



General Certificate of Education

Science for Public Understanding 5401

SPU2 Issues in the Physical Sciences

Report on the Examination

2007 examination - June series

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General Comments

There were some excellent answers this year with a general improvement in the longer answers. Many candidates handled some quite complex data well.

Candidates' inability to see a question as a whole remains an issue. The comments made in last year's Report on the Examination apply as strongly as ever this year; "Questions are structured with the more straightforward points usually being asked first. However, candidates should be encouraged to see the question as a whole and to be prepared to integrate all the information given. Each question in the paper is on a single issue and at least one part of any question is likely to expect candidates to integrate information from more than one section".

Where a question asks 'is there evidence in the data?' or 'do the results support the hypothesis?', candidates are expected to actually describe the relevant data in support of their answer.

The two questions requiring a longer response are marked on the overall quality of the argument. This includes making a clear claim that is backed up by a suitable range of evidence. This evidence may include information in the question, but needs to go beyond this for the higher marks. Evidence must be relevant to the question and to the claim being made. General points, such as 'the risk is too high', 'it is too expensive', or 'harms the environment' do not gain credit. A list of points not linked to an overall argument, will not attract high marks. In some questions a good answer will acknowledge the existence of counter-claims or contradictory evidence. However, some candidates attempted to do this and ended up contradicting themselves with no clear claim being made. Candidates should be advised to check that they are making a clear overall argument.

Some candidates have obviously prepared answers to past questions, such as the desirability of nuclear power or ante-natal testing and used the prepared answer that seems vaguely relevant to the issue, rather than thinking about the question that has actually been asked this year. There was no evidence to suggest that candidates ran out of time on the paper and they would be well advised to use more time to think about the questions before answering.

Question 1

In (a) (i), many candidates still believe that a renewable fuel is one that 'cannot run out' or 'is not used up'. These answers did not gain marks.

Most candidates understood the simple carbon cycle in (a) (i), although some did not specify that the atmospheric carbon is in the form of carbon dioxide.

The more able candidates handled the calculation in (b) (i) well.

There were lots of very general descriptions to (b) (ii), but not many specific examples of where the heat energy goes. The misconception that confuses waste energy with waste products such as carbon dioxide was less common this year, but still found in some answers.

In (c) (i), some candidates incorrectly stated that carbon monoxide caused 'breathing problems'. If it did it would be less dangerous, as victims would be aware of what was happening to them.

In (c) (ii), candidates had to use the data; general comments about the harm caused by these pollutants did not gain marks.

Question 2

In (a) (i), where two reasons are asked for, these must be distinct reasons, not the same point made twice in different words.

Not many candidates seem to know that a percentage increase expresses the increase as a percentage of the starting value in (a) (ii). Students also seem to need more practice in reading values from graphs.

Many candidates lost the mark in (b) because they said 'the number of protons and neutrons', confusing mass number and atomic number.

Most candidates wrote plenty when answering (c) (ii). However, very few thought carefully about what the question actually asked; the advantages and disadvantages of research. Details on the energy source itself needed to be linked to suggestions for further technological developments. A surprisingly limited set of evidence was used by most candidates. Statements such as 'environmentally friendly', 'nuclear power is very efficient', 'renewable energy does not harm the environment', 'nuclear power is pollution free' are either meaningless or wrong and were not considered as useful evidence to support an argument. This is a topic where opinions are strong, but the use of science explanations as evidence to support the argument was rather poor.

Question 3

Many candidates could not translate the information in the graph into the numerical form asked for in (c) (i). Understanding of different ways of expressing uncertainty is important in this subject.

Very few candidates seem to have learned 'the advantages and limitations of computer modelling' and most gave very vague and general answers to (d) (i). Almost all confused the level of uncertainty involved in models with 'not accurate'.

Question 4

Candidates often find the question on radiation the most difficult. This year was no exception. The basic science probably needs more detailed teaching.

In (a) (i), most candidates could not define or explain ionising radiation.

Whilst candidates used the word mutation in (a) (ii), few seemed to understand what it meant. 'Mutates cells' was a common answer. Some seemed to confuse X-rays with the short path of α rays.

It was pleasing that nearly all candidates recognised that the issue in (c) was a balance of risks rather than risk avoidance. However, many were unable to go much beyond this. For example, they worried about the risk from the CT scan but were unable to give any tangible benefits from the scan, such as early identification of cancer leading to better/more effective treatment. In an issue such as this, a generally applicable conclusion is unlikely; good answers often described a scenario, such as a high genetic risk, and discussed the relevant conclusion in that case. Few candidates picked up on the differences in medical opinion implied by the information in the stem of the question.

Question 5

In part (a), many candidates were not very clear about galaxies and described about equal number of stars and planets, rather than billions of stars.

Very few candidates could give a definition of gravity in its simplest form in (b); an Aristotelian idea of attraction to the centre of the Earth was popular.

Part (c) was all about the nature of scientific explanations, using examples from the text provided. Candidates who were familiar with the ideas about science in this part of the specification did well; others resorted to vague generalisations that did not gain marks.

Mark Ranges and Award of Grades

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