of arrows that ensures that A can trust B, who can trust C, who can trust D, who can trust A. Hence 4 policies are all that are needed.

(ii) Most candidates drew a diagram here, and established that each of the 4 countries needed 3 policies, if they could not depend on knowing the published policies of others. The key information needed to deduce this was contained in the sentences directly above **(a)(i)** describing the associativity of the relation, 'so long as A knows about each policy'. Many candidates did not appreciate the significance of this restriction and offered the same answer for **(ii)** as for **(i)**.

(b) Many candidates were able to offer a diagram in which all the five countries were able to trust each other – but a diagram showing the minimum number of connections was needed to score 2 marks ('How many more … would be <u>needed</u> so that ...').

(c) (i) This question required confidence to explore how such a federation could be constructed. It was not immediately clear how to arrange things so that a 2 step minimum was achieved, and there were pages of experimental diagrams accompanying the varied answers that candidates offered. A few looked at the problem applied to smaller networks, and then extrapolated. Many appreciated that the solution was likely to be symmetrical. There were a number of ways of representing the correct network, but the most common involved a single 'node' surrounded by six others regularly spaced around it, with a double arrow out from the centre to each of the six.

(ii) A number of candidates offered answers to **(c)(ii)** unsupported by comprehensible answers to **(c)(i)**, but were still able to gain credit.

(d) This problem did not depend on the structural insights of **2(c)**, but many candidates did not attempt it, perhaps chastened by their struggles with the previous question. There was only one mark available here, so those who showed that they understood what the longest chain would now be '5', but failed to address the difference, were awarded no marks.

(e) This question required candidates to identify the significant difference between the two networks (the fact that one of the nodes required 3 steps in Skip 1, and 2 steps in Skip 2) and articulate this

clearly. The appropriate measure (the number of steps to each other node) was not immediately obvious, and there was a wide variety of descriptive answers. No marks were awarded for the answer 'Skip 2' without a comprehensible explanation.

Question 3

This question involved times and distances travelled in two directions along a path, and what could be deduced from them. As a result, the inferences and optimisations that were at the heart of the problem were obscured by their representation (both involving a compound measure, speed, and an unwieldy unit, time). Most candidates attempted the questions, although some clearly struggled with the inferences.

(a) There was a fair amount of information to ingest at the start of this question, and a number of candidates offered the answer '36 km' or '12 km'. The correct answer involved appreciating that the other walker could only have walked for 5 hours at 3 km/h, and Peregrine had already walked 12 km.

(b) Most of those who answered **(a)** correctly also managed to answer this correctly. Some became entangled in distance/speed/time calculations, which could be avoided (given that both walkers were going at the same speed).

(c) The most common answer for this was 13:30, which is the latest time Peregrine can turn around if he is make if back to his starting point before dark (4.5 hours out and 4.5 hours back). But this was not what the question wanted. If he encountered anyone up to 12:00, they would be evidence that he would make it to his destination in time (for instance, someone encountered at 11:30 was evidence that the next hostel was no more than $5.5 \times 3 = 17.5$ km away, a distance Peregrine could walk before dusk). But no walkers after 12:00 could offer this guarantee: so he could never know how far it was, and could only walk forlornly on until 13:30 and then turn round. This last section would be pointless: he should turn around at 12:00.
Very few candidates managed to answer this correctly.

(d) The answer to this question did not depend on the subtleties of **(c)**, and many candidates answered it correctly. The walker who would be furthest away must have started at 06:00, and turned around at midday. At this point they were 9 km apart, and would meet 1.5 hours later (at 13:30). Many candidates showed little working for this, and so were awarded 2 marks or nothing.

(e) The demands of this problem did encourage many candidates to offer substantial working, and this enabled many to gain partial credit even if they could not offer a correct final answer. In particular, many candidates appreciated that the picnickers would stop 8 km away from Peregrine's starting point. An additional piece of analysis was needed to ascertain when Peregrine would meet them.

(f) (i) Many candidates were tempted to give the answer 4 hours (the maximum time that would enable Peregrine to reach the hostel by nightfall). But the fact that the family were sure that they would reach it by nightfall implies that it was a maximum of 8 km away. There was only one mark available here, so the correct deduction (of $(8 \div 3)$ hours) was necessary to gain credit.

