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**THINKING SKILLS**

**9694/43**

Paper 4 Applied Reasoning

**May/June 2018**

MARK SCHEME

Maximum Mark: 50

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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**PUBLISHED****Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
1(a)	<p>The data in the table do support this inference, because countries A, B and C have significantly both lower income per head and higher teenage motherhood than D, E and F [1]. However, this inference would not necessarily follow if the overall birth-rate in richer countries were very much lower than in poorer countries [1].</p> <p>It is possible that more girls in countries D, E and F begin having babies at an earlier age than girls in countries A, B and C [1]. This would be inconsistent with the claim, but we do not have the necessary information [1] and it seems unlikely.</p> <p>We only have data from 6 countries, which may not be sufficient to generalise [1]. There could be other factors shared by some of the chosen countries that could explain the difference [1].</p> <p>Country F appears anomalous, as one would expect it to have the lowest rate [1]. However, there is still a big difference compared to the three poorer countries [1].</p>	<b>3</b>
1(b)	<p>This hypothesis is consistent with the data in the table [1], but there are other possible explanations for the correlation between relatively high adolescent motherhood and numbers of females out of school [1]. For example, it may be that girls are denied education for some reason and consequently they start having babies [1]. Furthermore, if this were a very significant reason then one would expect to see a bigger difference between the figures for girls and those for boys [1].</p>	<b>2</b>

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
2	<p><i>1 mark for each element (maximum 4 if MC not identified).</i></p> <p><b>IC</b> (Accept) The world is about to experience a vast increase in the number of elderly people.</p> <p><b>IC</b> we can be sure it [medicine] will go further still.</p> <p><b>CA</b> The stories of vampires are generally considered to be fantastic legends,  <b>IC</b> (but) they [stories of vampires] may reveal the secret of eternal youth.</p> <p><b>IC</b> Even more impressive extensions to the human lifespan may be achievable by other means.</p> <p><b>IC</b> (In this way,) digital technology will offer an entirely different mode of prolonging life.</p> <p><b>MC</b> Governments and other institutions must (therefore) plan for a future in which human lifespan is considerably extended.  <b>IC</b> This major change will render current ideas of working ages, careers and pensions completely unrealistic.</p> <p><b>IC</b> So new patterns of intimate relationships and family life will have to develop.</p>	<b>6</b>

Question	Answer	Marks
3	<p><i>2 marks for a developed version of any of the following points. 1 mark for a weak or incomplete version of any of the following points.</i></p> <p><i>Paragraph 1</i></p> <ul style="list-style-type: none"> <li>• Because the rise in life expectancy is ‘largely because of the decline in infant mortality,’ it does not support the claim in this paragraph.</li> <li>• The predictions of life expectancy in the US rely on the assumption that the current trend continues.</li> <li>• In order for this IC to support the MC precisely, a conflation is required between ‘a vast increase in the number of elderly people’ and ‘human lifespan’ being ‘considerably extended’.</li> </ul> <p><i>Paragraph 2</i></p> <ul style="list-style-type: none"> <li>• The first sentence consists of an appeal to history, but this is not much of a weakness, since the remainder of the paragraph identifies evidence which supports the IC.</li> <li>• The reasoning in this paragraph relies on the assumption that results in yeast and mice are relevant to humans.</li> <li>• The final phrase conflates ‘favourable’ with ‘life-extending’.</li> </ul> <p><i>Paragraph 3</i></p> <ul style="list-style-type: none"> <li>• ‘Eternal youth’ is very different from prolonged old age, and is therefore inconsistent with most of the passage.</li> </ul> <p><i>Paragraph 4</i></p> <ul style="list-style-type: none"> <li>• The reasoning in this paragraph is entirely hypothetical, and therefore gives only weak support to the MC.</li> </ul> <p><i>Paragraph 5</i></p> <ul style="list-style-type: none"> <li>• This paragraph relies on the unlikely assumption that transferring the contents of someone’s brain into an avatar counts as prolonging their life.</li> <li>• This paragraph may not support the MC, because the existence of digital avatars is so different from the extension of physical life that it might not require radical change in social policy and planning.</li> </ul>	9

