UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the October/November 2009 question paper

for the guidance of teachers

9694 THINKING SKILLS

9694/04   Paper 4 (Problem Solving and Critical Thinking – Advanced), maximum raw mark 50

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 must be read in conjunction with the question papers and the report on the examination.

* CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the October/November 2009 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

1 (a) **Show that if one minute of adverts was shown at the end of the hour, maximum amount of music was played (given the amount of revenue fr~ advertising), there would be 3105 listeners at the end of the show.**

   Answer: One advert brings in $20 of revenue.
   This will pay for 10 minutes of music.
   This will attract (10 × 100=) 1000 extra listeners.
   The (remaining) 49 minutes of chat will attract (49 × 50=) 2450 listeners.
   The total attracted (1000 + 2450 = 3450) will be reduced by 10% by the minute of adverts : 0.9 × 3450 = 3105 listeners.

   1 mark for correct calculation of the listeners attracted by music & chat (1000 and 2450 seen OR 3450 seen).
   Second mark for working showing a 10% reduction.

   (b) **Find the maximum number of minutes of adverts that can be shown (and still attract 3000 listeners). Justify your answer.   [3]**

   Answer: Three minutes (1 mark)

   2 marks for a convincing justification that the answer is a maximum. This is likely to involve EITHER calculations for 3 minutes (3045) and 4 minutes (2880), OR an algebraic justication [the function expressing the number of listeners given x minutes of adverts is – $45 x^2 + 150 x + 3000$. If this equals 3000, then $x = 0$ or 3 ⅓.]

   1 mark for another suboptimal answer (e.g. for 2 minutes) with working.

   (c) **Find the maximum number of listeners that could be attracted to the show.   [1]**

   Answer: 3120 listeners (1 mark)

   (d) **Find the maximum profit that can be made from the breakfast show and state how long should be spent on the different types of entertainment to achieve this. The number of listeners does not need to be maximised, but must be at least 3000 at the end of the show. [profit = income minus costs].   [4]**

   Answer: $6 (2 marks)
   For 2 minutes of adverts, 17 minutes of music and 41 minutes of chat (2 marks)

   If the correct answer is not given:
   1 mark for another suboptimal answer (given below)
   2 marks if there are two suboptimal answers, or one which gives $4 profit.

adverts (minutes)	revenue ($)	music (minutes)	chat (minutes)	listeners (pre advertising)	listeners (post advertising)	pr
1	20	10	49	3450	3105	0
2	40	20	38	3900	3120	0
3	60	30	27	4350	3045	0
4	80	40	16	4800	2880	0
5	100	50	5	5250	2625	0
6	120	60	–6	5700	2280	0
7	140	70	–17	6150	1845	0
1	20	**10**	49	3450	3105	0
1	20	**9**	50	3400	3060	2
1	20	**8**	51	3350	3015	4
1	20	**7**	52	3300	2970	6
2	40	**20**	38	3900	3120	0
2	40	**19**	39	3850	3080	2
2	40	**18**	40	3800	3040	4
2	40	**17**	41	3750	3000	6
2	40	**16**	42	3700	2960	8
3	60	**30**	27	4350	3045	0
3	60	**29**	28	4300	3010	2
3	60	**28**	29	4250	2975	4
3	60	**27**	30	4200	2940	6
4	80	**38**	18	4700	2820	4
4	80	**37**	19	4650	2790	6

2 (a) **Who was the most popular second choice for Chairman?**   [1]

Answer: Colin Niloc (1 mark)

Colin Niloc has 26 second choice votes, Albert Trebla has 23, Liam Mail and Eileen Neelie both have 20 and Emma Amme has 19.

Skill: Extract relevant data.

  (b)   **All 115 members who submitted ballot papers took part in the vote for Chairman, but a number of these members did not register even a first choice for Secretary and/or Treasurer.**

  (i) **How many members who submitted ballot papers did *not* vote for Secretary?**   [1]

     Answer: 6 (1 mark)

  (ii) **How many members who submitted ballot papers did *not* vote for Treasurer?**   [1]

     Answer: 8 (1 mark)

     If both answers are wrong, award 1 mark for evidence of at least one of the following:
     • 115 members submitted ballot papers (i.e. voted for Chairman).
     • 109 members voted for Secretary.
     • 107 members voted for Treasurer.

     Skill: Process data.

(c) (i) Which *two* candidates will go forward to the second count for Chairman?

Answer: Emma Amme and Eileen Neelie (1 mark)

(ii) State clearly the total vote for each of the two candidates, including the second count. **[2]**

Answer: Eileen Neelie will be elected by 40 votes to Emma Amme's 38. (2 marks)

If 2 marks cannot be awarded, award 1 mark for evidence of either of the following:
- Eileen Neelie will pick up 15 second choice votes in the second count.
- Emma Amme will pick up 11 second choice votes in the second count.

Skill: Analyse complex data and draw conclusions.

(d) (i) Who will be elected Secretary? **[2]**

Answer: Len Nel (2 marks)

If 2 marks cannot be awarded, award 1 mark for evidence that Liam Mail and Eileen Neelie will tie for first place in the first count and/or that Liam Mail and Len Nel will go forward to the second count (because Eileen Neelie has to be eliminated).

