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Examiners' Report
Principal Examiner Feedback

Summer 2024

Pearson Edexcel GCE
In Design & Technology: Product Design
9DT0/01

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Principal Examiner's Report 9DT01 Summer 2024

This is the fourth full summer series sitting of the examination, with only small resit entries in the 2020 and 2021 October series during the pandemic. This was a new A Level in Design and Technology (Product Design) in 2019 and has an externally assessed exam reflecting 50% of the qualification assessment.

The overall paper includes several types of questions which include; short, medium and long open response questions, calculations and drawings. This provides increased rigour over the legacy specification examinations as candidates need a wider skill set in order to access the different types of question.

There is a 3 mark explain type question which requires a candidate to give a fact (sometimes knowledge in isolation and sometimes related to a specific context and follow it up with a justification which leads to further conclusion or a further consequence. This type of question provides additional rigour. Questions can require one, two or three explain responses totalling 3, 6 or 9 marks.

The long response essay questions together with the drawing question are assessed by use of a levels-based mark scheme. This type of mark scheme rewards more able candidates who can now go into greater depth and be awarded for knowledge and deep understanding.

The feedback on individual questions will follow together with commentaries on individual responses.

Feedback on Individual Questions

Question 1(a) (2 marks short open response)
This question required candidates to name two heat treatment processes that are used to restore a metals mechanical properties to make it tougher and less brittle. This question proved to be a moderately challenging question with an even spread of marks between zero and two. Many candidates gave incorrect answers relating to hardening and the most common correct answers were tempering and/or annealing.

Question 1(b) (4 marks short open response)
This question required candidates to explain two reasons why carbon steel is used for the blade of a chisel. The most common correct answer related to hardness resulting in less wear and tear and the blade retaining its sharp edge. However, many candidates gave an incorrect answer relating to toughness, which in context is incorrect because high carbon steel is more brittle than alternative lower carbon steels.

Question 1(c) (3 marks short open response)
This question required candidates to explain one benefit of using polypropylene for the chisel handle. Most candidates could identify a benefit and one linked explanation however only the more able candidates could provide a second link to expand upon the first for the full three marks. A common mistake was to identify three benefits rather than identify a

benefit then explain that benefit in detail. Candidates responded with a range of responses across the mark scheme, however the most frequent response related to toughness. Common mistakes included indicating benefits that are not relevant to the use as a chisel handle and referring to polypropylene as a smooth material which is a property of the mould or former rather than the material itself.

Question 2(a) (2 marks short open response)
This question required candidates to give two benefits of hot melt glue. Candidates performed well on this question probably because of familiarity with the product and its application in a workshop environment.

Question 2(b) (5 marks maths)
This was a calculation question relating to glue stick usage in a commercial scenario and required candidates to calculate the cost of waste glue over a 52 week period. Candidates demonstrated good mathematical application with 69.4% of candidates achieving 4 or 5 marks on this question.

Question 3(a) (2 marks short open response)
This question required candidates to explain one property of mahogany that makes it a suitable material for turning on a wood lathe. Most candidates responded with correct responses relating to the grain qualities of mahogany but not all were able to provide a linked explanation. Many candidates provided inappropriate answers relating to toughness and/or hardness.

Question 3(b) (4 marks sketches and annotations)
This question required candidates to describe, using labelled sketches, how a square section of mahogany would be prepared and then turned into a cylinder using a wood lathe. Candidates generally responded well to this question with 43.4% of candidates achieving the full four marks. Where candidates, who knew the turning process, went wrong was in their limited understanding of preparation of the material for turning on a wood lathe.

Question 3(c) (6 marks short open response)
This question required candidates to explain two reasons why mahogany might not be considered a sustainable material. The question proved to be a good discriminator between candidates of differing abilities with marks awarded following a normal distribution curve across the six-mark range. More able candidates were able to identify two disadvantages and provide two appropriately linked points for each explanation of the disadvantages. Most correct responses related to deforestation issues, transportation issues and/or renewability.

Question 4(a) (3 marks short open response)
This question requires candidates to give three benefits of using standardised parts and bought-in components. This proved to be a relatively easy accessible question with candidates demonstrating good knowledge across the range of responses within the mark scheme.

Question 4(b) (6 marks extended open response)
This question required candidates to outline the benefits of a just-in-time (JIT) system. Generally, candidates demonstrated some good knowledge about JIT with most focussing on reduced need for storage and associated cost savings before going on to include a range of other responses within the mark scheme.

Question 4(c) (2 marks short open response)
This question required candidates to give two value targets used in Six Sigma. The stem of the question provided candidates with some guidance but removed two of the five targets (improving quality/reducing defects and reducing costs) hence candidates were asked to give two other value targets. Candidates demonstrated some good knowledge of the Six Sigma value targets but many included one of the value targets included in the question stem reducing their opportunity to achieve full marks on the question.

Question 4(d) (9 marks extended open response)
This question required candidates to discuss how a circular economy will reduce the impact of manufacturing activity on the environment and promote sustainability. The question performed well with outcomes across the mark range following a normal distribution curve. A major focus of candidate responses was recyclability however candidates did demonstrate good knowledge of sustainable techniques, cradle to cradle approaches and use of the circular economy via repairability and end of life return to the manufacturer.

