
APPLIED GENERAL **APPLIED SCIENCE**

1775/ASC3 Science in the Modern World
Report on the Examination

1775
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Overall comments

The majority of students were able to attempt all questions on the paper. The questions that were left unattempted the most often were those about types and roles of scientists (Q5.2, Q6.4, Q11.2 and Q11.4). It is disappointing that many students were unable to apply their knowledge of the roles of scientists to the context of nanotechnology.

Most students were able to answer the questions fully without the need for additional pages. The majority of students did not use additional pages for the extended response question (Q9), and it was pleasing to see that centres had followed the guidance and encouraged their students to be succinct in their responses.

Fewer responses seen were direct quotes from the source material and it was clear that centres were encouraging students to write an answer in their own words unless the question specifically asked for a quote from the source.

Students appeared to be well-prepared for the type of mathematical calculations required in the ASC3 examination. The mathematical questions (particularly Q4.1, Q10.1, Q10.2, Q11.1 and Q12.1) were well-answered by most students. It was pleasing to see that students had practiced mathematical calculations in preparation for the examination.

Q1.1 (1 mark)

Most students were able to correctly identify how many nanometres there are in one metre in this multiple choice question.

Q1.2 (2 marks)

Over half of students scored both marks on this question and over 90% scored one mark. The full range of answers on the markscheme were seen in students' responses.

Q2.1 (1 mark)

Almost all students were able to give an answer regarding a large (or more) surface area being the reason why nanoparticles make good catalysts.

Q2.2 (2 marks)

This question was well-answered with almost half of students scoring three marks for a very well-explained answer as to why the author referred to chemical pesticides. Over 80% of students scored at least one mark.

Q3.1 (2 marks)

Over 60% of students scored two marks by explaining that there was reference to a story from 100 years ago. Those who only scored one mark, generally gave the year 1931 or '100 years' but failed to say why this was relevant.

Q3.2 (2 marks)

Most students scored at least one mark on this question. The most common answers seen were about people being able to relate to the types of media in the article and these making the article more interesting.

Q4.1 (2 marks)

Over 80% of students scored at least one mark, with a third of students scoring both marks. Many answers referred to the fictional vehicle being a submarine and this was given credit as the 'uses wheels' mark for the nanocar. Some students lifted a quote from the source about being 'driven in a particular direction' which did not answer the question so was not credited.

Q4.2 (2 marks)

Almost half of students scored both marks for correctly calculating the width of the nanocar from the information given. A further 20% of students scored one mark because they recorded the power of 10 incorrectly.

Q5.1 (2 marks)

Almost 60% of students scored both marks on this question. Most students were able to give an answer that referred to no unpleasant taste from the omega-3 oil when enclosed in nanocapsules. Those students who simply said that this was because the nanocapsules only opened in the correct environment, and did not mention the stomach, did not achieve the second mark.

Q5.2 (1 mark)

This question was very poorly answered with less than a third of students achieving the mark. Many students simply avoided giving an answer at all. This was disappointing as there was a range of possible answers all of which are on the specification.

Q6.1 (1 mark)

Over 80% of students scored the mark here. Reference to magnetic particles was ignored and students were still given credit as long as 'lipid filled with water' was also mentioned.

Q6.2 (1 mark)

Almost 80% of students were able to give the use of the liposome to carry the drug or deliver the drug to a particular place in the body.

Q6.3 (2 marks)

Almost 90% of students were able to describe the particles being heated up. The more able third of students went on to describe how the drug was released when the liposome became porous or changed from solid to liquid.

Q6.4 (1 mark)

Less than 20% of students were able to apply what they know to suggest an appropriate role of a pharmacologist in using the new technique. Many students thought the pharmacologist would be making the drug or injecting the patient, confusing a pharmacologist with a pharmacist or medical doctor.

Q6.5 (1 mark)

Almost 60% of students were able to identify information from the source about magnetic particles being already used in MRI scans. The other answers on the markscheme were seen in fewer students but the majority of students scored the mark in this question.

