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Examiners' Report  
Principal Examiner Feedback

Summer 2024

Pearson Edexcel GCE  
In Design & Technology (1DT0)  
1D: Systems

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## Introduction

This is the fourth full cohort of candidates that has taken the reformed (9-1) GCSE Design Technology.

There are six different material specialist papers on offer, each with a common core in Section A which was worth 40 marks and a Section B worth 60 marks based on one of the six material areas; Metals, Papers and Boards, Polymers, Systems, textiles and Timbers.

Question 1 (a)(i) The most common answer was soft alongside absorbent with some candidates not understanding what a property is and writing dries quickly or used the words water repellent. The occasional answer of “insulator” on its own was observed but was not acceptable since it was not qualified as being a thermal insulator.

It is important to stress here that these opening four small questions are about the properties of materials in the context of the product or component given in the table and therefore generic properties will not be accepted. Candidates often stated characteristics of materials or products instead of properties. A clearer understanding of the difference between these is needed.

Question 1 (a)(ii) This question was not particularly well answered with a large proportion of candidates referring to the material being lightweight, decorative or easy to mould. It was clear many did not understand resin as a material. The most common correct answer was hard, with many generic answers such as durable and malleable also seen.

Question 1 (a)(iii) Generally well answered, however, confusions between ‘opaque’ and ‘transparent’ were observed. Most candidates responded with ‘printability’, ‘absorbent’ and ‘flexible’. A lot of incorrect answers saying ‘lightweight’, ‘thin’, and ‘soft’.

Question 1 (a)(iv) Overall candidates answered this well with most saying ‘hard’, ‘tough’, ‘heat resistant’. Most incorrect answers consisting of ‘durable’, ‘waterproof’, ‘light’, ‘lightweight’, ‘dense’ and ‘doesn’t splinter’.

Question 1 (b)(i) A generally well answered question with most 2 mark responses being awarded for discussing thermal conductivity and the ability to cook food. Quite a few candidates referred to a high melting point but then incorrectly justified this by saying the pan would not melt. Many candidates answered that the pan would not rust or corrode in water or that food would not stick to the pan.

Question 1 (b)(ii) The first of the maths based questions. Many candidates were able to convert kg into grams and understood how to find a percentage. When answered incorrectly it was because there was a misconception that 3kg was 300g rather than 3000g.

Question 2 (a) The majority of candidates were able to state wool / sheep’s wool however, some candidates misunderstood the word fibre and just wrote the animal

- sheep or they mistook it for plant fibre - cotton / cotton wool or they wrote the word fur or sheep fur which was also seen.

Question 2 (b) Biofuels being renewable and not running out was a frequently seen answer - quite a few candidates understood it was sustainable but justified the sustainable by saying it meant 'no pollution', being 'environmentally friendly' or 'giving off less greenhouse gasses. Candidates also thought it meant the vehicles would be 'faster / cheaper' and very few could explain carbon neutral successfully.

Question 2 (c) Most correct candidates were responding either about adding 'render / colours', '3D views of the designs', and 'outputting the designs to CNC machines'. Very commonly candidates identified the CAD could be used in edited/modified designs but many candidates seemed to confuse CAD with CAM and talked about cutting out multiple sheep or the speed and accuracy. Many candidates also confused CAD with AI and discussed it involving no human error as the computer does it for you.

Question 2 (d) (i) Those candidates who understood the question were able to work out the calculation and were awarded 2 marks. The candidates needed to understand how to work out a percentage and it was evident that some did not have this knowledge. Overall answered well, most common incorrect answer was 30 for both amounts.

Question 2 d (ii) The vast majority of candidates demonstrated that they knew what bar graphs were and how to draw them accurately, but some candidates drew the bar graphs for the raw number of votes they had worked out in the previous question, rather than the percentages. Where it was incorrect candidates had often transferred the 45 and 15 from the previous question.

Question 3 (a) This question presented much more of a challenge than it should have and very few candidates were correctly able to identify the pulley as a v belt.

Question 3 (b) Most candidates were able to identify that aluminium wouldn't rust, some were able to gain the extra mark because they understood that it was a non-ferrous metal / did not contain iron. Lightweight and not weighing down the boat was also a common correct answer.