(ii) Once again, it is tempting to say 17:59 or 18:00, but such a family would had walked $12 \times 2 = 24$ km starting at 06:00, and Peregrine would have passed them at 15:00 if he started at 09:00. This is the latest time he could pass a family, and there were a number of ways to deducing this. Most candidates found the tracking of the two 'parties' (Peregine and a family), travelling at different speeds (3 km/h and 2 km/h) starting at different times (09:00 and 06:00) too hard to model.

(g) This question required a similar approach to **(f)(ii)**, and caused similar difficulties. In this case we can assume that the runner passed Peregrine at the very end of his walk (at 18:00) and work back from there. A number of candidates appreciated that the runner had taken (21 ÷ 5) hours, but only a few correctly put the two pieces of information together and concluded 12:45 pm.

Question 4

This question involved the tracking of ferries (and people) whose behaviour was summarised in a schematised map and timetable (combined with a fairly simple tariff). The tracking was made harder by the need to cope with the arrival times as distinct from the departure times, the roll-over nature of the timetables, and the difficulties that candidates have manipulating times (when they are under time pressure themselves).

(a) This tested candidates appreciation of how the timetable worked (CDMDC ...) and how the times on the map must fit with the timetable (31 minutes from C to D, leaving at 8:00, must imply a 6 minute wait in D before setting off to M at 08:37). These two insights were easy to lose amongst the mass of information, and most candidates managed to offer an answer that depended on one misinterpretation. These tended to be awarded one mark out of two.

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(c) This free-standing problem, independent of the timings and cycles of the ferry timetables, was accomplished well. A number of candidates offered a table showing the number of visitors on the island after each ferry. Partial credit was given to those who appreciated this logic, but gave the number on the island at an 'adjacent' time.

(d) This question was also independent of the timetables, and was tackled fairly well by most candidates. Most candidates did break their working down (offering the price of the Day Roamer tickets and the price to Ockelman Island and back), and so gained partial credit.

(e) This question did not involve the timetables; it did present a potentially daunting search (finding multiples of $15 and $9 which added to $1059) towards the end of the paper. The question could be dealt with by parsing it algebraically and solving the linear equations that emerged, but there were few examples of candidates using this technique. Most chose to combine some 15s and 9s, find their sum, and then adapt their numbers accordingly.

(f) Nearly half the candidates sitting the paper omitted this question altogether – which may have been due to time mismanagement, or due to perceived difficulties in answering the question. I suspect for many it was the former, since it was fairly easy to begin a solution (by listing the times of ferries that Susie might take, starting at Carleton). Partial credit was awarded for any solution that correctly showed the arrival times in Munro via the two routes.

THINKING SKILLS

Paper 9694/32
Problem Analysis and Solution

Key messages

Questions 1, **2** and **4** attracted gratifying amounts of supporting working, which allowed many candidates to gain partial credit for their attempts even if the final answer was incorrect. Candidates' efforts to present answers to **Question 3** were often too sparsely presented or disorganised to gain marks for method – this may have been partly due to the fact that it was less obvious how to refer to the different journey distances, times and directions required, and so many of the worked solutions were unaccompanied by the brief commentary that would enable a marker to establish what process the candidate was using.

General comments

All of the scenarios offered here required candidates to initially take in a logical structure and a collection of numerical details: the correct assimilation of these parts, and in particular the logical relations between the parts, was vital for an attempt at the questions to be fruitful. The number of candidate solutions which depended upon hasty simplifications of what was given on the Question Paper showed how easy it is to omit or misread what is given. Examples in this exam paper included: assuming that the pieces of ribbon used in **Question 1** started at the beginning of a new coloured section each time; assuming that one country could trust another's policies whether they were secret or not in **Question 2**; forgetting that everyone else walking on the path knew how far away the hostels were in **Question 3**; appreciating that the times it took the ferries to travel were not the same as the times in between departures in **Question 4**. Misjudging any of these logical insights derailed candidate approaches to much of the question. Candidates must be encouraged to be alert to such nuances and details, and to highlight/underline all key information.