Question 5(a) (6 marks maths)
This question was a maths question requiring candidates to calculate the area of a design technology workshop floor from a dimensioned plan drawing. Candidates performed well on this question with 82.2% of candidates achieving five or six marks. Where candidates dropped a mark, this was usually because of incorrect application of the one decimal place requirement.

Question 5(b) (2 marks maths)
This question required candidates to calculate the cost of the cans of paint required to paint the workshop floor in question 5(a). Error carried forward applied so candidates could use their 'own' floor area as a starting point. This question proved to be a good discriminator of mathematical ability although 63.1% of candidates achieved the full three marks.

Question 6(a) (2 marks short open response)
This question required candidates to give two safe working practices when operating a bandsaw. Here the use of PPE had been excluded as this is given as an example in the question stem. This proved to be a very accessible question with 95.2% of candidates achieving one mark or more and 70.6% of candidates achieving the full two marks. The most common mistake was to respond with items of PPE that had of course been excluded by the question stem.

Question 6(b) (6 marks short open response)
This question required candidates to explain two considerations of user centred design to ensure that products are fit for purpose. Considering user needs, wants and values had been given as an example in the question stem. Candidates demonstrated some good knowledge

of user centred design but many failed to explain two linked points for each identified consideration. The question proved to be a good discriminator between candidates of differing abilities with marks awarded following a normal distribution curve across the six-mark range.

Question 6(c) (6 marks extended open response)

This question required candidates to discuss the consequences to a company of non-compliance with health and safety legislation and regulations. The question stem provides the focus on the protection of workers. Many candidates attempted this question with some success. They understood risk assessment, fines and impact of legal actions. They were able to discuss the role of HSE and some were successful in gaining full marks as they discussed and range of responses. The candidates who did not gain marks focused on the impact of the consumer rather than consequences to the company. The question proved to be a good discriminator between candidates of differing abilities with marks awarded following a normal distribution curve across the six-mark range.

Question 6(d) (2 marks short open response)
This question was a recall question requiring candidates to give two parts of a risk assessment. The level of risk including severity and likelihood were provided as examples in the question stem this left five potential responses. The key response of identification of hazards was not often seen and candidates often responded with identification of risks, which is excluded as a valid response by the question stem. It was clear that many candidates did not know the difference between hazards and risks. Control measures and people at risk were the two most frequently seen correct answers.

Question 6(e) (3 marks maths)
This question required candidates to calculate the percentage of spend on PPE within the total health and safety budget after application of a price increase on PPE. Candidates generally performed well on this question with 66.7% achieving full marks. A common mistake was to correctly calculate the new cost of PPE but then to divide by the 'old' total spend which resulted in a slightly higher percentage.

Question 7 (6 marks drawing)
This question required candidates to produce an isometric projection of a chocolate box that had been presented to them in the form of a net. Whilst many candidates performed well on this question a common mistake was to incorrectly plot the position of the four top corners of the box or to draw the box to an incorrect height. Candidate achievement was fairly level across the full mark range.

Question 8 (9 marks extended open response)
Candidates were provided with an image of a hotel elevator lobby. The question required candidates to discuss how the interior design of the elevator lobby was influenced by Art Deco philosophies. Many candidates were aware of the philosophies of the Art Deco design movement and how it linked to a period after WW1, discovery of Tutankhamun's tomb and austerity. Candidates were successful in identifying geometric, zigzag, influence of Egyptian, African cultures and symmetry. Where candidates went wrong was confusing Art Deco with Art and crafts or Art nouveau. The question proved to be a good discriminator between

candidates of differing abilities with marks awarded following a normal distribution curve across the nine-mark range.

Question 9 (9 marks extended open response)
This question required candidates to discuss how innovation management is used when developing and introducing new consumer products. Candidates who responded appropriately this question mostly referred to feedback, collaborative work and push/pull. Iterative and prototyping was also discussed by some candidates. However, this did prove to be a challenging question with marks skewed to the bottom end of the mark range.

Question 10 (9 marks short open response)
This question required candidates to explain two benefits and one drawback of reactive glass and via the question stem had provided a steer to candidates by explaining photo-chromic glass and then stating that reactive glass is another form of smart material. The candidates who answered correctly mostly understood the need for electrical current and benefits linked to turning glass opaque immediately. They acknowledged the use of reactive glass in providing switchable privacy or in safety equipment, for example in welding masks. Many candidates either answered drawback as expensive with little understanding as to the cause of expense such as installation and effect of budgets, or the need for constant electricity/power. Unfortunately, despite the steer provided by the question stem many candidates only referred to photochromic glass so did not achieve well on this question. However, this did prove to be a challenging question with marks skewed to the bottom end of the mark range.

Question 11 (12 marks extended open response)
This question required candidates to evaluate a 'spinning bike' used for indoor group exercise classes. The focus of the evaluation needed to be how the designer of the bike had addressed ergonomics and user requirements for group exercise activities. Candidates worked from a labelled image of the bike and a provided list of features. Generally, candidates were able to provide good responses relating to adjustability and the features of the bike with the more able candidates more able to consider these features in the context of a group exercise environment. The question proved to be a good discriminator between candidates of differing abilities with marks awarded following a normal distribution curve across the twelve-mark range.

Summary

Overall, the candidates performed very well with an increase in the mean score from previous series potentially indicating a return to normality after the pandemic years. Very few blank responses were seen and most candidates attempted every question.