Q7.1 ((1 mark)

Three quarters of students scored a mark here. Most students gave the correct response about camouflage. Responses about hiding from predators or prey were also seen. Other mark points on the mark scheme were not seen in student responses.

Q7.2 (3 marks)

This question was well-answered by students with almost 90% scoring at least one mark. Over half of students scored three marks.

Q7.3 (1 mark)

Less than half of students scored the mark in this multiple choice question. The majority of students who did not score the mark thought that the nanoparticles were made of water.

Q7.4 (1 mark)

40% of students could suggest what 'biomimicry' meant. 'Copying biology' was not given credit. Many good answers were seen that went even further than the markscheme such as 'copying biological features of other living organisms'.

Q8 (2 marks)

Less than 20% of students scored both marks here, whilst almost 70% scored one mark. Since the website PHYS.ORG was mentioned in the question, responses that simply stated 'it is a scientific website' were not credited here. All answers on the mark scheme were seen.

Q9 (9 marks)

Students achieved across the full range of marks on this extended response question. 20% of students achieved well-deserved level 3 marks (7 – 9 marks) for detailed descriptions of the advantages and disadvantages of the use of nanotechnologies in the sources. These responses were well-structured and included correct use of scientific terminology. Half of students scored within the level 2 marks (4 – 6). Some students only included one advantage from each source when there were many to write about, particularly in source A. Students scored lower marks if their description did not include advantages **and** disadvantages. The more able students remembered to say that there were no disadvantages in source B where that was the case. Weaker students' responses were simple lists (such as nanowhiskers, sunscreen, nanotubes) and lacked any detail about advantages or disadvantages. Some students made up their own information, saying things like 'nanoparticles are very toxic to the human body' rather than explaining that they could be harmful but we don't know yet whether they are or not. A few candidates discussed the validity and effectiveness of the sources, demonstrating that they had not read the question properly.

Q10.1 (1 mark)

It was very pleasing to see that almost 90% of students scored a mark for this simple calculation.

Q10.2 (3 marks)

Almost a third of students were able to achieve the full three marks here. Some scored one or two marks for incomplete calculations or errors carried forward from an incorrect calculation in an earlier step in the calculation.

Q11.1 (2 marks)

Over half of students performed a calculation that enabled them to state that structural steel is stronger than Kevlar. A small number of students stated that structural steel is 'harder' or 'heavier' and clearly had not read the question carefully.

Q11.2 (1 mark)

Over two thirds of students were unable to apply their knowledge of the roles of scientists to identify a type of scientist who would 'test graphene for properties such as strength'. Material scientist is on the specification so students should have an understanding that material scientists test the properties of materials.

Q11.3 (4 marks)

Students achieved marks across the full range of marks in this question, with 95% of students achieving at least one mark. 20% of students were able to explain two good reasons why graphene would be better for making helmets and body armour than Kevlar. 'Provide more protection' was allowed for 'stronger'. Responses about being more durable were not credited.

Q11.4 (1 mark)

The responses to this question, as with the other questions about the roles of different types of scientists, was disappointing. Only 10% of students were able to name a product developer as the type of scientist who would design helmets and body armour made from graphene.

Q12.1 (2 marks)

This question was well-answered by 40% of students who knew how to perform a percentage decrease calculation.

Q12.2 (2 marks)

Over 70% of students scored at least one mark here. Some students did not achieve one of the marks because they gave the trend that was already given in the question rather than two 'other' trends. Some students did not achieve marks because they did not refer to 'increases with time' and just said that the 'number of transistors increases', which in itself is not a trend.

Q12.3 (3 marks)

Over 60% of students were able to make an attempt at this question and score at least one mark. 45% of students scored two marks for correctly doubling the number three times. The numbers in the table were in thousands, so to achieve the third mark students needed to add the word 'thousand' or 000 to their final answer. The majority of students did not achieve this third mark.

Mark Ranges and Award of Grades

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