As always, a number of questions required explanations as well as numerical answers, and candidates should consider what level of detail is needed to show that they have understood the essential logic. Sometimes a single, carefully chosen calculation can demonstrate understanding (as in **1(a)**); sometimes it is required to make precise claims about the problem's mechanism not given in the question, in order to demonstrate understanding (as in **1(c)(ii)**).

Comments on specific questions

Question 1

This question involved a procession of related problems, stemming from a simple repeating pattern applied to a simple three-dimensional problem. The problem solving elements arose from the fact that the decision points of the problem were sufficiently deep into the pattern to require short-cuts, changes of focus and generalisations to answer correctly under time pressure.

(a) This question allowed candidates to check that they understood the basic wrapping process – by confirming that the length of string was 124 cm. Fairly low expectations were set as to what was expected for the demonstration: any sum that included the appropriate multiples of 20s, 10s and 12s was awarded a mark.

(b) (i) Focusing on the critical values at which the red sections began (0, 30, 60, 90, 120) allowed candidates to deduce that 44 cm were needed. The most common wrong answer here was 40 cm, but there was normally very little working shown.

(ii) Candidates needed to track the critical values for the red sections and the critical values for each new ribbon (0, 124, 248, 372, …) in order to answer this. As with **(a)(i)** there was often little working shown on the answer sheet, and less than half the candidates offered a correct answer to this.

(iii) This required candidates to continue the process initiated in **(i)** and **(ii)**, and track their answers. There was no need to look for deeper patterns, and any detailed organised approach was likely to yield the correct answer. It is likely that the size of the investigation may have put off some candidates who then hypothesised patterns and predictions from the answers to **(i)** and **(ii)**, often wrongly.

(c) (i) This question returned to the analysis of the wrapping process, and how that would be affected by a change of design. No diagram was offered, and so candidates needed to find a way of modelling the effect of the change – with a sketch or a list of the component pieces – and then for comparing the two total lengths. Many candidates took hasty short-cuts here (such as multiplying all three dimensions by 3, or forgetting about the bow), and a substantial minority offered an answer for how much ribbon would be used to wrap a stack (but forgetting to compare with the amount needed to wrap all three separately).

(ii) The standard of explanation required here was higher than that for **part (a)**: the candidate had to demonstrate that they were not just 'working backwards from the answer'. As an example, an answer which said, *'The height affects both the wrapping methods in the same way, so the difference would be the same'* is an answer which is not wrong, but which could have been offered as a deduction based on what was said in the question, rather than by consideration of the problem itself. So it would have scored no marks. When candidates are considering whether they have given enough information they need to consider whether they have offered detail which could only be delivered by someone who understands the mechanics of the problem.

Question 2

This question involved the analysis of trust networks: a simple extension of a network diagram, about which candidates were not expected to have any prior knowledge.

(a) (i) The correct answer involved a loop of arrows that ensures that A can trust B, who can trust C, who can trust D, who can trust A. Hence 4 policies are all that are needed.

(ii) Most candidates drew a diagram here, and established that each of the 4 countries needed 3 policies, if they could not depend on knowing the published policies of others. The key information needed to deduce this was contained in the sentences directly above **(a)(i)** describing the associativity of the relation, 'so long as A knows about each policy'. Many candidates did not appreciate the significance of this restriction and offered the same answer for **(ii)** as for **(i)**.

(b) Many candidates were able to offer a diagram in which all the five countries were able to trust each other – but a diagram showing the minimum number of connections was needed to score 2 marks ('How many more … would be <u>needed</u> so that ...').

(c) (i) This question required confidence to explore how such a federation could be constructed. It was not immediately clear how to arrange things so that a 2 step minimum was achieved, and there were pages of experimental diagrams accompanying the varied answers that candidates offered. A few looked at the problem applied to smaller networks, and then extrapolated. Many appreciated that the solution was likely to be symmetrical. There were a number of ways of representing the correct network, but the most common involved a single 'node' surrounded by six others regularly spaced around it, with a double arrow out from the centre to each of the six.

