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# A-LEVEL DESIGN AND TECHNOLOGY: PRODUCT DESIGN

7552/1 – Paper 1  
Report on the Examination

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## **General Comments**

This was the first examination of the reformed A-Level qualification and marked a significant change in approach from the legacy qualification. All questions were compulsory and responses were recorded in an integrated question and answer booklet. A number of students made use of additional answer booklets in order to expand upon their answer.

The paper had a total of 120 marks and equated to 30% of the overall qualification.

Lower level responses were often identified by the use of generic statements often not supported or explained; higher level responses showed a depth of understanding and application of knowledge including clearly stated technical detail.

Students need to be able to successfully identify command words in the question and ensure that they link their response to any provided context. Where students successfully responded to the command word in the question they were able to access the higher mark bands.

Where students were given stimulus material, low level responses were typified by observations without greater depth of understanding or application to the context given.

Students find knowledge recall questions accessible, but often find application questions difficult, failing to bring in their material and process knowledge to explain impact on a given context.

Students are advised to show their working out when answering the maths questions as this may allow them to access method marks for early calculations where the final answer may be inaccurate.

### **Question 1**

This question asked students to explain why 'potatopak' was a suitable material for the manufacture of disposable cutlery.

The majority of students identified this material as a biodegradable polymer and linked the material to the short lifespan of the product and a subsequent reduction in contribution to landfill. The material's non-toxic properties were a common observation, while fewer students commented on the renewable nature of the material or the manufacturing process used.

### **Question 2**

This question asked students to explain how BSI certification impacts the purchase of a child's car seat.

Students were aware of BSI certification and the majority of responses made reference to some form of testing to ensure a safe product. Often students linked their responses to the child's seat but rarely did the response make any reference to the purchasing element of the question and how consumers would be reassured by the child's seat having BSI certification. It was common to see students make reference to the Kitemark, but few then explained that this may be visible on packaging or labelling etc.

Where students explained the context of the question well and made the link to the both the child's seat and the purchasing activity, they successfully accessed the top mark band.

### **Question 3**

This question asked students to give three benefits of stock forms of material for a manufacturer.

It was clear from responses to this question that although students were familiar with the term stock form, few were able to identify specific benefits to the manufacturer and suggested generic comments such as 'cheap' or 'widely available'. Many responses identified that they have a standardised size and therefore could be easily stored but where students had made links to the ability to set machinery, or plan for efficient manufacture they were able to access all available marks.

### **Question 4**

This question asked students to identify the stock form of timber PAR.

There were a wide variety of responses to this question, many correctly identifying PAR as Planed All Round. It was however clear that some students had never come across this term, highlighting the importance of covering the details of the specification fully.

### **Question 5**

This question asked students to explain why powder coating was an appropriate finish for the climbing frame shown in the image provided.

The photographic stimulus in this question clearly helped students focus their responses and most students made basic reference to both the ability to colour the finish and the corrosion protection that a finish would provide, but few provided any justification or detail that linked these directly to powder coating and this limited their access to the middle and higher mark bands. Those students who understood the process and linked their response to the climbing frame context were able to successfully access the higher mark bands.

### **Question 6**

This question asked students to define the terms

- copyright
- trademark
- patent

It was clear from responses that students were familiar with most if not all of the terms and most were able to offer accurate definitions to one or more of the terms.

'Trademark' was the most accurately defined term, with students finding 'copyright' and 'patent' more challenging to accurately define. Many incorrectly stated that 'copyright' applied to a design and often responses for 'patent' failed to clearly define or imply that a 'patent' applied to a new design or innovation.

### **Question 7**

This question asked students to compare the environmental impact of cardboard and ABS for the manufacture of the cores for adhesive tape.

It was clear from responses that students were familiar with both materials and could successfully identify the environmental issues associated with both materials. Responses tended to focus on the sourcing of both materials and their disposal, with only a limited number of students making any reference to the manufacture of the cores in their responses. Responses in the form of a bullet pointed list of relevant points without any comparison or evaluation were limited to the lower mark band.

