MARK SCHEME for the October/November 2007 question paper

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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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

1 (a) Answer: R1 and R2.

800 from the U25 group must be chosen
This gives:

Sport: $(0.8 \times 13) + (0.1 \times 11) + (0.1 \times 4) = 11.9$ hours

News: $(0.8 \times 4) + (0.1 \times 4) + (0.1 \times 2) = 3.8$ hours

Drama: $(0.8 \times 3) + (0.1 \times 3) + (0.1 \times 13) = 4$ hours

This fulfils the 1st and 2nd requirement but not the 3rd. Reference to the "10% rule" is not required. Accept any unambiguous reference to the manager's requirements.
The correct answer without working will be awarded one mark. Correct working without a reference to which criteria are fulfilled will be awarded no marks.

(b) Answer: any unambiguous selection which fulfils the 3rd criterion, and shows the expected amount of news.

One solution is to maximise the 55+ group: 80%, and 10%, 10% for the others : news = 2.4 hours.
At the other extreme, the proportion of 55+'s must be greater than 50 %.
A correct choice of percentage achieves two marks.
A candidate who chooses 50% can only score 1 mark (since this doesn't give less than 3 hours).
A candidate who chooses a selection which satisfies the "10% rule", and satisfies the 3rd criterion, but adds up to less than 100% will be awarded one mark.

(c) (i) Answer: 500 Under 25's, 125 25-54's and 375 55+'s.

Let A, B and C represent the number of people from each group (in age group order).
This gives the equation: $3A = 12B = 4C$
$4B + B + 3B = 1000$
$8B = 1000$
$B = 125$, $A = 500$ and $C = 375$

The correct percentages achieve both marks.
Percentage choices which give the same viewing figures for two groups achieves one mark. For instance 60%, 10%, 30% gives the same for the middle and upper age groups.
% choices which achieve all three the same, but do not add up to 100 get one mark.

(ii) Answer: R1 and R2.

The correct solution would give 9.375 hours of Sport, 4.5 hours of Comedy, 3.25 hours of News and 6.75 hours of Drama. Therefore the 1st and 2nd requirements would be satisfied, but not the 3rd.
One mark for the correctly identified requirements (in some unambiguous way) as long as it agrees with the solution from (i).
Allow for follow through marks from (i) as long as they make clear which percentages they are using, and abide by the "10% rule".

(d) (i) Two marks will be awarded for a solution which fulfils requirements 2 and 3.
Allow one mark for an answer which moves closer to the solution, without sacrificing the 3rd requirement.

(ii) Similarly – two marks for a completely correct solution. One for a correct solution with numerical errors.
Allow one mark for an answer which fulfils requirements 2 and 3 and moves closer to the solution but does not achieve the 1st requirement.

Possible solution: 390 U25's, 100 25-54's, 510 55+'s.

A range of possible solutions exist keeping the number of 25-54's the same and varying the numbers of 55+'s from 501 to 515 (and the U25's accordingly).

Candidates who find a solution which satisfies all three criterion will be awarded 4 marks, irrespective of whether they answer **(d)(i)** separately.

2 (a) (i) Answer: 474 – award 1 mark.

The graph shows 21% imperfection for a total output of 600 per day.

Skill: Extract and process relevant data.

(ii) Answer: $2794 – award 2 marks.

If answer is wrong award 1 mark for an answer of $5244 (failing to subtract the $2450 fixed costs), or for correct method with errors in calculation.

Each perfect Chumbal sells for $10 more than it costs to make, and each imperfect Chumbal sells for $4 more.

Total profit is $474 x $10 + 126 x $4 – $2450.

Skill: Process Data.

(b) (i) Answer: 800 – award 2 marks.

If 2 marks cannot be awarded, award 1 mark for correct calculation of at least two of the following:

72% of 700 = 504
63.5% of 800 = 508
54% of 900 = 486
44% of 1000 = 440
33.5% of 1100 = 368
22% of 1200 = 264

Candidates who misread the graph and conclude that 504 perfect Chumbals can be produced from 800 manufactured, and answer the question appropriately will be awarded one mark.