(ii) Who will be elected Treasurer? **[2]**

Answer: Adam Mada (2 marks)

If 2 marks cannot be awarded, award 1 mark for evidence that Adam Mada and Liam Mail will tie for first place in the first count (and hence go forward to the second count).

Skill: Analyse complex data and draw conclusions.

3 (a) **Provide a brief analysis of the argument by Ziauddin Sardar in Document 1.**

Main Conclusion: The contemporary way of looking at the future, as established b~ academic study of the future, known as 'futures study' needs to be reviewed.

Reasons:

R   The Whitehall programme predicts to English speakers a future of great technological progress in front of them.

But this is because (**IC1**) Whitehall programme is directed by conventional western wisdom which says the future lies in front.

R   (**C/A**) – The Aymara say the future is behind us because we cannot see it but the past is in front to us as we can see the past.

They teach us that the future cannot be known apart from the past.

Therefore – **IC2** – The Aymara, who see the future as behind them, have a more accurate approach.

R   The Whitehall programme only looks at relatively recent developments.

R   All learn is that we will enjoy more of the wonders of technology - a projection of past technology into future technology.

R   We have abandoned past values.

R   Many of us in the West do not even know what it means to live a life worth living.

Therefore – **IC3** – The Whitehall programme does not constrain us to look honestly and deeply enough into the past.

Therefore – **IC4** – All we see before us is a one-dimensional track of technological progress for its own sake.

Therefore – **IC5** – Our modern world has trapped us in a spiral with no direction.

Therefore – **IC6** – Current futures approach is pointing us in the wrong direction.

Therefore – **MC** – The contemporary way of looking at the future, established by 'futures study' needs to be reviewed.

Marks

Gist or just MC = **1 mark**
In the breakdown of marks that follows, the inclusion of CA is considered to be equivalent to an IC.

MC + 1 IC = **2 marks**
MC + 2/3 IC's = **3 marks**
MC + 4 or more IC's = **4 marks**
Candidates who get the MC cannot get a separate mark for IC6
Candidates who mistake the IC6 for MC:
IC6 + 1 IC = **1 mark**
IC6 + 2 IC's = **2 mark**
IC6 + 3 or more IC's = **3marks**
Candidates who fail to identify MC (or IC6 as MC), but identify 2 or more ICs – **2 marks**

(b) Give a critical evaluation of the Futurist's reasoning in Document 3 (GGP ~~before?~~), commenting on its strengths and/or its weaknesses, and ~~~~ assumptions it makes.

The argument is clearly designed to persuade the reader to take a very optimistic view of overall world progress in terms of GGP, and goes beyond the evidence provided. The persuasion is marked by several dubious assumptions and weaknesses. There is plenty of opportunity here for students to apply their skills of critical evaluation and identify flaws and assumptions.

Para. 1 – (**weakness/flaw**) straw man counter-argument: "so few people truly understand…" – whereas today most people would understand this point. There is no real or true counter-position on which the author draws the conclusion that "without a deep appreciation of this no predictions… future are credible."

Begging the question: the circularity lies in the stipulation: the world is progressing at an exponential and accelerating rate, as the basis for investigating or predicting the future. Predictions made on foregone conclusions cease to be genuine predictions.

There is an **assumption** that unless the economic growth is understood in mathematical terms no one can predict the future credibly , whereas it is possible to make predictions on the future based on insights drawn from other disciplines than purely economy maths, e.g. history, sociology, anthropology, philosophy etc.

Weakness/assumption: that the overall growth in world economy necessarily translates to a better world; whereas in reality in today's world wealth is distributed quite unevenly and the majority of the world's population in developing worlds live in poverty.

Weakness/assumption: that the world is a homogenous entity, whereas in reality the world is vastly diverse and disparate from place to place.

Flaw/Generalisation: GGP is only a general measure, overall GGP may not be the general pattern of growth in each and every country.

3rd para: **Insufficient evidence/flawed argument from history / relativity flaw:** 3rd para. "annual growth unheard of in the 19th…" – no way to measure this accurately a hundred years ago, statistical studies for global measure not yet developed; world not a global village as its getting to be etc; expectations in18th and 19th centuries very different from expectations today; infra-structure of society very different in the past. Thousands of years ago too remote in history to access facts about; world was very disparate geographically then for any comparative exponential assessment; on the other hand anecdotes from tradition and myth show some countries in remote history were amazingly gross-resource wealthy than others e.g. Marco Polo's account of the orient. Hence also **Significance** of graph is weakened.

Weakness/flaw: Last para "**will be** so steep… is so vast….".The principle of exponential growth is used as a hypothetical reasoning to draw non-hypothetical conclusions for 2050. Further, economic growth is not a **sufficient** condition to guarantee overall well being of humanity.

Astute candidates may well point out how the significance of the graph can be mitigated because it has been deliberately presented to create a singular image of growth, which excludes other possibilities and probabilities. The strong **bias** towards a narrow capitalist world view could also be pinpointed.

