



General Certificate of Education

General Studies 6761 *Specification A*

GSA5 Science, Mathematics and Technology

Report on the Examination *2007 examination - June series*

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Unit 5 Question 1

(GSA5 Science, Mathematics and Technology)

This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

1.1	A	1.11	C
1.2	D	1.12	D
1.3	B	1.13	C
1.4	C	1.14	C
1.5	B	1.15	C
1.6	B	1.16	A
1.7	A	1.17	D
1.8	C	1.18	D
1.9	A	1.19	D
1.10	C	1.20	A

GSA5 Science, Mathematics and Technology

Section 1

(Questions 1.1 to 1.20)

The performance of candidates on this section of the paper was better than on the corresponding section last year; the mean facility of the questions this year was 71% compared with 67% in June 2006. All questions discriminated satisfactorily between the best and worst performing candidates.

All questions appeared to be accessible to the majority of candidates; there were none with a facility of less than 40% and many questions that candidates found very easy.

Notes on selected questions

Of the three groups of questions, Pulleys, Electric Sewing Machines and Symmetrical Tile Patterns, the most challenging was that on Symmetrical Tile Patterns, but the mean facility in this section was still as high as 69%.

The most difficult question in the first group, with a facility of 62%, was 1.4, where candidates had to select the incorrect statement out of four about the effects of various pulley configurations. A quarter of candidates chose the statement about the relative sizes of pulleys affecting the speed of others as the incorrect one. The easiest question, answered correctly by over 90% of candidates, was 1.1, identifying which of the figures showed all pulleys turning anti-clockwise.

The group of questions on sewing machines included one of the most difficult questions, 1.7, with a facility of 42%; this required candidates to identify the function of the bevel gears in the machine. The final two questions in this group, 1.11 and 1.12, were also relatively difficult; these both required candidates to deduce from the diagram and the explanation how the machine operates in practice.

The hardest question, 1.15, with a 40% facility, was about tile patterns. This was a question simply asking which of the given patterns had rotational symmetry. Candidates did well, however, to come to terms with the explanation about chiral reflections to successfully answer questions 1.16 and 1.17 (77% and 86% facility respectively).

Section 2

General comments

The essay questions were answered with the following distribution, based on a sample of approximately 600 scripts:

2.1	2.2	2.3	2.4	2.5	2.6
19%	9%	14%	7%	31%	19%

In recent years there has been a tendency for a highly skewed distribution of answers, with one question attracting a disproportionate number of responses. This year, although the distribution was not even, there was a greater spread of answers. Examiners commented that the questions appeared to offer a high degree of accessibility.

The marks for each question were awarded in two parts, with up to 20 marks awarded for content based on Assessment Objectives AO1, AO3 and AO4 according to five level descriptors; and up to 5 marks were awarded for communication based on Assessment Objective AO2. Examiners were encouraged to use the full mark range available.

Centres should remind candidates that there are several elements to each question and they should answer all of them in order to achieve high marks. In particular, each question requires an explanation of some specific scientific or technological knowledge in addition to a discussion of wider issues. Without the science explanation, the essay as a whole will be incomplete and will fail to attain the higher grades.

The standard of spelling, grammar and punctuation varied significantly between candidates. It is important that centres impress on candidates that there are specific marks for communication and that, other things being equal, a fluently written answer will score more highly than a poorly written one. Centres should remind candidates of the rubric concerning continuous prose, as a small number of candidates this year appeared to think that lists of bullet points were sufficient for their answers.

There continue to be rubric infringements (i.e. candidates attempting all six questions) and these tend to be concentrated in individual centres. A basic element of exam preparation ought to be instructions on the structure of the examination paper and the selection of questions. It is particularly frustrating for examiners, as some of the candidates answering all six questions were clearly very knowledgeable and may well have achieved high marks if they had concentrated on one question, as demanded in the rubric.

Question 2.1

For this question, examiners were looking for knowledge of a range of surveillance systems, a detailed explanation of one of them, and a discussion of their benefits and potential drawbacks.

Most candidates demonstrated knowledge of at least some surveillance systems, with CCTV and store loyalty cards being the most frequently mentioned. However, there were few detailed explanations. The discussion was often appropriate, but some candidates diverted into comments on identity theft via the internet, which was not strictly relevant.

Question 2.2

This question introduced the concept of the 'precautionary principle' and invited a discussion of it in relation to a number of scientific developments.

Most candidates attempted a balanced discussion and were able to introduce relevant science. However, there were a number of weaknesses in scientific knowledge – for example confusing reproductive cloning with therapeutic cloning, discussing nuclear energy without mentioning the problem of waste, and explaining genetic modification in terms of 'added chemicals'. Very few candidates made any reference to nanotechnology.

Question 2.3

This question gave candidates the opportunity to discuss a wide range of appropriate requirements for a planet to support life, including the planet's position in relation to its star, gravity, magnetic field, atmosphere, geological activity, existence of water, chemical elements, etc.

The best answers considered some or all of these points. Some candidates wrote at length about biological matters, especially photosynthesis, but failed to put that knowledge in the context of conditions for life on a planet. Weaker candidates interpreted 'life' as meaning human life, some even discussing the question in terms of human colonisation – presumably missing the issue of distance measured in light years.

Question 2.4

Examiners were a little surprised that more candidates did not attempt this topical question. Answers should have included an explanation of the mutation and evolution of bacteria resistant to a range of antibiotics, at least partly as a result of the overuse of the antibiotics; an account of the enhanced hygiene measures being used in hospitals; and a discussion of the economic and political issues arising from this problem.

There were some clear explanations of the science involved in the development of 'superbugs', though there was some confusion between bacteria and viruses. Some, though not all, candidates described the hygiene measures, while accounts of economic and political implications were not always realistic.

Question 2.5

This was the most popular question on the paper and was clearly seen by some candidates as the soft option. Examiners were looking for scientific arguments for and against non-human animal testing as well as ethical arguments.

Too many answers presented the arguments as simply science versus ethics. Indeed, many answers ignored the scientific arguments altogether, and the weakest engaged in vague and emotive assertions. The better responses often involved examples of testing for psychological experiments, and the wider issues were well discussed in these answers.

Question 2.6

This question required information on the uses of packaging and the problems of disposing of often non-biodegradable material in landfills or by incineration. There was also a requirement for a discussion of policies on reduction, re-use and recycling of waste.

In general, the question was well answered, though some candidates failed to realise that packaging often had a purpose beyond mere presentation and marketing. There was some sound science in relation to problems of disposal. Evaluation of the effectiveness of the 'three Rs' varied from discussion of best practice internationally to simple anecdotes of the variously coloured bins available in candidates' local areas.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.