GCSE
ENGINEERING

8852/W: Paper 1
Report on the Examination

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General comments

It was pleasing to note that the vast majority of students attempted most of the questions on the paper. The communication skills shown by students were varied. In a number of cases, students seemed to have responded to questions without reading the questions carefully. To avoid this in the future, we recommend that students take the time to read over the questions before attempting to answer them. In this way, simple errors and generic responses to longer questions can be avoided.

There were a number of instances where the responses throughout the paper were not detailed, specific or technical enough to gain the higher level of marks. Although many students wrote clearly and expressed themselves well, there were some whose handwriting and powers of expression were limited.

A vast majority of students were able to show good mathematical ability and many students scored well in the questions which asked them to demonstrate mathematical skills. However, at times, mathematical skills were more evident than engineering subject knowledge when achieving marks.

Question 1

1.1 Most students attempted this question, but only slightly more than half gained full marks.

1.2 A lot of students were able to identify malleability as the correct response.

1.3 Very few students achieved full marks in this question. A good number of students identified quenching, but many confused hardness and ductility with each other, or with strength.

1.4 Most students attempted this question, with the vast majority of students identifying welding as the correct response.

1.5 Similarly, the majority of students identified the correct response for this question.

1.6 Many students were able to identify the correct equation for force.

1.7 Less than half the students who answered the question identified structural concrete as a composite.

Question 2

2.1 Many students gave generic answers such as ‘strong’, ‘heavy’ or ‘cheap’ without specific detail of the differences. Many students also gave repeated or flipped answers, which were only credited once. Centres would be advised to ensure students know the engineering properties of the most commonly used materials.

2.2 This question proved challenging, as many students did not analyse the two different materials and often gave answers that were more suitable for Q2.1. The answers were often not linked to the manufacture of car bodies.

Question 3

3.1 This question was a useful differentiator and saw a good spread of marks. Some students responded well to this question and showed a clear understanding of the advantages and disadvantages of a chain and sprocket system rather than a pulley system. However, many students did not read the question carefully enough and only wrote about the pulley system.

3.2 After the exam had been sat by students, it was identified that the gear ratio given in this question, 1:3, was expressed incorrectly and should have been written as 3:1. To ensure no student was penalised, a variety of responses were rewarded which used either form of the ratio (1:3 or 3:1).

3.3 It was pleasing to see that many students attempted this question, but few achieved full marks. This is because many students did not take into account the 2mm of the saw cut.

3.4 This question was demanding for students with no knowledge of a lathe, which is a standard piece of engineering equipment. There were very few students who were able to achieve the top mark band for this question, with more than half of students achieving 0-2 marks. Many students' responses lacked basic terminology such as 'chuck', 'feed speed' and 'facing off'. It appeared that some students had never used a lathe. Where students clearly had some knowledge of using a lathe, they often were unable to link this knowledge to the question being asked, lacking the specifics related to producing the component.

3.5 This question asked students to name two different tools to accurately measure the diameter of an axle. Less than half the students were able to name one tool, and a minority of students were able to name two different tools. Many students named measuring tools that could not measure to the degree of accuracy asked for in the question, such as callipers or rules. Digital callipers and Vernier callipers were both acceptable answers.

3.6 Students were either able to answer this question using area or volume to calculate the percentage waste when manufacturing a washer. There was a clear spread of marks on this question, covering the full mark range with many students achieving full marks on this question. Where students didn't achieve full marks, it was often because they struggled with the understanding of how a washer was made. Therefore, many did not subtract the area of the centre hole when working out the waste.

3.7 Many students gained full marks on this question. The most popular answers were 'improving how it looks' and 'improve corrosion resistance'.

3.8 Again, this was a well answered question, with many students identifying galvanising as a suitable answer.

Question 4

4.1 Responses for this question covered the full mark range. Many students did not understand the term non-metallic, and gave aluminium as their material answer. In addition, many students gave generic terms such as 'light' and 'strong' as their relevant properties. These responses were not awarded a mark. Students needed a specific material property that linked their answer more closely to the question and to the use of a ladder to be awarded full marks.

4.2 Students generally responded well to this question with a good spread of marks across the mark range. Where they could recall the required formula, they went on to achieve full marks. However, around a quarter of all students failed to be awarded any marks for this question. With the increase of marks being awarded for maths skills in this specification, students would benefit from continued practising.

Question 5

5.1 This question was less well answered, with the majority of students unable to name tension as the correct answer.

5.2 Many students gained full marks on this question and were able to read the table correctly to work out the correct answer. A few students wrote incorrect units, such as cm, after their final answer. This meant that these students were not awarded the second mark for this question.

