

**A-LEVEL**  
**DESIGN AND TECHNOLOGY**  
**PRODUCT DESIGN**

7552/1

Report on the Examination

---

7552

June 2022

---

Version: 1.0

---

Further copies of this Report are available from [aqa.org.uk](http://aqa.org.uk)

Copyright © 2022 AQA and its licensors. All rights reserved.

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

## General Comments

The examination this summer was only the second full entry for the A-Level Product Design qualification. Candidates sat the exam paper in the Autumn of 2020 and 2021, but in greatly reduced numbers. There is clear evidence that centres and candidates are more aware of the requirements of the new specification and the differences in the style of question and expected response from the legacy qualification.

Although a full entry was seen, 2022 is the first examination series that follows the disruption to education and external examinations, caused by the Covid-19 pandemic. In line with JCQ guidance, advance information was provided to all candidates in preparation for sitting this examination paper.

All questions were compulsory and responses were written in an integrated question and answer booklet. Some candidates made use of additional answer booklets in order to expand upon their answer. Where additional pages are used, or where candidates are using a word processor, it is important to clearly label their responses.

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

Low level responses were often found to include generic statements and basic descriptions or observations supported by the material provided in the questions, whether that be visual stimulus or information drawn from tables.

It remains clear that candidates are more familiar with workshop processes than industrial manufacturing processes and procedures. It is also clear that questions based on timber and polymer are usually answered in more detail than those examining knowledge of metals.

Candidates need to be able to successfully identify command words in the question and ensure that they link their response to any provided context.

Candidates 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. They should also be encouraged to lay out their calculations in an ordered and logical manner.

### Question 1

- Candidates were asked to state three reasons why Precious Metal Clay may be used to manufacture a decorative pendant for a necklace.
- It was clear that candidates were familiar with the material and its working properties.
- Its ability to be shaped and formed by hand before firing, was a common observation with fewer candidates referring to its property once fired.

### Question 2

- Candidates were asked to calculate how many components could be made from a series of volumes provided in a table of data.
- Many candidates calculated the correct final answer with no working.

- Where the final answer was incorrect it was common for candidates to have correctly calculated the volume of each pigment and the total volume of resin and pigment available.

### Question 3

- Candidates were asked to analyse and evaluate the materials and finish of a shopping basket.
- High level responses included reference to both the material and surface finish, but most importantly they made constant reference to the shopping basket context throughout their answers.
- Common answers referred to the low carbon steel being prone to corrosion and that the chrome plated finish would prevent this. Fewer candidates made reference to the material properties and their suitability for the manufacture of the basket.
- Where responses were descriptive in nature with little evaluation or analysis, candidates limited their ability to access the middle and higher mark bands.

### Question 4

- Candidates were asked to explain how rapid prototyping had impacted traditional manufacture.
- It was clear from many responses, that although familiar with the terminology, many were not clear on the meaning of rapid prototyping. It was common to see reference to CAD modelling or simple statements suggesting the speed at which models are built.
- High level responses were exemplified by reference to 3D printing with a clear understanding of how this technology has impacted traditional manufacturing techniques. Often candidates referred to a move away from hand skills to digital capability along with the reduction in scale of manufacturing facilities and associated costs. Fewer focused on the complexity of the prototyping that is now feasible using additive manufacture.
- Low level responses tended to be superficial with reference to speed and awareness that 3D printing may be used.

### Question 5.1

- Candidates were asked to plot a laser cutter path on a grid provided.
- This was a well answered maths question with most candidates correctly plotting the points from the data table and subsequent path.
- Inaccuracies tended to be where candidates had used the y axis then the x axis to plot the points on the graph.

### Question 5.2

- Candidates were asked to calculate the shaded area of a laser cut component shown on the grid.
- A range of appropriate alternative methods for calculating the area was seen.
- Candidates who did not achieve full marks may have achieved 1 mark for counting the squares and establishing the area from the graphic.