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
3	<p><i>Paragraph 6</i></p> <ul style="list-style-type: none"><li>• The discussion at the World Economic Forum was based on a hypothesis, but the IC assumes that the hypothesis will come to pass.</li><li>• (Allow) There is an inconsistency between the estimates in paragraphs 1 and 6 of life expectancy in 2100.</li></ul> <p><i>Paragraph 7</i></p> <ul style="list-style-type: none"><li>• There is an assumption that the differences in people's experience of everyday life are such as to make marriage become inappropriate.</li></ul>	

Question	Answer	Marks
4	<p><b>‘Extending life expectancy would do more harm than good.’</b></p> <p><b><i>Specimen Level 4 Answers</i></b></p> <p><i>Support (811 words)</i></p> <p>As the first part of Doc 1 indicates, the history of medicine can be interpreted as the story of a progressive postponement of death. In some ways, this process has been a good thing and has rightly been welcomed. Much sadness is caused by premature death, both for the people whose hopes and plans are cut short and for their family and friends, who are deprived of their companionship and support too soon, perhaps at a time when they need them most. There is, for example, universal rejoicing when modern medical techniques and resources succeed in saving the life of a young parent who is struck down by an illness or accident which would previously have been fatal.</p> <p>Prolonging old age, however, is much less beneficial. As Doc 5 indicates, life satisfaction after the high point at age 70 falls rapidly. There is no reason why anyone should want to go beyond the current low point at age 96. Old age brings a diminution of physical and mental powers, ultimately resulting in dependence upon other people, whether loved ones or strangers. This dependence removes people’s dignity and makes them vulnerable. In many cases, caring for elderly relatives imposes intolerable physical and mental strains on spouses and children, many of whom are quite elderly themselves. Many octogenarians find themselves working harder than at any time in their lives, caring 24 hours a day, 7 days a week, for someone who is no longer recognisable as the person they once loved. It is not surprising that there have been so many true stories of ‘elder abuse’, by both relatives and so-called carers.</p> <p>There seems to be a natural length to life, and dying too late is just as problematic as dying too soon.</p> <p>As Docs 1 and 2 indicate, a lot of interest, effort and resources is being dedicated to various projects which would extend life expectancy beyond current parameters. Some of those projects are more plausible than others: in particular, despite Aubrey de Grey’s expertise in molecular biology, his claim (Doc 2) that a lifespan of 1000 years is within reach seems unrealistic. Furthermore, some of the people holding out extravagant prospects probably have vested interests to exaggerate what may be possible, in order to win research grants and funding from wealthy patrons. Nevertheless, these ambitions show that many people want (or think they want) to prolong their own lives beyond what currently seems feasible. Unfortunately for them, the projects which are most fanciful and least likely to be successful are those which look for the fabled secret of eternal youth. Realistically, prolonging life means extending old age.</p>	30



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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4	<p>Document 3 clearly identifies some of the most important problems which would be caused by an extension to life expectancy. Governments are already responding to increased life expectancy by raising retirement ages. People will be expected to continue working to a much older age than at present, but natural decline in physical and mental strength will prevent many people from continuing to work much beyond current retirement ages. It is already common for people to be forced by physical limitations to give up work several years before the official retirement age and to be financed by disability benefit for the last few years of their career. So there will be stringent natural limits as to how long retirement can be postponed.</p> <p>If people are going to spend significantly longer in retirement than they do at present, the costs will be intolerable. If, for example, retirement were to last as long as a typical working life, workers would have to save half of their income (that is, to earn twice as much as they needed to live on) in order to fund their retirement. In addition, most people will have to expect to spend their final years in a care home, at vast expense to themselves or to their relatives or to society as a whole.</p> <p>Furthermore, Doc 4 is right to highlight spiritual issues concerning ageing and dying. The point of view expressed in that article is strengthened by the fact that it draws on several religious and non-religious traditions. It is unlikely that these traditions would independently make such similar claims if they were not well-founded. As the document makes clear, the mere prolongation of life is an inadequate goal. Life is a pilgrimage, in which the quality of life is of greater importance than its extent.</p> <p>Some people will benefit from a small extension to their lives, but many will be worse off if their existence is prolonged by a single day, and no one would benefit if life expectancy were to be greatly extended (however unlikely such a prospect might be). In addition, society would almost certainly not be able to bear the costs if extended old age became normal. Overall, therefore, extending life expectancy would do more harm than good.</p>	