(ii) A number of candidates offered answers to **(c)(ii)** unsupported by comprehensible answers to **(c)(i)**, but were still able to gain credit.

(d) This problem did not depend on the structural insights of **2(c)**, but many candidates did not attempt it, perhaps chastened by their struggles with the previous question. There was only one mark available here, so those who showed that they understood what the longest chain would now be '5', but failed to address the difference, were awarded no marks.

(e) This question required candidates to identify the significant difference between the two networks (the fact that one of the nodes required 3 steps in Skip 1, and 2 steps in Skip 2) and articulate this

clearly. The appropriate measure (the number of steps to each other node) was not immediately obvious, and there was a wide variety of descriptive answers. No marks were awarded for the answer 'Skip 2' without a comprehensible explanation.

Question 3

This question involved times and distances travelled in two directions along a path, and what could be deduced from them. As a result, the inferences and optimisations that were at the heart of the problem were obscured by their representation (both involving a compound measure, speed, and an unwieldy unit, time). Most candidates attempted the questions, although some clearly struggled with the inferences.

(a) There was a fair amount of information to ingest at the start of this question, and a number of candidates offered the answer '36 km' or '12 km'. The correct answer involved appreciating that the other walker could only have walked for 5 hours at 3 km/h, and Peregrine had already walked 12 km.

(b) Most of those who answered **(a)** correctly also managed to answer this correctly. Some became entangled in distance/speed/time calculations, which could be avoided (given that both walkers were going at the same speed).

(c) The most common answer for this was 13:30, which is the latest time Peregrine can turn around if he is make if back to his starting point before dark (4.5 hours out and 4.5 hours back). But this was not what the question wanted. If he encountered anyone up to 12:00, they would be evidence that he would make it to his destination in time (for instance, someone encountered at 11:30 was evidence that the next hostel was no more than $5.5 \times 3 = 17.5$ km away, a distance Peregrine could walk before dusk). But no walkers after 12:00 could offer this guarantee: so he could never know how far it was, and could only walk forlornly on until 13:30 and then turn round. This last section would be pointless: he should turn around at 12:00.
Very few candidates managed to answer this correctly.

(d) The answer to this question did not depend on the subtleties of **(c)**, and many candidates answered it correctly. The walker who would be furthest away must have started at 06:00, and turned around at midday. At this point they were 9 km apart, and would meet 1.5 hours later (at 13:30). Many candidates showed little working for this, and so were awarded 2 marks or nothing.

(e) The demands of this problem did encourage many candidates to offer substantial working, and this enabled many to gain partial credit even if they could not offer a correct final answer. In particular, many candidates appreciated that the picnickers would stop 8 km away from Peregrine's starting point. An additional piece of analysis was needed to ascertain when Peregrine would meet them.

(f) (i) Many candidates were tempted to give the answer 4 hours (the maximum time that would enable Peregrine to reach the hostel by nightfall). But the fact that the family were sure that they would reach it by nightfall implies that it was a maximum of 8 km away. There was only one mark available here, so the correct deduction (of $(8 \div 3)$ hours) was necessary to gain credit.

(ii) Once again, it is tempting to say 17:59 or 18:00, but such a family would had walked $12 \times 2 = 24$ km starting at 06:00, and Peregrine would have passed them at 15:00 if he started at 09:00. This is the latest time he could pass a family, and there were a number of ways to deducing this. Most candidates found the tracking of the two 'parties' (Peregine and a family), travelling at different speeds (3 km/h and 2 km/h) starting at different times (09:00 and 06:00) too hard to model.

(g) This question required a similar approach to **(f)(ii)**, and caused similar difficulties. In this case we can assume that the runner passed Peregrine at the very end of his walk (at 18:00) and work back from there. A number of candidates appreciated that the runner had taken (21 ÷ 5) hours, but only a few correctly put the two pieces of information together and concluded 12:45 pm.

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THINKING SKILLS

Paper 9694/33
Problem Analysis and Solution

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(f) Nearly half the candidates sitting the paper omitted this question altogether – which may have been due to time mismanagement, or due to perceived difficulties in answering the question. I suspect for many it was the former, since it was fairly easy to begin a solution (by listing the times of ferries that Susie might take, starting at Carleton). Partial credit was awarded for any solution that correctly showed the arrival times in Munro via the two routes.