**Question 6**

- Candidates were asked to undertake a range of calculations in order to establish how much closer two table brackets would be if there was an extension to the height of a desk.
- It was clear that trigonometry is one of the more challenging maths skills that may be examined with candidates' responses sometimes showing confusion between where it is appropriate to use 'sin' or 'tan' calculations.
- Where full marks were not awarded it was common for candidates to have incorrectly established the distance between the original brackets.

**Question 7**

- Candidates were asked to explain why galvanising was an appropriate finish for the low carbon steel.
- Popular responses related to protection from corrosion with a good level of understanding that the galvanising process makes use of a zinc coating to protect the base metal.
- Fewer candidates demonstrated an understanding of why galvanising is particularly appropriate for tubular and hollow components.
- High level responses made accurate reference to the scaffolding context, including its predominant use outside, the fact that it may get scratched when being erected or transported and lack of ongoing maintenance.
- Some candidates stated inappropriate or inaccurate reasons including increase in strength and grippy surface texture.

**Question 8**

- Candidates were asked to state three different stimuli that can cause a change in the property of a smart material.
- It is clear that smart materials are a well taught area of the specification, with Heat, Light and Electricity being the most common responses.

**Question 9**

- Candidates were asked to name a specific application for a range of materials.
- It was clear that Styrofoam was the most familiar material with prototype modelling being the most popular application.
- Candidates were less familiar with fluted polypropylene and cellulose acetate.
- It is important that candidates provide a specific application; too often single word generic applications such as 'packaging' were used.

**Question 10**

- Candidates were asked to compare and evaluate the suitability of Styrofoam and high-density modelling foam for the manufacture of an aesthetic block model.
- In high level responses, it was clear that candidates had first-hand experience of both materials and were able to both analyse and evaluate them successfully. Detail about surface finish, the ease with which they can be shaped and formed, along with detailed understanding of the limitations and specific methods needed to apply a paint finish were seen.
- In lower level responses candidates tended to focus on the Styrofoam only with basic reference to its ability to be shaped by hand.

- Where responses were not worthy of credit, candidates displayed confusion between expanded polystyrene and, in some cases, foam core and plastazote foam.

### Question 11

- Candidates were asked to explain why die casting was an appropriate manufacturing method for a model toy vehicle.
- High level responses demonstrated comprehensive understanding of the process and included reference to the intricate detail of the vehicle, the smooth surface finish with some candidates also referring to the wall thickness achievable, but in all cases using the toy vehicle context to reinforce their answer.
- Low level responses tended to describe the die casting process, with little or no reference to the context provided.
- As the material was not given in the stem of the question, those candidates who were not familiar with die casting often described the injection moulding process or referred to polymer redistribution in some form.

### Question 12

- Candidates were asked to describe two polymer additives.
- Where candidates were familiar with the polymer additives, they often provided detailed descriptions that demonstrated a high level of understanding.
- It was found that plasticisers were better known than fillers.

### Question 13

- Candidates were asked to give two reasons why outdoor decking may be pressure treated.
- This was a well answered question with candidates clearly familiar with pressure treatment. Resistance to fungal attack, and increased resistance to weathering were popular answers.
- Common inaccuracies tended to refer to making the wood stronger or allowing people to stand on the decking.

### Question 14

- Candidates were asked to describe the main stages of the polymer extrusion process.
- High level responses described the full process in detail and included reference to the extrusion being supported, cooled and occasionally drawn through the die.
- Lower level responses tended to focus more on information relating to the hopper, heating the polymer and the Archimedean screw, failing to really describe the action of extrusion. This is a change in focus from the legacy specification, candidates should now be encouraged to focus more on the detail of the moulding process itself, this goes for all polymer processes that may be examined.
- Where candidates were not familiar with the process, they often used the image as a guide and described line bending or vacuum forming.