Skill: Analyse Complex Data and Draw Conclusions.

(ii) Answer: 1000 – award 2 marks

If 2 marks cannot be awarded, award 1 mark for correct calculation of at least two of the following: (It is not essential to subtract the $2450 fixed costs here as it does not affect the optimum daily output.)

700 – 504 x $10 + 196 x $4 = $5824 (– $2450 = $3374)
800 – 508 x $10 + 292 x $4 = $6248 (– $2450 = $3798)
900 – 486 x $10 + 414 x $4 = $6516 (– $2450 = $4066)
1000 – 440 x $10 + 560 x $4 = $6640 (– $2450 = $4190)
1100 – 368 x $10 + 732 x $4 = $6608 (– $2450 = $4158)
1200 – 264 x $10 + 936 x $4 = $6384 (– $2450 = $3934)

Skill: Analyse Complex Data and Draw Conlusions.

(c) 3 marks for correct answer: either 8 days at 800 and 2 days at 900 (producing 5036 perfect Chumbals and profits of $38 516) or 7 days at 800 and 3 days at 900 (producing 5014 perfect Chumbals and profits of $38 784). No reference to the number of perfect Chumbals manufactured or the profits made is needed to be awarded marks.

If a correct answer is not given, give one mark for an answer which combines outputs of 700, 800, 900 or 1000 and produces a sufficient quantity of Chumbals, but does not satisfy the profit requirement. Only award the mark if there is a combination of different outputs (not just 10 days at 700 or 800.)

Give a further mark if the candidate's solution gives a combination of only 800's and 900's.

Skill: Process Data and Draw Conclusions.

3 (a) What follows is a schematic representation of the argument, not a model answer.

Main conclusion (C): People have to be priced off planes and cheap flights will have to end.

Reasons and sub arguments:

(1)   Many countries will fail to meet targets.

Therefore:

(IC1)   Cut price flying will make countering global warming impossible (with potentially disastrous consequences).

(2)   The convenience of flying is a threat to life on earth.

Therefore:

(IC2)   Clash of interests cannot be ignored.

(3)   In Britain alone CO2 emissions have doubled since 1990 and will double again by 2003.

(4)   Aircraft emissions in the stratosphere have twice global warming effect of ground level emissions.

(5)   Planes pump out 8 times the CO2 of trains.

(6)   One flight equal to CO2 for a house for whole year.

Therefore (from 1–6):

(IC3)   We have to reduce our flying.

(7)   The only answer is forcing prices up.

Marks:

For main conclusion [1].
For IC3 [1]
This may in the form of one conjunctive statement.

From main reasons and other intermediate conclusions above
5 or more given [4]
4 given [3]
3 given [2]
1 or 2 given [1]

(b) One mark will be awarded for a candidate's attempt to evaluate the whole piece.

The remaining seven marks will be awarded for individual evaluative points as described below.

Marks will only be awarded for identified strengths if the candidate adds some explanation of the nature of the strength (rather than merely repeating the point and expressing admiration for it).

The areas which may be identified as strengths are likely to focus on the following reasons:

(1) It is political suicide;

(2) It is unjust and undemocratic;

(3) That politicians and environmentalists do it, which is hypocritical;

(4) That there is a better solution – choice (which she elaborates on).

Criticism of the argument may include:

- There is an assumption in the first paragraph that a strong line on global warming and climate change would not also be popular, and/or outweigh resentment about higher flying costs.

- In the last paragraph it is assumed that people will discover the benefits and pleasures etc. or that they will be willing to return pre-jet-age travel speeds. The argument is convincing only if these claims and assumptions are accepted.

- Paragraph 2 is a weaker argument. There is arguably a flaw in the reasoning that because politicians etc. fly, the argument against flying is weakened, which it is not. Some candidates may use the technical terms ad hominem or tu quoque. Either would be appropriate.