Question 3 (c) Overall answered well by most candidates. Answers were very dependent on whether candidates were able to rearrange a formula. Some used the triangle method successfully and also understood how to use the ratio. A common mistake resulted in the answer 12000, or 333 as an ECF where candidates had not transposed the formula correctly.

Question 3 (d) A generally well answered question, with most referring to the need for sunlight and the impact on the boat of clouds / darkness. Those who only received one mark, usually didn't provide a justification linked to the model boat.

Question 3 (e) Candidates generally performed well on this question, particularly when discussing balsa wood's lightweight nature and its ability to float or not sink. Many candidates earned marks by focusing on these points. Some candidates also correctly identified that balsa wood is soft and easy to cut, although there were misconceptions with some stating it is strong and durable. Confusion arose when some mistook the model boat for a real one, attributing characteristics like strength, robustness, seaworthiness, and durability.

Question 4 (a) This question was largely unsuccessfully attempted, many candidates did not know what a conductive ink is; many confusing it with thermochromic dyes or inks. The most common correct answer related to being used to draw circuits, whether with a pen or via a printer. The better answers stated that conductive inks can be used to replace wires and could be used in restricted spaces. Some candidates made reference to how this question links to the previous question and wrote about how the inks could be used on the balsa wood boat. Candidates very commonly offered inks for aesthetic reasons on packaging and on the external surfaces of products.

Question 4 (b) Generally well answered with many candidates offering 3.6g without any working out shown but some different versions of calculations also seen, still arriving at the correct answer. Some conversion errors were seen, reducing marks awarded.

Question 4 (c) Candidates frequently talked about recycling or reusing parts and materials to save landfill. Some referenced a life cycle assessment along with references to carbon footprint. However, the term "new and emerging technologies" confused some candidates, leading them to discuss CAD/CAM and prototyping as ways to minimise material impact. Many candidates were repetitive in the points that they made and effectively reworded their answer given numerous times. Most candidates gained some credit for their responses.

Question 5 (a) Most candidates were able to get 3-4 out of 6. Most candidates identified how to hold 3 more soldering irons. They mostly created a shield, cover or cap to stop the user burning themselves and a few suggesting turning the soldering irons upside down to limit the chance of burning. Some were able to add about holding the soldering irons in place using clips. Most were able to add protection from burns creating a shield. Most were able to add an indicator, commonly using a thermistor, LCD screen and LED. Most were able to make the base sturdy, add a leg, or structure for stability; ranging from weighted bases, extended sized bases, extendable legs, fold out legs, hinged supports etc. Most were able to add a method of hanging, although tended to be a little unimaginative where many simply provided a string/wire to hang the rack up with. Communication of ideas in the drawings was sometime poor but notes overall were clear and explained the design features well.

Question 5 (b) Candidates seemed to struggle with this question and overall, it was not answered well. The question was poorly answered by candidates, and they mainly used the question in the answer by saying that the LEDs lit up when the two pieces were put together.

Question 6 (a) This question was answered poorly by candidates, rarely scoring a mark. Where they scored was by saying that screen printing improved the aesthetic value. Candidates did not make reference to the second marking point in the mark scheme and candidates rarely made reference to printing on HIPS and Acrylic.

Question 6 (b) Candidates generally performed poorly on this item. Candidates got confused with the use of hand tools, with many sketching / annotating the use of a pillar drill. Many answers lacked basic detail and it was obvious that lots of candidates were unfamiliar with drilling a hole with a hand drill. There were quite a few references to drilling using a pillar drill. Most responses were very simplistic with comments like 'drill through acrylic and finish edges' very few showed steps on how to set up the piece including the clamping or use of scrap material. There was very little reference to using a pilot drill or using a sacrificial piece of material under the acrylic. Some candidates did get marks for identifying the speed and set up (vertically) of a hand drill. Most frequent answers including clamping, drilling with hand drill or power drill, rarely saw vertical or perpendicular. References to drilling slowly or holding the drill vertically were quite scarce. The majority of candidates included sketches in their responses. The waste piece confused some candidates where a line is marked near the end of the piece of acrylic. They thought they had to explain how to cut that waste piece off.

Question 6 (c) This question was not well answered by candidates. When a valid answer was seen, they referenced its transparency or lack of, with a glow being given off. Fewer candidates made reference to its rigidity and stiffness.

