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Design and Technology: Product Design 45551

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Unit 1: Written Paper

Report on the Examination

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General

In the third year of this single tier examination the preparation sheet provided an accessible topic which was well researched by many. Some candidates prepared very well and there was clear evidence that commercial packaging solutions had been studied in detail by some centres. Centres are advised to use primary product analysis on the preparation sheet theme as a good preparation for the examination. Where candidates had a clear understanding of design and technology terminology and its application, it was possible for very high marks to be achieved. Aspects of commercial manufacturing covered in questions 4 and 7 were the least well understood areas by the majority of the entry.

Question 1

a) This was well answered by many candidates with correct answers focusing on the packaging functions of protect/ contain/ inform/ display and preserve. Vague responses such as 'look nice' were not accepted, similarly, design criteria responses such as 'safety' and 'no sharp edged'. Where candidates had given a clear function for the packaging they could generally follow this up with sensible explanations. Some repeated the packaging function in the explanation which lost marks.

b) Many very good answers were seen with popular correct responses being types of card and corrugated card. PET and expanded polystyrene were often mentioned for inserts to the packaging. Reasoning did need to focus on the properties of the material to gain the marks and this was well done by many candidates.

c) In the designing section of the paper a very wide range of responses was seen. The vast majority of candidates approached the question by designing a box for the perfume to sit in. Solutions which had been drawn in proportion with commercial features such as windows, locking flaps and inserts could access the highest marks. Marks were also awarded for the construction of the packaging which was not always well done. Candidates who had thoughtfully considered glue flaps and commercial closures were able to score highly. A number of candidates designed blister packs, card inserts or vacuum formed inserts to fit inside the box and this was rewarded as a commercial constructional method. Many failed to fully consider proportion when drawing nets and few included dimensions. Many candidates thoughtfully applied surface decoration, making careful and sensitive use of colour and tone, and had clearly prepared well. A large number simply applied block colouring with little aesthetic appeal. Candidates who included commercial industry standard logos such as bar codes, estimated sign (e), recycling symbols, use within date symbol could access the higher marks. Credit was also given for appropriate annotation of the design with reference to the packaging functions. The standard of annotation varied throughout the entry from simplistic labelling to a detailed explanation of how the design performed the functions.

Question 2

a) (i) There were mixed responses with some candidates gaining full marks and others scoring one or two marks only. Candidates sometimes incorrectly gave the answer wood or pine for the main material for the spatula and 'paper' for the sketchbook which was not accepted. Responses required the names of specific materials and the correct identification of their source. Where candidates incorrectly named the material, they were able to correctly identify the source and whether or not it was renewable.

(ii) Many candidates had poor understanding of the properties of materials and misread the question, referring to the advantage instead or properties of the product rather than the material e.g. 'a wide base' for the glass. Generic responses such as 'strong' and 'cheap' were also seen but which needed further explanation to gain marks.

b) Many candidates successfully identified composite materials with alloys, carbon fibre, GRP and laminates being popular correct answers. These candidates were able to explain enhanced properties such as strength, non-rust etc. A significant number of candidates misunderstood the context of the question as they focused their response on the fabrication of products i.e. using different materials in the manufacture of a range of consumer products. These responses were not accepted. Some candidates gave examples of coatings such as varnish and paint which were also incorrect.

Question 3

a) Well answered by most candidates who gave clear descriptions of flat pack furniture as furniture bought unassembled, with parts packaged together requiring self-assembly in the home.

b) (i) Mixed responses were seen. The successful responses focused on the advantages to the user with typical correct responses being simple assembly requiring few specialist tools and discussions relating to assembly or disassembly for movement of the furniture and flat pack for transport.

(ii) Generally poorly answered as few candidates considered the needs of the manufacturer when producing flat pack furniture. Typical correct responses mentioned the fittings being produced in bulk as a standard part, thus reducing cost, or the fact that the product did not need to be assembled by the manufacturer reducing labour cost. Far too many responses gave simplistic statements such as 'cheap' or 'easy' to make, which were not accepted.

c) (i) Some candidates had difficulty with this question and focused the responses on cost or aesthetics. Many did however correctly identify that flat pack furniture had become a fashion item that could be and was more frequently changed by homemakers than traditionally manufactured furniture. More able candidates noticed that the flat pack nature of the furniture made movement into the house without significant issues with door sizes and removal of windows and therefore encouraged its use. Candidates also often correctly discussed the need to replace due to lack of long term durability of flat pack products. Where candidates had considered the short life nature of the product, product life cycles or built in obsolescence they could access high marks.

(ii) There were some good answers with candidates credited for considering both positive and negative effects on the environment of flat pack products. Popular positive issues given by candidates were the ease of repair of the products, the use of sustainable or recycled timbers and the opportunities for recycling of the product and packaging. Negative impacts focused on deforestation, emissions from increased transport resulting in an increased carbon footprint and contribution to climate change, as well as the inability to recycle some of the components such as laminated boards and the packaging waste.

