AS
Product Design
7551/W
Report on the Examination

7551
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Introduction

This was the first year for this AS examination, including questions that include mathematical elements for the first time. These appear to have provided a significant challenge for some students. However, of the questions that proved to be difficult but did not include mathematical elements, knowledge recall of content that did not appear on the legacy Design and Technology specification appears to have been the biggest barrier to achievement.

Students need to ensure that they pay careful attention to the command word used in the question and use this to structure their answers appropriately. Comparison questions require students to compare the stated items in their answers, but in many responses, students simply analysed or evaluated these items separately. In evaluation type questions, both positive and negative aspects should be considered; in many responses to this type of question, students often offered only positive or negative comments and this restricted their ability to offer a more critical evaluation.

Section A

Question 1
This question was generally well answered with the majority (59.3%) of students correctly selecting 'galvanising' as the most appropriate finish for the streetlight.

Question 2
This question was well answered with a majority of students (51.9%) able to categorise all of the metals correctly, with only 5.8% of students failing to achieve a mark.

Question 3
Responses to this question showed wide variation. 35.7% students correctly defined both of the material working characteristics and gained full marks. In responses that gained no marks (31.9% of responses), student definitions did not relate to the stated material working characteristics, or showed confusion between the two material working characteristics.

Question 4
This question was poorly answered. 66.7% of students failed to achieve a mark on this question. In many cases, there was confusion in student responses between the process of 'hardening' and the material working characteristic of 'hardness'. When student responses did show an understanding of hardening, there was often a lack of knowledge of which specific metals this process could be used for. This resulted in unsuitable specific products being named, along with reasons that did not relate to the expected references of maintaining sharp edges or resisting abrasion.

Question 5
Student responses to this question were very varied. 8.1% of students failed to attempt the question, whilst 20.7% of students achieved the maximum mark available. When students struggled to answer this question, not being able to calculate the volume of a cylinder proved to be the biggest barrier to achievement. For students that were able to calculate the volumes, many were then unable to calculate the difference as a percentage of the entire component.

Question 6
This question elicited responses that gained a wide range of marks. A number of responses showed detailed evaluations of the suitability of both techniques, making reference to all three bullet points given. This allowed 10% of students to achieve marks in the top mark bracket.

Answers that were weaker tended to only make reference to one of the bullet points from the question, or failed to show a clear understanding of the differences between the two processes.

Question 7.1
This question was generally well answered with 45% of students achieving full marks. When students that attempted the question failed to achieve full marks, it was often due to mis-calculating the area of the two curved sections. Some students that made this error failed to recognise the difference between a radius and a diameter in their calculations; others failed to recognise these curved sections were based on semi-circular sections and used full circles in their calculations.

Question 7.2
This question was poorly answered by the majority of students. Very few knew how to calculate and increase in surface area when the dimensions are increased by 50%. Many students that failed to achieve a mark multiplied their answer from 7.1 by 1.5, rather than 1.5^2 (or 2.25). An alternative method of recalculating the area by using the same method as for 7.1 was used by very few students. In total 75.9% of students failed to achieve a mark on this question.

Question 8
A significant number of students (28.7%) failed to achieve a mark as their answers did not show an understanding of Just In Time production. At the lower end of marks achieved, 35% of students were able to describe Just In Time production, but failed to explain how this method can improve efficiency in production. At the top end of the marks achieved, explanations were clear, detailed and covered a range of examples of the efficiency improvements achieved. 33.4% of students achieved marks in the middle mark bracket, showing a clear understanding of this concept with some good explanations of improvements in efficiency. The most common improvements in efficiency given by students related to:

- the reduced need for storage of stock and associated savings related to smaller sites
- reduced risk in manufactured stock going out of date and associated cost savings
- ability for manufacturers to change production in response to demand

Question 9
On this question, a majority of students achieved marks in the lower half of the marking grid due to describing the suitability of each material, but not comparing them. Descriptions of suitable properties tended to be good, but a majority of students did not understand how the chair could be formed when made from solid timber rather than laminated veneers. There was also evidence in a number of students' responses to confusion between the process of laminating veneers in comparison to lamination of papers/boards (encapsulation) or with the use of a laminate in a product such as a kitchen worktop. To improve performance on this type of question, students must ensure that a comparison is made in order to access the top half of the mark scheme.