THINKING SKILLS

Paper 9694/41
Applied Reasoning

Key messages

- Most candidates gained very few marks in **Question 1**.
- In **Question 2** many candidates knew exactly what to do and gained most or all of the available marks.
- In **Question 3** most candidates did as they were asked and attempted to evaluate the reasoning but few achieved very many marks.
- In **Question 4** many candidates created their own argument structure, ignoring the sequence in which the documents are presented, but few engaged *critically* with the documents provided.

General comments

Most candidates appeared to have enough time to finish the paper – only very few appeared to have run out of time. Often, those who did not have time to complete **Question 4** had spent a disproportionately long time on previous questions, although such responses were in the minority.

The standard of candidates varied greatly but there was evidence that many candidates had been prepared with regard to answering **Questions 2**, **3** and **4**.

Comments on specific questions

Question 1

(a) Candidates were presented with some statistical evidence and asked to make some criticisms of the evidence presented. The full range of scores, from 0 to 3, was seen, although the vast majority of responses were awarded no marks. Most commonly, candidates gained marks for reference to one of the examples, Lemmy from Motörhead, being from the wrong year. Other points that regularly gained credit were criticisms of the unreliability of memory, the conflation of 'famous people' with 'people with whom the author is familiar' and questions about the annual variation and pre-2012 figures. Other marking points were rarely, if ever, seen. Some candidates alluded to creditworthy points but responses were insufficiently well expressed; a response that states 'we do not know the figures for any other years' is not as good as one that states' the pre-2012 average might have been higher'. Some candidates criticised the credibility of the evidence provided and received no credit.

(b) Remarkably few candidates were able to offer a plausible alternative explanation for a perceived increase in celebrity deaths in 2016. Some merely confirmed that there had been such an increase or suggested a reason for an increase in celebrity deaths.

Question 2

This question rewarded the well-prepared candidate. Those who knew what was expected and attempted an analysis of the argument usually gained five marks easily and many gained all 6. Although there were fewer elements to identify, candidates were generally able to identify the ones that were there. Very few candidates provided a non-creditworthy summary or gist. As ever, some candidates, particularly those sitting Paper 41, are still unaware that quoting from the text is an appropriate, indeed a required, way to answer this question.

Question 3

Most candidates were aware of the nature of the task and attempted to evaluate the passage. However, most found the passage quite challenging and only a minority of candidates were able to gain marks. Historically, very few candidates have been able to identify assumptions, indeed many appear not to have learned that an assumption must not be stated in the text. However, on this occasion assumption marks were regularly credited. Points that were awarded marks were as follows: the assumption that the natural state is desirable; the straw man in paragraph 2; the assumption that increased spread of information results in people being well-informed; the confusion of social media posts with social network users; the assumption that not being in paid employment makes it more likely that you will post on social media; the relevance of the statistic about women who are not in paid employment to increasing the number of women senior business executives; the assumption that social networks can provide the same sort of career benefits as 'social clubs and other organisations'; the inconsistency between women taking over the majority of senior business roles and the aim of gender equality; the assumption that rapid political change is a good thing, and, once, the assumption that 'fun' is 'good'.

Question 4

Candidates were required to use the documents and their own ideas to construct a reasoned case to support or challenge the conclusion that online social networking is good for society. Many found they could engage with this topic and many candidates seemed ready and able to offer appropriate counterarguments to points brought up in the documents. More marks than has been the case in previous series were awarded for the 'treatment of counter-positions' skill. It was noted in the November 2018 series that many candidates were presenting their answers as a series of analyses of each document in turn. In the current series this was rarely seen and most candidates attempted to construct their own arguments; the more successful of these were able to arrange their ideas into strands of reasoning that supported intermediate conclusions. Hence, marks for the structure and quality skills often exceeded Level 2. Few candidates were using the documents with a critical eye, which meant their marks for 'use of documents' was restricted to Level 2. It is worth reminding Centres 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

- Most candidates gained very few marks in **Question 1**.
- In **Question 2** many candidates knew exactly what to do and gained most or all of the available marks.
- In **Question 3** most candidates did as they were asked and attempted to evaluate the reasoning but few achieved very many marks.
- In **Question 4** many candidates created their own argument structure, ignoring the sequence in which the documents are presented, but few engaged *critically* with the documents provided.