Question 4

a) This was well answered by many candidates with clear product drawings which were suited to manufacturing in quantity. There was little development of the shape beyond its current form and much annotation concerning manufacturing techniques and surface embellishment. A few candidates misread the question and produced a sequential drawing of the process for making the product. Where the concept of the product was clear this was accepted and it was still possible for candidates to gain full marks. Very few candidates did not use the intended shape, where they did, Christmas Trees were often seen and a maximum of half marks could be awarded.

b) (i) This was well answered with popular correct choices being acrylic, pewter and flour to make biscuits. Marks were awarded for specific materials only and generic materials such as plastic, biscuit dough or metal were not acceptable. Some candidates gave inappropriate materials such as stainless steel which would not be appropriate to the scale of manufacture and then described laser cutting which was not accepted.

(ii) Responses needed to refer to choice in respect of the scale of production and was very poorly answered by many. Answers focused on the property of the material in respect of the finished product and aesthetic appeal rather than the issue of manufacturing in quantity. Where candidates had considered factors such as stock size and the bulk manufacturing processes appropriate to the material, they were able to access the full range of marks.

c) There were some good answers. Candidates who had discussed accuracy and repeatability available through the use of CAD/CAM along with specific quality control checks scored highly. More able candidates were able to describe the role of moulds, templates, cutters, jigs and

formers in achieving accuracy and repeatability in the process and were therefore able to access the full range of marks.

d) Candidates sometimes gave irrelevant responses which did not focus on health and safety considerations relating to the tools and equipment. Many candidates gave materials or components such as pin for the badge, paint or glue which were not acceptable. Popular correct responses gave equipment such as the laser cutter with the relevant health and safety precautions of extraction of fumes, danger to eyes if watching the laser during cutting and supervision due to the fire risk. Some candidates gave incorrect responses for the laser cutter such as *ensure lid is closed*, *wear goggles and apron*, *don't touch as it is hot* which were not accepted. Generic health and safety rules such as *using goggles and tying hair back* had to be relevant to the process described in parts (a) to (c) to be awarded marks. Many responses warned 'to take care' which were insufficiently descriptive to be awarded marks.

Question 5

a) (i) A number of candidates confused the needs of the hearing impaired user and the partially sighted user resulting in incorrect answers. No marks were given for 'louder speakers' which was a common response**.** However many candidates did give full mark responses with good explanations which including flashing lights.

(ii) Better adaptations for the visually impaired user were seen. Most correctly referred to increasing the size or changing the shape of the telephone buttons and suggested Braille. Contrasting colours and bigger screens were also rewarded as correct adaptations. More innovative adaptations seen were touch tone sounds which gave the number as the key was pressed. A few candidates described louder speakers here too which were incorrect as the user was not hearing impaired.

b) Very successfully answered by most with many candidates accessing the full range of marks. Typical correct responses focused on alterations to either the wheelchair or the environment for the disabled person. Many candidates gave successful adaptations to the wheelchair as electrical control systems, lighter weight, comfort of the seat, angled wheels and manoeuvrability. Correct environmental changes often given were ramps, lifts, doors and bathroom and kitchen inclusive design.

Question 6

a) (i) This was well answered by many with correct responses explaining the study of human measurements. Some answers referred to the 5^{th} 50^{th} and 95^{th} percentile.

(ii) Some candidates confused the terms anthropometrics and ergonomics. The best answers described how hand measurements had been used in the design of the handle and positioning of the buttons. A minority of candidates considered how arm length could be used in the design of the body of the hairdryer and position from the head and height of the user to determine the length of the cable. Many candidates achieved full marks.

b) (ii) Many correctly described ergonomics as the fit of the product to the user. Candidates also often confused anthropometrics with ergonomics and some talked about aesthetic styling and sustainability.

(ii) Where candidates had understood part b(i) they could often give relevant explanations relating to the shape and grip of the handle fitting the consumer. Candidates also considered the weight of the hairdryer and the heat output which would ensure the comfort of the user.

c) This was well answered with many candidates knowing the European Standards symbol.

d) (i) Some very good responses but many referred only to the CE mark rather than the wider range of product symbols. Some candidates successfully described aspects of communication and not being specific to any particular language. Other good responses described a range of symbols for example recycling.

(ii) Many referred to testing which does not happen with the CE mark as it is self-awarded, but others correctly identified consumer confidence, safety and an assurance given by the mark of quality and fitness for purpose.

Question 7

a) A mixed response with some very accurate explanations of materials and components being ordered and delivered in time for a particular stage of the manufacturing process to save costs and the need for storage. Many candidates confused just in time with stock control or invented a plausible explanation based on the wording of the question. Many showed a better understanding of stock control with the better answers considering the use of bar codes, data bases and automated ordering systems controlled by computers.

b) There were very mixed responses explaining the use of CAM, ranging from very poor to well written responses, with good use of English and grammar. Candidates gained marks for referring to speed, accuracy, nesting, efficient use of materials and better profits after initial set up costs. Good examples of products produced this way were often given although sometimes these were school based products such as clocks and jewellery cut on the laser cutter rather than commercial mass production. Some responses failed to score marks as they did not answer the question but talked about how CAD could be used or computers in general.

Mark Ranges and Award of Grades

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