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4	<p><i>Challenge (840 words)</i></p> <p>As the first part of Doc 1 indicates, the history of medicine is the story of a progressive postponement of death. No sane person doubts that this process has been a good thing. Much sadness is caused by premature death, both for the people whose hopes and plans are cut short and for their family and friends, who are deprived of their companionship and support too soon, perhaps at a time when they need them most. There is, for example, universal rejoicing when modern medical techniques and resources succeed in saving the life of a young parent who is struck down by an illness or accident which would previously have been fatal. But what counts as ‘premature’ is changing and will continue to evolve alongside the increase in life expectancy. A generation or two ago, those who survived to their early 70s were considered to have done well, but now most people feel that age is too soon to die. Perhaps there is a limit beyond which life should not be extended, but we have certainly not approached that limit yet.</p> <p>As Doc 1 goes on to describe, a lot of interest, effort and resources is currently being dedicated to various projects which would extend life expectancy significantly beyond existing parameters. So many research projects are under way, as described in Doc 1, that some of them are highly likely to succeed. Though the claim by Aubrey de Grey (Doc 2) that a lifespan of 1000 years is within reach may seem unrealistic, he has significant expertise in molecular biology and his projection should therefore not be rejected out of hand. Even if this extreme prediction is more hopeful than realistic, successive smaller increases will almost certainly be achieved. People would not be interested in reading about these projects, or in some cases funding them at vast expense, if they did not want to extend their own life expectancy.</p> <p>Although Doc 5 indicates that life satisfaction declines from the age of 70, it is not until about age 90 that people become as miserable as they were aged 40. Furthermore, all the variations are between points 4 and 6 on the 7-point scale, which suggests that life far beyond current boundaries would still be well worth living.</p> <p>Although Doc 4 is right to point out that the mere extension of life is an inadequate and self-defeating goal for life, this argument fails to give due weight to the fact that life is the precondition for all other good things. Whatever people may want to achieve or to enjoy, they will not be able to do it if they are dead. Since extending people’s life expectancy increases the experiences they can enjoy and the good they can achieve, it will bring great benefits.</p>	

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>
4	<p>Another weakness in Doc 4 is that – although it is right to highlight spiritual issues concerning aging and dying – it fails to identify old age as the time when this spiritual dying takes place. Many people whose maturity has been spent in frenetic activity have testified that old age has given them priceless opportunities for the pace of life to change, giving them time to reflect, to learn how to receive help graciously instead of always being the giver, and to appreciate that their true worth lies in who they are, not in what they achieve. The longer this time of life can be prolonged, the better for the sake of these processes of personal development. Extending life expectancy can, therefore, contribute to this spiritual task rather than – as alleged by Doc 4 – detracting from it.</p> <p>Doc 3 alleges that the costs of increasing life expectancy will be prohibitive, but this claim relies on the assumption that economic circumstances will not change. It became evident about thirty years ago that the Information Technology revolution had the potential to transform inherited ideas of work and wages. Successive governments have avoided facing this challenge, and have perpetuated policies based on the increasingly unrealistic assumption that everyone needs to work to earn their living. A greatly extended period of retirement offers a fair way of adjusting to the reduced need for work. The kind of prospect which was being discussed thirty years ago involved a small, highly paid group of workers, and a larger number of people who would never need to work, but would devote their whole lives to leisure activities. If life expectancy is going to be greatly extended, everyone can occupy both roles in that scenario, working until the age of – say – 60, and then enjoying a well-deserved and fulfilling lengthy retirement.</p> <p>Extended life may prove burdensome to a few people, and it would, admittedly, impose some costs onto personal and national economies. But these burdens and costs would be far outweighed by the opportunities which extended life would offer for making further contributions to the common good, for enjoying the many good things which life has to offer, and for growing into spiritual maturity. Overall, therefore, extending life expectancy would not do more harm than good.</p>	