General comments

Most candidates appeared to have enough time to finish the paper – only very few appeared to have run out of time. Often, those who did not have time to complete **Question 4** had spent a disproportionately long time on previous questions, although such responses were in the minority.

The standard of candidates varied greatly but there was evidence that many candidates had been prepared with regard to answering **Questions 2**, **3** and **4**.

Comments on specific questions

Question 1

(a) Candidates were presented with some statistical evidence and asked to make some criticisms of the evidence presented. The full range of scores, from 0 to 3, was seen, although the vast majority of responses were awarded no marks. Most commonly, candidates gained marks for reference to one of the examples, Lemmy from Motörhead, being from the wrong year. Other points that regularly gained credit were criticisms of the unreliability of memory, the conflation of 'famous people' with 'people with whom the author is familiar' and questions about the annual variation and pre-2012 figures. Other marking points were rarely, if ever, seen. Some candidates alluded to creditworthy points but responses were insufficiently well expressed; a response that states 'we do not know the figures for any other years' is not as good as one that states' the pre-2012 average might have been higher'. Some candidates criticised the credibility of the evidence provided and received no credit.

(b) Remarkably few candidates were able to offer a plausible alternative explanation for a perceived increase in celebrity deaths in 2016. Some merely confirmed that there had been such an increase or suggested a reason for an increase in celebrity deaths.

Question 2

This question rewarded the well-prepared candidate. Those who knew what was expected and attempted an analysis of the argument usually gained five marks easily and many gained all 6. Although there were fewer elements to identify, candidates were generally able to identify the ones that were there. Very few candidates provided a non-creditworthy summary or gist. As ever, some candidates, particularly those sitting Paper 41, are still unaware that quoting from the text is an appropriate, indeed a required, way to answer this question.

Question 3

Most candidates were aware of the nature of the task and attempted to evaluate the passage. However, most found the passage quite challenging and only a minority of candidates were able to gain marks. Historically, very few candidates have been able to identify assumptions, indeed many appear not to have learned that an assumption must not be stated in the text. However, on this occasion assumption marks were regularly credited. Points that were awarded marks were as follows: the assumption that the natural state is desirable; the straw man in paragraph 2; the assumption that increased spread of information results in people being well-informed; the confusion of social media posts with social network users; the assumption that not being in paid employment makes it more likely that you will post on social media; the relevance of the statistic about women who are not in paid employment to increasing the number of women senior business executives; the assumption that social networks can provide the same sort of career benefits as 'social clubs and other organisations'; the inconsistency between women taking over the majority of senior business roles and the aim of gender equality; the assumption that rapid political change is a good thing, and, once, the assumption that 'fun' is 'good'.

Question 4

Candidates were required to use the documents and their own ideas to construct a reasoned case to support or challenge the conclusion that online social networking is good for society. Many found they could engage with this topic and many candidates seemed ready and able to offer appropriate counterarguments to points brought up in the documents. More marks than has been the case in previous series were awarded for the 'treatment of counter-positions' skill. It was noted in the November 2018 series that many candidates were presenting their answers as a series of analyses of each document in turn. In the current series this was rarely seen and most candidates attempted to construct their own arguments; the more successful of these were able to arrange their ideas into strands of reasoning that supported intermediate conclusions. Hence, marks for the structure and quality skills often exceeded Level 2. Few candidates were using the documents with a critical eye, which meant their marks for 'use of documents' was restricted to Level 2. It is worth reminding Centres 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

- Most candidates gained very few marks in **Question 1**.
- In **Question 2** many candidates knew exactly what to do and gained most or all of the available marks.
- In **Question 3** most candidates did as they were asked and attempted to evaluate the reasoning but few achieved very many marks.
- In **Question 4** many candidates created their own argument structure, ignoring the sequence in which the documents are presented, but few engaged *critically* with the documents provided.

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