### **Question 8**

This question asked students to calculate the material cost for a 3D printed component.

This was the first maths question in the paper and was fairly well answered. Capable students accessed full marks and their working out was clear and logical. Students who failed to get the final answer correct were still able to access some marks for earlier calculations with most correctly establishing the volume of the base rectangle. A significant number of students failed to correctly calculate the volume of the semi-circle, with many failing to remove the 6mm diameter hole. It was also noted that a large proportion of students were unaware of the convention for dimensioning a diameter. Information such as this should be highlighted when covering working drawings in the NEA.

### **Question 9**

This question asked students to identify a specific application for a range of compliant materials.

It was clear from responses that students were familiar with the compliant materials but many were unable to identify specific applications for their use. Generic terms such as ‘packaging’ were often provided for all materials. Students must show a clear understanding of the properties of the material when giving their answers.

### **Question 10**

This question asked students to evaluate two methods for rendering a design.

It was clear from responses that there was a lack of understanding of the term ‘rendering’ and a significant number of students simply provided a generic response about the benefits of CAD over hand drawn designs. Often students made no reference to the rendering process, preventing them from accessing even the lower mark band. In responses where students may have included reference to ‘adding colour to a design’ etc, it was not always clear whether the student understood that this was rendering.

Students who were familiar with the term provided comprehensive answers with excellent comparison between the two methods and it was clearly evident that it is an activity taking place in many centres.

### **Question 11**

This question asked students to calculate and compare the costs of producing an aluminium seat clamp through a redistribution process and a machining process.

Many students successfully accessed all available marks on this question; where the accuracy of either final calculation was inaccurate, most had accessed marks for earlier calculations, most commonly for accurately calculating the volume of the Aluminium block.

### **Question 12**

This question asked students to explain the safe working practices necessary to protect workers when using solvent adhesives.

It was clear that the vast majority of students had experienced the use of these adhesives and most were able to access the lower mark band with an awareness of PPE; here responses tended to provide examples set in a school based environment.

Students who accessed the higher mark bands provided justified and detailed explanations covering a wide range of safe working practices, including staff training, COSHH guidance and Risk Assessments along with detailed storage and disposal information.

### **Question 13**

This question asked students to explain why neoprene was a suitable material for a case to carry a laptop.

This was clearly a familiar context, with responses illustrating that most had a clear understanding of the purpose of a laptop case and the likely situations where it would be used. Most responses identified the impact resistant property and the ability of the neoprene to stretch around a laptop and could justify why both of these material properties were important, directly referencing the laptop case context.

Few students included information about the suitability of the material when providing an explanation of the manufacturing processes used for the actual fabrication of the case, and this tended to be the element of the question that allowed students to access the top mark band.

This was the first of the larger tariff questions and it was noted that many students started their answer by restructuring the question or by providing a detailed background about the properties of elastomers, often not actually responding to the question with information worth of credit until half way down the available answer space. Students should be reminded that this type of introduction is unnecessary and often detrimental to the overall quality of response.

### **Question 14**

This question asked students to evaluate the inclusivity of a lift interface.

The context of the lift was familiar to all students and most students performed well, supported by the illustration of the lift and the lift interface. Those who correctly identified a range of features but failed to provide any evaluation of them limited themselves to the lower mark band. Students

should be taught to identify command words within each question and ensure that their response fully covers the focus of the question.

The inclusion of braille and the height of the lift interface were the most commonly discussed features.

### **Question 15**

This question asked students to calculate the volume of hardener needed to create a glass reinforced polymer (GRP) moulding.

Generally a well answered question with a significant proportion of students accessing full marks. Where the question was attempted but the final calculation miscalculated, most students correctly manipulated the figures provided in the table to establish the area of matting.

### **Question 16**

This question asked students to explain why industrial tests are more accurate than workshop tests when testing material properties.

This question was accessed by most students, with popular responses identifying an increased level of machinery and equipment enabling controlled tests and therefore more accurate testing to take place.

