



General Certificate of Education

Design and Technology: Product Design (3-D Design) 1551

PROD1 Materials, Components and Application

Report on the Examination

2010 examination – January series

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Set and published by the Assessment and Qualifications Alliance.

General

Overall, candidates performed better in this January series than in the previous year with an increase in the mean mark. This is partly due to the January paper being used as a retake opportunity and candidates therefore having the experience of the previous June series, and centres preparing candidates for the general style of question and content.

Administration:

The layout of the answer booklet has led to most candidates completing the examination without the need for additional answer sheets. However, there were still a numbers of additional sheets used which in most cases did not result in many additional marks. Some candidates also wrote outside of the spaces provided which in most cases was unnecessary. The quality and clarity of hand writing by the majority of candidates was good, and drawings were generally sound.

Section A

Question 1

- (a) (i)/ (ii) There were good responses to this question but some candidates referred to 'cling film'.
- (b) (i) Most candidates were able to correctly name a composite material. Some candidates referred to alloys such as stainless steel' or 'brass'.
- (ii) This was generally answered well with a suitable product and justification for the material being used.

Question 2

- (a) Responses to this question were quite varied but most candidates were able to correctly match at least two components to applications.
- (b) The majority of candidates were able to give two good reasons for the use of K-D fittings. Some poorer responses included terms such as 'strong'.

Question 3

- (a) A considerable number of candidates were unable to correctly name two hardwoods and two softwoods. Hardwoods were generally much better known than softwoods but some candidates made reference to manufactured boards, particularly 'plywood', 'chipboard' and 'MDF'.
- (b) This question was well answered with most candidates naming a suitable product and appropriate reason. The most popular product was 'furniture'.

Question 4

This question was not answered particularly well. answered.

- (a) The better answers made good reference to medical or dentistry uses as well as spectacle frames. Unfortunately, many candidates gave answers such as 'car wheels', 'car parts' and 'bike frames'.
- (b) This question was generally not answered well. Candidates' responses favoured relevance to other smart materials such as 'thermochromatic pigment' or 'phosphorescent'. A number of candidates suggested 'camera film'. Better answers included reference to 'transition lenses' etc.

Section B

Question 5

On the whole, candidates scored well with question 5, with most able to get at least half marks. However, many responses were very basic, making use of obvious statements and vague terminology.

- (a) This was generally well answered although there was some confusion between biodegradable and recyclable, missing the point as to why biodegradable polymers are used.
- (b) There were some mixed responses for this question. Better answers tended to focus on the material's ability to form curves easily, the application of hardwood veneers for aesthetic value and large board sizes unlike solid timbers. Some candidates stated that laminated furniture meant that the plywood was covered in plastic or was water resistant. There were a number of references to laminate flooring.
- (c) The most popular responses centred around 'hardness' and 'heat resistance caused by friction when cutting/drilling'. Some candidates mentioned cermets and sintering processes. A number of candidates offered generic terms such as 'aesthetically pleasing', 'lightweight', 'weather resistant'.
- (d) Most candidates gave good responses linked to product use with reference to heat / scratch resistance and ability to be laminated with various prints/finishes for aesthetic value.
- (e) Primarily well answered with good references being made to aspects such as aesthetics and the card's ability to be scored or cut into a net shape. Some lower attaining responses included answers such as the ability of the material to be re-used for another gift, as well as references to material properties associated with metals, such as 'ductile'.

Question 6

This was not a very popular question with candidates, the majority favouring question 5. This reflects a similar pattern to previous papers where candidates generally avoid questions about metals. Responses were very mixed, some being excellent but many showing a good deal of confusion around relevant properties and correct manufacturing processes.

- (a) Better responses made appropriate reference to heat conductivity, non-corrosive, non-toxic properties and these were well justified. Many candidates were confused between heat conduction and insulation; some made reference to aluminium being a heat insulator to 'keep the coffee warm for longer'. There were also references to electrical conductivity.
- (b) Metal processing appears to still be an area of weakness for many candidates. Some of the poorer responses included references to 'sand casting' and 'injection moulding' or 'rotational moulding'. Better responses had the die resembling the product and good labels on diagrams to include 'gooseneck', 'ejector pins' etc.
- (c) Some mixed responses with better answers showing knowledge of the die casting process such as the level of detail available and the speed of production to meet demand.

Section C

Question 7

This question provided a wide range of responses. Part (a) seemed to be quite challenging for many candidates with many responses giving incorrect materials and poor descriptions of the manufacturing process. The latter parts were well answered with most candidates demonstrating good preparation for the parts relating to ergonomics, anthropometrics and safety.

- (a) (i)/(ii) Responses to part (i) were mixed with about half of the candidates giving thermosetting plastics such as UF. Where this was the case, candidates were not penalised in part (ii). Reasons relating to product use were generally well linked.
- (iii) The quality of response was generally low with a lack of specific terminology being used by candidates. Diagrams tended to lack detail. Every thermoplastic process was suggested with 'blow moulding' and 'vacuum forming' being the most popular of the incorrect proposals. Some candidates suggested 'press forming' using plastic sheet. Higher attaining answers showed a good understanding of injection moulding with detailed diagrams and the use of specific terminology in an appropriate sequence.
- (iv)/(v) Aluminium or stainless steel were the most popular answers. Many candidates referred to the metal being a 'heat insulator', 'non conductor so won't get burnt / electrocuted' or a 'heat conductor so keeps the air in the dryer warm'. Some better responses included 'chemical resistant, will not be affected by overspray from hair products such as hairspray', 'lightweight so does not add much extra weight to the product which is used with one hand and held above the head for some time', 'does not rust therefore will not be affected by long wet hair touching it'.
- (b) This was generally well answered with better responses mentioning aspects such as, 'double insulation', 'CE stamp to show it has passed safety standards', 'rear cover with small holes to prevent hair being sucked into the fan'. Lower level responses tended to focus on ergonomic features, or aspects such as, 'air holes for air ventilation', 'holes at the back to let air in and prevent overheating'. There was also some confusion between heat or electrical conduction and insulation.
- (c) Answers in general referred primarily to finger grips on the handle as well as a different placement for buttons. Some higher attaining responses mentioned the use of TPE to improve grip, alternative placement of the lead, colour coded buttons etc. Most candidates had used sketches to illustrate their points. Some candidates focussed on aesthetic rather than ergonomic considerations.

Mark Ranges and Award of Grades

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