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Level	Structure	Max 8	Quality of argument	Max 8	Use of documents	Max 8	Treatment of counter positions	Max 6
4	<p>Precise conclusion and accomplished argument structure with consistent use of intermediate conclusions. Likely to include at least two of the following:</p> <ul style="list-style-type: none"> <li>• strands of reasoning</li> <li>• suppositional reasoning</li> <li>• analogy</li> <li>• evidence</li> <li>• examples</li> </ul> <p>Argument is structured so the thought process is made clear. Uses vocabulary of reasoning appropriately and effectively to support argument.</p>	7–8	<p>Cogent and convincing reasoning which answers the question which was asked. Subtle thinking about the issue. Use of relevant own ideas and ideas from documents. Very few significant gaps or flaws.</p>	7–8	<p>Perceptive, relevant and accurate use of documents to support reasoning. References 3+ documents. Sustained and confident evaluation of documents to support reasoning. (Two or more valid <b>evaluative</b> references to documents). Able to combine information from two or more documents and draw a precise inference.</p>	7–8	<p>Consideration of key counter arguments and effective response to these. Use of own ideas in response to counter arguments not mentioned in the documents. Use of valid critical tools to respond to counter arguments. Effective use of appropriate terminology.</p>	5–6
3	<p>Clear conclusion that is more than 'I agree'. Clear argument structure, which may be simple and precise or attempt complexity with some success. Appropriate use of intermediate conclusions. Use of other argument elements to support reasoning. Generally makes thinking clear. Appropriate use of vocabulary of reasoning.</p>	5–6	<p>Effective and persuasive reasoning which answers the question which was asked. (Although there may be some irrelevance or reliance on dubious assumptions.) Use of own ideas and ideas from documents. Few significant gaps or flaws.</p>	5–6	<p>Relevant and accurate use of documents which supports reasoning. References 3+ documents. Some evaluation <b>and</b> comparison of documents to support reasoning. Inference drawn from at least 1 document.</p>	5–6	<p>Consideration of key counter arguments and effective response to these. Response uses own ideas or is developed from documents. Some use of appropriate terminology.</p>	3–4

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<b>Level</b>	<b>Structure</b>	<b>Max 8</b>	<b>Quality of argument</b>	<b>Max 8</b>	<b>Use of documents</b>	<b>Max 8</b>	<b>Treatment of counter positions</b>	<b>Max 6</b>
2	Conclusion stated but may be 'I agree'. Sufficient clarity for meaning to be clear throughout. Structure may be easy to follow but brief or a longer argument which has a less clear structure. Uses reasons. Some appropriate use of vocabulary of reasoning.	3–4	A reasoned stance which attempts to answer the question which was asked. Some support for the conclusion. (Although there may be considerable irrelevance or reliance on dubious assumptions.) Some thinking/own ideas about the issue. Use of rhetorical questions and emotive language. Some significant gaps or flaws.	3–4	Some relevant use of documents to support reasoning, but some documents used indiscriminately. Some comparison of documents <b>or</b> some critical evaluation of documents <b>or</b> reasoned inference drawn from document.	3–4	Inclusion of counter argument or counter assertion. Response is direct but weak or taken entirely from documents.	2
1	Attempt to construct an argument. Unclear conclusion, multiple conclusions or no conclusion. Disjointed, incoherent reasoning. Use of examples in place of reasoning. Possibly a discourse or a rant. Reasons presented with no logical connection. Documents considered sequentially. Substantial irrelevant material.	1–2	Attempt to answer the general thrust of the question. Attempt to support their view. Excessive use of rhetorical questions and emotive language. Ideas which are contradictory.	1–2	Some, perhaps implicit, use of documents. No attempt at critical evaluation. No comparison of documents.	1–2	Inclusion of counter argument or counter assertion. Response is direct but ineffective.	1