Question 10
Very few students achieved marks on this question, with 75.9% of students achieving 0 marks and 9.7% of students failing to attempt the question. In many cases, there was confusion between a UV hardening adhesive and UV stabilisers used in plastics. When students did know what a UV hardening adhesive was, there was often confusion over suitable applications. Few students recognised that for a UV hardening adhesive to work, the adhesive must be accessible to a UV light source. Good responses made reference to dental braces, glass furniture and glasses frames.

Question 11
This question was generally well answered with 64.3% of students achieving 50% or above. In some responses there was a lack of recognition that foil based coffee refill pouches are made from

two materials that require separation for recycling. To allow for this, responses that referred to the foil based coffee pouches as being only made purely from foil were also accepted.

Good responses to this question showed a detailed analysis and evaluation of the environmental impact of both products at several stages of the products life (including material extraction, transportation, production and end of life reuse or disposal). Responses that gained fewer marks tended to only focus on the end of life reuse or disposal of the products.

Section B

Question 12
In answering this question, many students showed a good understanding of what jigs can be used for when welding a bike frame, but often failed to then explain why the jig would be used for this purpose. When students gave both a point and an explanation they were able to achieve the maximum 4 marks available. In many cases however, students often made a simple statement of why the jig would be used without further explanations. Such responses failed to achieve the second mark available for each reason given.

The most common reasons given related to improved accuracy, holding the parts of the frame in the correct position and an increase in speed due to the jog helping to line up components.

Question 13
This question was poorly answered with 56.3% of students failing to achieve a mark.
26.8% of students achieved full marks and were able to calculate the length of tube required using trigonometry, with a fairly even split between these students using the sine rule or cosine rule. Some students that calculated the lengths of b and c correctly failed to then calculate the total length of tube required, as stated in the question.

Question 14
This question was quite well answered, with students showing an understanding of the use of Kevlar fibres in the development of sporting products. However, very few students (4%) achieved marks in the top mark bracket due to a lack of detail in their responses. Students needed to evaluate the impact of Kevlar on the development of sporting products, but many simply stated properties of the material with little evaluation of how these have impacted on specific examples.

Common responses referred to properties such as Kevlar being lightweight or being good at resisting cutting, but without further explanation. Some students showed a better understanding to the material with reference to sweat wicking and reference to how the woven fibre nature of the material has contributed to improvements

In a minority of responses, students referred to uses of Kevlar that did not relate to sporting products. This meant that they were not able to access the marks as effectively, reinforcing the need for students to refer to the contexts stated in the question.

Question 15
Students had a good understanding of the uses of exploded views, but parts of responses relating to the sectional view were less well answered. For the exploded view, students made good reference to uses such as showing how parts fit together, allowing all components in a product to be seen and allowing replacement parts to be identified. However, for the sectional view, few students were able to give reasons for use other than allowing dimensions to be shown.

Question 16
This question was very poorly answered. The majority of students were not aware of the concepts of a circular economy. 21.2% of students failed to attempt this question, whilst a further 56.5% of students failed to achieve a mark.

Question 17
This question was well answered with a majority of students able to name the Vernier calliper and suggest a quality control application for it.

Question 18
This question was well answered overall, although some students lost marks through answers that were repetitive, re-stating a previous answer in a different way. Common responses included third party feedback providing an un-biased viewpoint, allowing possible improvements to be identified that might have been overlooked by the designer and allowing for feedback from people with a different background to the designer (different demographics).

Question 19
This question was well answered overall, although a significant number of responses failed to recognise any limitations in the design of the control panel. The best responses made reference to a range of user groups (most commonly, visually impaired users, users with limited grip capacity and children) and evaluated good points about the control panel along with aspects that made the design more difficult to use. Students that achieved lower marks simply stated good things about the user interface with little or no reference to different user groups or limitations in the design.

Mark Ranges and Award of Grades

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

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.