- Being more charitable this could be construed as a legitimate argument, since its conclusion is not that it is all right to fly, but that it is difficult to persuade people not to if you do it yourself. (Seen this way it could be called a justified ad hominem, and not a fallacy.)

- Another possible flaw is that the author assumes an either/or situation, leaving no room for a combination of measures, e.g. taxing air traffic and using the money to make alternatives more acceptable. In this respect the author could be said to be limiting the options or creating a false dilemma.

- Likewise the author overlooks the possibility of other options altogether, like rationing air traffic to a specific number of trips a year.

Marks:

1 mark for each sound evaluative point, (e.g. as listed above) up to a max. 5.

Up to 3 further marks available for the quality of the evaluative points: well explained, backed by examples, etc.

(c) Generic descriptors:

12–16 marks for

- presenting a cogent, relevant and well-reasoned argument in response to the source materials and the assignment;
- selecting evidence and arguments judiciously from the supplied sources;
- introducing strong supporting evidence, examples and arguments in addition to the supplied sources;
- drawing conclusions which are supported by, and consistent with, selected evidence and reasoning used;
- considering consequences; anticipating and meeting counter-arguments.

6–11 marks for

- presenting some sound, relevant arguments in response to the source materials;
- selecting some useful materials to support own argument/s;
- introducing some relevant supporting evidence and/or argument in addition to the source materials;
- drawing a conclusion (or conclusions) which receive some support from the evidence and/or reasons offered.

1–5 marks for

- presenting some recognisable argument in response to the source materials;
- making some reference to the source materials and introducing some additional observations;
- drawing a conclusion (or conclusions) on the basis of the reasons offered.

Suggestions

Candidates should recognise that the question asks for a conclusion in the form of a recommendation, and give a clear expression of their recommendation: e.g. that the government should not risk damaging a thriving industry by forcing people to stop flying. OR that governments should make flying a rare luxury by forcing prices up. (A factual conclusion, such as 'Air travelling is causing global warming', would not be a relevant conclusion in response to the question).

They should offer reasons to support their recommendation. E.g. that although many of the documents show that there are large emissions from planes, and that they are greater than other forms of transport, they give no evidence that these are harmful or that they cause climate change / global warming; nor even that global warming is taking place. The threat is purely conjecture and until such evidence is produced, it would be a mistake to take drastic action. OR that the risk to the planet is so great and so important that unless there is evidence that global warming is under control, all measures to prevent it – especially air travel – should be cut back.

They should consider consequences: e.g. the loss of jobs that cutting back on air travel would have, including especially poor countries that rely on tourism. Also the cost to businesses if people had to travel by ship or train and be away from their desks etc for much longer. Also the insularity which would follow if holidays were restricted to close-to-home locations; reduction of knowledge about the rest of the world if travel curtailed, etc.

Candidates should make selective use of the documents:

(1) By challenging or supporting one and more of the arguments. They could argue, for example, that the authors of Document 2 give good reasons why air travel is a problem, but no good reasons for dealing with it by raising fares, rather than other options.

(2) By evaluating evidence, and making inferences from the data. They could observe, e.g., that if the two graphs are representative of the travelling public, the arguments which focus on business travel are only dealing with the tip of the iceberg: leisure accounts for a much bigger proportion of air travel. Or they could observe that although the statistics are headline grabbing, there is no evidence of the significance of the figures – what effect they have.

As well as giving their own reasons and arguments, candidates should consider and respond to possible objections to their viewpoint or conclusions. For example, if they recommend a severe cutback in air travel, they should have some response to the problem of resulting unemployment and harm to the tourist industry.

Where relevant, candidates may introduce ideas, knowledge or experience of their own: for example, the building of a controversial local airport might be relevant to the debate.

They may mention particular locations which they know of or have read about which would be particularly affected. They might draw analogy with the consequences of 9/11 and the Tsunami, which hit tourism very severely, and observe that this might be repeated elsewhere.

These points are given as suggestions, and other comparable lines of reasoning will receive appropriate credit.