### Question 15

- Candidates were asked to describe the advantages of using bought in components.
- Higher level responses showed a good level of understanding and tended to include reference to financial savings by not producing the components themselves, and detailed

explanation of both consistency and the quality assurance provided by using bought in components.

- Lower level responses tended to focus on financial savings but with little justification, and often described JIT manufacture.
- As with previous questions where a particular context, material, user or manufacturer is provided in the question, they must be directly referenced in the candidate response.

### **Question 16**

- Candidates were asked to calculate the time taken to cut a path on a cylinder.
- Where the correct final answer was not achieved, many candidates could often correctly calculate the circumference of the cylinder and successfully establish the length of the short edge of the laser cut path.
- That said, it was also clear that many candidates were unfamiliar with the correct formula for calculating a circumference, with area of a circle regularly seen. Many were also unclear on what a diameter or radius represents.
- Candidates should be reminded that formulae will not generally be provided in the maths questions in either paper.

### **Question 17**

- Candidates were asked to analyse and evaluate the two materials and manufacturing processes used to produce the two moneyboxes.
- Q17 was the largest tariff question in the paper and it was encouraging to see candidates' responses reflecting this tariff.
- Higher level responses tended to logically address each material and manufacturing process in turn, making perceptive and relevant comparison appropriate to the context.
- It was clear that polymer manufacturing process' are familiar to candidates, with some providing detailed responses about the suitability of each process.
- High level responses used the stimulus images to enable them to refer to the complexity of each form, identifying the split line in the injection moulded pig and understanding that it would require two injection mould tools.
- Although many candidates were familiar with PMMA and LDPE, there were often inaccuracies in the material properties stated, and lower level candidates tended to state properties without making any link to the moneybox contexts.

### **Question 18**

- Candidates were asked to describe the stages that timber goes through from felling to the production of the stock form PSE.
- Higher level responses gave detailed descriptions of each stage of the process and it was clear that this topic has been well taught in centres.
- There were some excellent descriptions of both conversion and seasoning that showed a detailed understanding of the processes.
- Lower level candidates often provided more generalised bullet pointed responses that prevented them from accessing the middle and upper mark bands.
- The descriptions of the conversion process and the seasoning process were often clearer and more detailed than the final planing stage.

### Question 19

- Candidates were asked to describe two ways that a jig could be used to improve accuracy in manufacture.
- Those who provided detailed descriptions clearly linked their response to how accuracy would be improved.
- Candidates who provided a simple response often described the function of a relevant jig without any further explanation.
- Many candidates incorrectly described templates and moulds with many also referring to go no-go gauges.

### Question 20

- Candidates were asked to justify why Finite Element Analysis (FEA) may be used to improve efficiency during product development.
- It is clear that candidates' understanding of computer modelling is constantly improving as we move through the specification.
- Higher level responses showed a detailed understanding of FEA and understood how it is used to directly impact the efficiency of product development.
- Lower level responses tended to be descriptive in nature and understood that it involved a CAD model that could be tested.
- Where the terminology was misunderstood, candidates often focused on the word 'finite' and provided responses about the environment and sustainability.

### Question 21

- Candidates were asked to explain why tungsten carbide is an appropriate material for the manufacture of a centre lathe cutting tool.
- There were some excellent responses to this question where candidates were not only familiar with the properties of tungsten carbide, but also demonstrated a comprehensive understanding of turning which enabled the higher level candidates to successfully link both the material and application.
- Lower level responses tended to focus on the material's hardness, but did not justify its relevance to the cutting tool context.
- Lower level responses often included confusion and contradiction between the material properties and the application.

### Question 22

- Candidates were asked to outline how and why a company may use social media to market their product.
- It was clear that this was a familiar context to all candidates, with many detailed responses seen and many candidates drawing upon their own experiences to illustrate their answers.
- Low level responses tended to be limited to an understanding of the size of audience and speed of communication.
- Although a familiar context, few candidates demonstrated an understanding of the use of cookies or how customer data is obtained.



### **Mark Ranges and Award of Grades**

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