



General Certificate of Education

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

PROD1 Materials, Components and Application

Report on the Examination

2009 examination – June series

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Set and published by the Assessment and Qualifications Alliance.

General

On the whole, this first June series paper was tackled well by candidates with the majority being able to complete the paper and attempt all questions. There were, however, some issues with quite a number of candidates completing additional sheets. This was a result of either candidates writing too much for each response and therefore running out of space or alternatively completing the questions, then crossing them out and therefore needing spare paper. The space provided on the paper for responses is given careful consideration when the examination is designed. Candidates do not need to write long discursive answers and should pay attention to the mark allocation to guide them on how many points to make. As a guide, questions with 4 marks usually require a response of two properties with a brief explanation of each, whilst six marks usually require three properties with brief explanations.

Centres are reminded that candidates need to be able to write in a clear, legible manner. Quite a number of responses were very difficult to read where handwriting was very small, faint or untidy. Where candidates have particular problems with handwriting, centres should apply for special arrangements i.e. the use of a laptop or writer.

Question 1

- (a) (i)-(iii). The majority of candidates answered this well giving a brief definition of the term 'thermoset polymer', naming a current polymer and an appropriate product, followed by a brief reason why the polymer is used.
- (b) Most candidates correctly gave issues such as problems with recycling.

Question 2

- (a) Quite a few candidates struggled to define the term 'smart material'.
- (b) (i)-(ii) In line with part (a) a number struggled to name a specific smart material, but most were able to give a product that smart materials are used in (usually thermometers or baby feeding products). Most were able to give a valid reason why the smart material was used in the product.

Question 3

The intention here was that each adhesive or solvent would be used only once. In future examinations, the wording of the question will reflect this. In marking this question, the mark scheme had to allow for a range of responses as contact adhesive and epoxy resin could technically be used on more than one material combination. In practice, most candidates scored well on this question.

Question 4

- (a) (i) Few candidates gave the expected answer for this question. The mark scheme did however allow alternatives such as 'corrugated card'. If the generic 'cardboard' was given in this part, candidates were not double penalised for the second part.
- (a) (ii) The majority of candidates were able to give two relevant reasons why corrugated card or the generic 'cardboard' might be used.
- (b) (i) Generally, candidates scored well giving an appropriate polymer such as LDPE. The less specific 'polythene' was accepted for this 1 mark question.
- (b) (ii) The majority of candidates gave two correct answers for the use of the polymer film named in part (i).

Question 5 (optional question)

As with the January paper and in the legacy specification papers, this style of question was popular with candidates and the majority scored well. In some cases, answers were too long, particularly where the function was unnecessarily described- especially when the relevant properties were not referred to. For example, quite a number of candidates went into lengthy descriptions of why safety glasses are worn. Where candidates gave two relevant properties for each material and product and then explained briefly why the properties were relevant, full marks were awarded.

Question 6 (optional question)

Although not as popular as question 5, those that attempted this question generally scored well.

- (a) Most candidates were able to give relevant properties for a high quality card, recognising the need for a bright white and smooth surface for printing, good creasing/cutting properties and appropriate stiffness to maintain the form of the package.
- (b) (i) Answers for this were varied, ranging from the inappropriate e.g. 'acrylic', to correct polymers such as HIPS, PVC or PET.
- (b) (ii) If candidates gave an incorrect material for part (i), they were not double penalised. Most candidates scored well for giving three properties such as transparency, ability to be vacuum or thermoformed and the ability to be recycled, and then briefly explaining their relevance.
- (b) (iii) In most cases, candidates described vacuum forming and often gained at least half marks. Some produced accurate descriptions with clear step by step diagrams and gained full marks.

Question 7

This question is very similar to the section C question exemplified in the published sample question paper. This was available at the specification launch meetings last year and since then has been posted on www.aqa.org.uk. Modelling questions have also featured in the legacy specification PD1D papers over the last two to three years.

When this question was set, it was done so believing this to be more accessible to candidates than a question based on specific industrial processes. The majority of candidates will have developed knowledge of modelling as part of the design process and therefore be able to name suitable modelling materials and describe the process of making and finishing a model. Many will have put this knowledge into practice in producing their models for coursework.

Unfortunately, a significant number of candidates seemed to ignore the emboldened “non-functioning” model in the question stem and the word “model” in parts a (i), (iii), (iv), and (v). In many cases, candidates described materials more appropriate to the final production version, giving reasons in part a (ii) such as functional aspects and then in part a (iii) describing industrial manufacturing processes- most commonly injection moulding. In response to this, it was felt that it was appropriate not to penalise candidates after part a (ii) as it would have skewed results. This compromise meant that candidates who had correctly described modelling materials and the reasons for their use, had access to an additional five marks.

It should be noted that industrial processes such as injection moulding will feature regularly in PROD1 but **not** always. Workshop hand /techniques might equally be tested.

- (a) (iii) Most candidates scored well with this part. In the majority of cases, the modelling processes were described highlighting appropriate tools and equipment using notes and simple sketches. There were some excellent descriptions of model making using CNC milling or routing with candidates referring to specific CAD software, machine tools and clamping, etc. Alternatively, candidates described sand casting or industrial processes such as injection moulding but usually with a clear description and good diagrams.
- (a) (iv) This was not well answered. Very few candidates were able to describe a specific finish and in most cases ‘paint’ was stated which would be ‘sprayed on’. Few went into details of preparatory sanding, cleaning, priming, and so on.
- (a) (v) The majority of candidates scored well with this part. Most candidates gave at least two precautions and explained why they were necessary gaining full marks.
- (b) (i) This question was well answered with most candidates recognising the aesthetic qualities of aluminium and its softness aiding machining. Some described the low melting point of aluminium, making reference to casting the buttons. This was given credit as it demonstrated wider subject knowledge.
- (b) (ii) This was well answered with most candidates gaining 3 - 4 marks for describing the suitability of CNC turning for the manufacture of small buttons at a consistent quality and speed.
- (c) The majority of candidates did very well with this question. Given that candidates usually have some form of MP3 or similar electronic device, they were able to make some very pertinent observations. Almost all were able to make a number of critical observations concerning ergonomic issues of the model but fewer made observations about

aesthetics. There were some excellent diagrams suggesting improvements to layout, overall size, inclusion of a screen and so on.

Mark Ranges and Award of Grades

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