Responses tended to be simple statements, with fewer students providing enough detail or additional information necessary to access the second available mark.

### **Question 17**

This question asked students to describe how a specific industrial test is undertaken to measure material hardness.

Leading on from question 16, it was clear that although students were aware of material testing few could name or had knowledge of a specific test. Responses often described crude workshop tests or appeared confused between impact and hardness testing, limiting those students from accessing marks.

Successful students could identify a range of named tests and provided detailed and accurate descriptions of the test procedure. Although many stated that the size of the indentation corresponded to the hardness of a material very few students made reference to comparing this result to a predetermined scale or other test sample.

### **Question 18**

This question asked students to evaluate the suitability of the materials and manufacturing processes of an aluminium bike frame and a CFRP bike frame.

As in question 13, often student responses started with an unnecessary restructuring of the question.

The context of the bike frame was familiar to most students and most responses did make reference to both bike frames. Where students had provided a bullet pointed list that covered material properties with little or no evaluation or reference to the frame context they struggled to access the middle or top band.

Common observations covered the weight of both materials; however, many students thought that the aluminium would be lighter than the CFRP frame and there was confusion as to whether CFRP was a thermoplastic with many incorrectly stating that it could be recycled.

Those students who had logically structured their responses, comparing and evaluating first the materials and then the manufacturing processes tended to be more successful at accessing the higher mark bands.

A number of responses indicated that students had misread the question and their responses focused on sustainability rather than suitability.

### **Question 19**

This question asked students to calculate the time taken to machine a shape in both MDF and Plywood.

In order to access this question, students needed to establish the total distance of travel of the cutter and also identify that the number of passes of the cutter would be different for the two different materials. This was a question where students needed a subject specific understanding of the CNC routing process in addition to maths skills.

It was clear in many responses that the term 'cutter path' was unfamiliar to many as too was the understanding of the number of passes needed. Here students tended to calculate the area of the circle rather than the required circumferences. Again, the diameter symbol was unfamiliar to a fair proportion of students.

Where students were successful most correctly calculated the total tool path distance with the highest achieving students correctly calculating the time taken for both materials.

### **Question 20**

This question asked students to explain why the provided knock down fitting was appropriate for each specific application.

While students were clearly familiar with the knock down fittings shown, few could correctly identify and explain why they were used. Most provided a basic statement but few could justify or provide sufficient detail to access the second available mark.

The Barrell nut and bolt and the Dowel were the knock down fittings that most students were able to provide relevant information for. Many responses for the Cam lock fitting simply stated that it is strong.

### **Question 21**

This question asked students to explain the importance of the efficient supply of materials and components in a Just In Time (JIT) manufacturing process.

Most students were able to provide a basic response to the question, identifying that without efficient supply of material, the manufacturing process would be delayed or stopped; many went on to explain the link to the absence of storage provision.

It was common for students to have repeated the same point about materials arriving on time at several stages of the manufacturing process without further justification or analysis. It was also common for students to move away from the context of the question and provide information referring to systems that do not involve the use of JIT.

Responses that covered more than just the initial delivery of materials and components to a manufacturer were able to access the higher mark bands.

### **Question 22**

This question asked students to give three reasons why a kitchen work surface may have a melamine formaldehyde layer applied.

This question was well answered by most students with them suggesting a range of appropriate reasons. Where students provided one word answers eg: waterproof, it was unclear as to whether they had enough understanding to be worthy of credit. Students should be encouraged to provide greater detail to reinforce their response even on the lower tariff questions.

### **Question 23**

This question asked students to describe the process of forming a timber product using lamination.

This was met with mixed responses, with some describing laminating via encapsulation or explaining how a plywood board would be manufactured.

Most successful responses made reference to forming a product made from layers of timber featuring an adhesive around some form of mould or former.

The responses that were placed in the top mark band were very detailed and in most cases it appeared that these students had practical experience of forming a laminated timber product.

### **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.