The **post-hoc conclusion** about 2050 is well overdrawn – the Futurist fails to ~~~ account all other corresponding state of affairs in the world that would need to be co~~~ to enable the exponential curve to continue e.g. there are other variables such as va~~~ natural catastrophes, both man-made and unpredictable e.g. related to eco-systems a~~~ global warming that can, curb or slow down growth, <u>and</u> man-made disasters such as wa~~~ that can overturn humanity's hopes for an ideal future.

Comments which criticize the predictions exponential trends in the light of the present global recession may gain one or two marks.

Comments on the graph – allow **one mark** for candidates who critically comment on the graph but fail to appreciate the implications of the logarithmic scale. **Two marks** may be awarded for a critical comment which does take it into account.

Comments on the details of the GGP prediction (in the sixth para) which merely criticize the lack of explanation do not get credited: but a comment on the speculative nature of making such predictions (or the variety of models that such extrapolation could appeal to) may be credited.

This outline is not exhaustive and other evaluation points may be made.

Marks

Each basic sound evaluative point gets 1 mark, up to a maximum of 6.
A precise and well-developed evaluative point merits 2 marks.

(c) **"Fifty years from today, world civilization would have progressed so steepl~~y~~ poorest nations would be as rich as the richest nations of today, and health, and prosperity would be accessed by every person in the world."**

Commenting critically on some or all of Documents 1–5, and introducing ideas of your own, argue *either* for *or* against this prediction of the condition of humanity in fifty years time, suggesting how world/global trends or policies have led to this outcome. Construct a well-reasoned case supporting a clear conclusion. **[20]**

The question asks the candidate to challenge or support the stated prediction of the future of the world in fifty years time, basing their argument on evaluative judgment drawn from the stimulus sources and own perspectives.

Credit will be given for the **judicious use of the resources**. They should select material from the stimulus sources that both support and counter their own position. E.g. a negative prediction that sides with Doc 4 should not disregard the optimistic world view evident in Doc 3 and Doc 5. It should be seen that Doc 2 errs on the side of caution though by no means pessimistic. Doc 1 may enable the candidate to find a rationale/standpoint for the exercise (e.g. either by agreeing or defying the principle of past-present continuum or interpreting the principle differently)

Credit will be given for **the critical analysis and evaluation candidates apply to the sources**. The analogy of backing into the Future (Doc 1) may be critiqued against Doc 5. The realism shed by Doc 4 may be contrasted with assumptions in Doc 3. The graph in particular, may come under protracted scrutiny as a flawed model or an unsustainable prediction, given Doc 4. The differing perceptions of modernity suggested by Doc 1 may provide a springboard for multi-cultural perspectives of what the world would look like in 50 years time. It is expected that candidates will make comparative judgments of the various sources to bolster their own conclusions.

Credit will be given for **the inferences candidates draw from the sources and from other examples or observations they bring to the debate**. The contours/scope for argument are clearly suggested by Docs 1–5. Fresh lines of arguments may be built by further developing those expressed in text or from additional perceptions. Further arguments may range from foreseeing thrilling apotheosis, to neutral or moderate or alternative predictions to extremely negative conclusions of doom and gloom, but they should all be framed (a) in a global, whole world context supported by careful reasoning rather than fanciful imagination, and (b) have a clear conclusion. Special knowledge in economics, history, philosophy, religious studies or sociology etc. may be brought to support reasoning (credit being given for the quality of reasoning skill not the knowledge content).

To obtain higher marks, a candidate should be able to consider objections to his/her own position, ruling against the objections not stridently, but with sound reasoning. Very able candidates may bring into their arguments the issue of obligations to future generations, such as utilitarianism or sustainability, in order to construct a preferred future foreseeable for 2050.

No marks are reserved for the quality of written English.

Band	Overall	Within	Score
Top	A critical stance: ideally **an *evaluation* of sources, and explicit consideration of counter-arguments** (or conflicting sources). Reference to at least 3 doc's.	Candidates must introduce their own ideas and arguments.	20 19 18
		Occasional explicit critical comments.	17 16 15
Middle	A reasoned stance: **a clear conclusion, supported by reasons clearly expressed/cherry-picked from the sources.** Some independent reasoning. Reference to at least 2 doc's.	Implicit consideration of counter-arguments. Clear statement of 2/3 reasons in support.	14 13 12 11
		Cherry-picked reasons. Some irrelevance/ deviation from the question. May be multiple conclusions with little support for each one.	10 09 08 07
bottom	"pub rhetoric": **unclear conclusion, reasoning that goes off at a tangent (substantial irrelevant material)**	Reproduced reasoning from (a) and (b). Disorganised.	06 05 04
		Stream of consciousness.	03 02 01

Note to markers: credit candidates' attempts to compare and synthesise arguments from different documents. Evidence of this should elevate the candidates' score by up to 3 marks apiece (depending on the sophistication and clarity of the attempt).

Note to markers: individual critical comments and examples of candidate's own creative reasoning within a Middle band answer can also elevate their score by up to 3 marks apiece (depending on the sophistication and clarity of the comment).