MATHEMATICS

Overall grade boundaries

Grade:	E	D	C	B	A
Mark range:	0 - 7	8 - 15	16 - 22	23 - 28	29 - 36

General comments

This was the first session with the new marking criteria. On the whole this did not seem to present many difficulties for the supervisors and candidates.

The range and suitability of the work submitted

As always, the range of topics was quite wide (and sometimes quite imaginative), which is a good thing. However many were not suitable. Most of the time a subject may not be inappropriate *per se* but unfortunately leads the candidate to an inappropriate essay.

For example, a subject in statistics can be quite adequate but most of the candidates who choose a subject in statistics spend all their efforts in circulating poorly conceived questionnaires to their entourage and then apply merely elementary (and often unjustified) tests with little mathematical content.

Similarly a subject in the history of mathematics may be quite adequate but most candidates limit themselves to listing results obtained by one or more mathematicians without explaining (or even understanding) them resulting again in EEs with negligible mathematical activity.

Some subjects are unsuitable because they are too difficult (or too advanced) so that most candidates end up reproducing material from various sources (mostly from the web) which they do not understand (sometimes they do not even realize that they do not understand). In that category we find subjects like fractals and transfinite cardinals (even though, occasionally, some particularly brilliant candidates manage to deal meaningfully with these subjects).

Some subjects are adequate but lead to essays loaded with paragraphs emoting on “the beauty and ‘magic’ of mathematics” while in most cases, in fact, having a negligible mathematical content; in that category we find among others the Golden number and the Fibonacci sequence.

Finally some subjects are completely inadequate and are to be avoided such as those trying to deal with mathematics in sports or in gambling (the latter because the mathematical content is either trivial or considerably above the capabilities of a secondary school student).

Candidate performance against each criterion

A: research question

One should note here that supervisors should exert a better control on the choice of the research question and reject those that appear inadequate.

B: introduction

Most introductions were fairly adequate but some candidates were too anecdotal and personal, failing to contextualize the subject.

C: investigation

Candidates, for the most part, did locate sources (when relevant) but not always critically. Too many (see above) quoted these sources without understanding them. When the investigation was personal (in the rare cases when it was feasible by a secondary school student) it was usually adequate.

D: knowledge and understanding of the topic studied

Candidates who chose topics within their range of ability usually displayed good knowledge and understanding. This was almost never the case when the subject chosen was too difficult.

E: reasoned argument

Appropriate topics within the capability of the student helped form the basis for the construction of a sound argument.

F: application of analytical and evaluative skills appropriate to the subject

Again the choice of topic was vital in determining whether the student was able to meet the requirements of this criterion

G: use of language appropriate to the subject

Mathematical language (even in otherwise reasonably adequate EEs) was often poorly used. Terms used without definition, inappropriately, and without clear understanding were a frequent problem with essays.

H: conclusion

The quality of conclusions generally matched the overall quality of the EE. When the subject was too difficult, conclusions were usually meaningless and/or completely unjustified.

I: formal presentation

In an EE in mathematics good presentation implies in particular adopting a mathematical approach i.e. stating definitions, theorems, proofs, and this was very rarely the case. Some EEs were on the verge of complete confusion (supervisors should provide help to these candidates by indicating weaknesses of expression in a general way).

J: abstract

Most abstracts were adequate but some were totally uninformative about the content of the EE and quite a few omitted mentioning the conclusion.

K: holistic judgment

Supervisors are reminded that their report can be extremely useful in assessing this criterion as it can, for instance, provide a background to their student's research activities.

Recommendations for the supervision of future candidates

Supervisors should err on the side of providing too much guidance rather than being too passive: too many candidates derive no benefit despite having spent a significant amount of time writing a worthless essay. It must never be forgotten that before being an instrument of assessment, EEs are meant to provide a learning opportunity, an active hands-on experience with the subject. This opportunity for learning must be carefully monitored by the supervisor who must try to make it as positive an experience as possible.

Too many supervisors ignore the requirement of writing appropriate comments on the cover sheet: often the supervisor states that he/she spent a significant number of hours with the candidate and yet offers no comments.

Finally, supervisors should not hesitate to reject subjects which are obviously or potentially inappropriate: they know (or should know) what their candidates are capable of doing and should accordingly steer them away from subjects that will lead to a sterile, negative experience.