Question 6 (d) Many candidates responded to question with a piece of equipment/machinery rather than the process associated with it i.e. saw not sawing, belt sander not use of a belt sanding machine. This had a large affect on the marks, with a low number of candidates achieving more than 3 marks. Candidates also struggled with gaining marks with the linked justifications if they got the method correct, candidates would just describe advantages of using the method. Cutting/Sawing and Laser Cutting were the most popular answers. Sanding was less popular, and CNC was rarely seen.

Question 7 (a) A large number of candidates answered this question incorrectly.

Question 7 (b) This question was poorly answered by candidates, with rarely a correct answer. When they did occur, the most popular answer was related to having good impact resistance (4/100). We very rarely saw good plasticity or good thermal stability. Most correct answers were related to impact resistance and breaking if dropped. Some got confused with strong but got second mark point relating to not breaking or cracking.

Question 7 (c) Most candidates engaged with this question, resulting in a large number of full mark answers. In many instances where the question was answered incorrectly, candidates were still able to secure 1 or 2 marks for showing correct working out. Where they did not get full marks, candidates generally picked up marks for identifying that  $244 \text{ cm} \times 122 \text{ cm} = 29768 \text{ cm}$ . Fewer candidates managed to calculate the length of the semi-circle as 28.278 cm and the total length of the part required as 60.278 cm. Many students who gained fewer marks confused the circumference and area often adding an area to a length. Some did not halve the circumference and others did not multiply the result by 30 to find the area of the curved section.

Question 7 (d) A popular and generally a very well answered question with the majority of candidates gaining some marks and a high proportion achieving good marks. Candidates were familiar with the use of cable ties and could offer advantages of using them for cable management. Candidates could identify that cable ties were needed to keep leads together and organised them to prevent tangling. They could also identify they could be separated if necessary to aid with replacement of wires. However, many candidates lost marks by commenting on the low cost and the wide availability of cable ties which weren't in the mark scheme. In many cases justifications for using cable ties offered limited details where their explanations were too brief and didn't fully explain their justification.

Question 8 (a) Numerous candidates provided explanations and / or justifications linked to the use of LEDs. Some gained marks by stating that they came from a wide range of suppliers, came in a range of colours and were small thin low profile. The most popular answer tended to be related to being energy efficient but not consume small amount of power. Few stated that LEDs don't get hot.

Question 8 (b) This question was poorly answered by the candidates with very few having an answer relating to components being smaller and more dense boards or smaller and therefore smaller products. A lot of answers related to being secure and not moving. We very rarely saw more than 1 mark. It was quite clear that some candidates were confused with Pick and Place machines and thought that SMT was exclusively used with SMT. Typical responses that did gain marks were often related to time saving. Some candidates referred to SMT being smaller components however they linked this to more densely populated circuit boards.

Question 8 (c) This was generally a challenging question where candidates who gained marks made reference to little human interaction, human error and speed, making boards faster. Very few was related to vacuum although a limited number of answers were related to precision and consistency. Accuracy (precision) was more popular but only some were able to correctly justify the point linked to batch production.

Question 8 (d) This question was a poorly answered question where candidates seemed to be confused about what the question was asking. Many did not answer the question with reference to evaluating the cost factors of the LED strip light.

Many candidates' responses to the question were related to the impact on the environment by manufacturing the polymer in America and then shipping to the UK. Most candidates did not mention any point about the cost of materials, use of stock materials or the manufacture processes related to the light. This showed that candidates really struggled to identify or understand any cost factors. Candidates seems to use buzzwords such as carbon emissions, sustainability and environmentally friendly with no relation to the question. Overall, that's why most candidates scored poorly on this question. A number of candidates discussed the exploitation of low paid workers abroad. Scale of production mentioning batch production did appear in a few answers as did automated production methods and SMT but only in a few responses. Environmental issues relating to the manufacture of the product became a focus for a number of candidates without referencing cost issues.

#### Paper Summary

Overall, the paper provided questions that gave candidates the opportunities to demonstrate their knowledge of Design and Technology via a range different context based questions, including several maths based questions but in a DT context. The paper offered a range of differentiated questions that candidates could answer in differing degrees and a full range of marks were observed across the whole cohort.