5.3 This was a good differentiating question, with only half of students gaining full marks. Many students were able to interpret data from the table but didn't manage to use it to calculate the correct percentage and write it to one decimal place.

5.4 This was by far the most successfully answered question on the paper, with the vast majority of students being awarded full marks. Where students hadn't been awarded full marks, they tended to have drawn two different lines on the graph or labelled the axes as *x* and *y*, rather than *length* and *weight*.

5.5 Again, a vast number of students were awarded full marks for this question. Where students hadn't, it was because they had drawn inaccurate graphs and had not used the table in Q5.2 to check the validity of their response after drawing the graph.

Question 6

6.1 Responses for this question covered the full mark range. It was surprising that only a few students were awarded full marks, and this indicates that simple mechanism and motion knowledge need to be built upon, with the rest of this specification.

6.2 This question was well answered, and the vast majority of students identified the image as a bearing.

6.3 This question proved challenging, with only half of all students able to identify one or two points and around half not being able to identify the need for a bearing in a mechanical system.

Question 7

This question produced an even spread of responses, with the conversion from ml to mm^2 proving the most challenging part. A few students were unable to recall the formula or transpose it, and a few students were awarded zero marks for this question. Some students wrote the correct formula down, but then used 70mm in their calculation instead of converting it into the radius. Only a minority of students were awarded full marks for this question, and some did not attempt this question at all.

Question 8

8.1 A few students were awarded top marks for this question, whilst the majority of students only achieved 0-3 marks. This is a new topic area from the legacy specification, and centres should ensure that they have covered all areas of the new specification and are not still using the legacy specification when teaching.

8.2 This question drew a range of good responses, but there was still a percentage of students who gave generic responses such as 'quick', 'fast' and 'cheap'. These were not credited.

8.3 Some students answered this question well and showed good technical knowledge, but again there were a large number of students who gave generic answers for the second part of the question. Often these answers were unrelated to the question.

8.4 There was a wide spread of responses from this question. A few students were able to give well explained responses, clearly showing a good understanding of emerging technologies. At the lower end of the mark range, many students had difficulty expressing themselves. They demonstrated a limited knowledge and often gave repeated or unjustified answers for both rapid prototyping and automated processes. Centres are reminded to cover all areas of the specification and to encourage students to practise their knowledge using descriptive notes.

Question 9

9.1 A good number of students were able to identify relevant additional requirements for the secure entry system. Responses were also credited if the student had written a user requirement and reason. Responses were not credited where the student had merely copied out the requirement given as an example in the question.

9.2 Many students were able to express themselves well and responded with a justified choice for their method of entry, with a vast number of students being rewarded with 2 or 3 marks for this question. A few students focused on a single method and thus failed to evaluate both methods.

9.3 Many students did not give specific component names, often writing what the component would need to do, without naming a specific component that would do that. Students should be reminded to take time to read the question carefully to fully understand what is being asked.

Question 10

10.1 This question was either answered very well, with students being awarded four marks, or very poorly with students being awarded zero marks. There were very few students awarded 1-3 marks. Where students were able to recall the formula, they generally went on to achieve full marks. Where students were awarded zero marks, they often had the incorrect formula and were therefore unable to transpose the formula and unable to calculate the correct answer.

10.2 Only half of students who responded to this question had given enough detail to be awarded full marks. The majority of students were awarded one mark for the response 'turn off and on', but did not go on to justify their response.

Question 11

This question gave a wide range of responses. The students who were awarded a mark in the top band gave responses that were detailed, well thought out and planned, and they addressed all aspects of the question. It was pleasing to see many students using prior knowledge from other subjects to answer this question, but students should be aware of exactly what the question is asking of them, as many did not link their responses directly to this question. Students gave detail about wind turbines in general but often failed to mention maintenance issues on land or in the sea. They often gave flipped generic answers, such as 'Wind turbines are easy to access on land but difficult to access at sea.' Many students mentioned the lack of use of fossil fuel linked to using wind turbines, but again did not link their response to the question asked.

Question 12

12.1 This question was well answered and well attempted, with many students identifying the correct answer.

12.2 Only a few students achieved the one mark for this question.There seemed to be a gap in knowledge about FETs. This was also evident in the responses to Q12.3.

12.3 This question had the lowest response rate, with a vast majority of students either not attempting the question or being awarded no marks. It was also evident from the responses that students had little understanding of this section of the specification.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.