General Certificate of Education

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

PROD1

Report on the Examination

2550

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General

The format of the paper is well established and was similar to that of recent examinations. The level of response was varied and questions addressing polymers and polymer processes were generally more confidently answered than those questions addressing metals. In section B, question 5 was answered by more students than question 6 but the mean mark was higher for question 6.

There appears to be a reduction in the use of generic unexplained terms such ‘cheap’, ‘strong’, ‘durable’, ‘can be coloured’ but within some scripts these terms continue to be a feature. Centres are again reminded that generic unexplained terms will not attain credit and students should make reference to specific properties and link these to the particular product.

Section A

1 This question was primarily well answered and students showed a good understanding of the link between the polymer process and resultant product.

2(a) The majority of students correctly described the term ‘alloy’ as a mixture of two or more metals to create a metal with enhanced properties. The most common errors showed a reference to ‘a mix of materials’ or students missing the reference to enhanced properties.

2(b)(i) The most popular named alloys were brass and stainless steel, linked to applications such as musical instruments and kitchen sinks respectively.

2(b)(ii) Most students found this question very accessible and reasons were well linked to product use such as, brass being malleable to allow it to be bent into shape for a French horn, good chemical resistance for stainless steel, meaning detergent used for washing dishes did not degrade the material.

3 Students generally showed a good understanding of the symbol meanings. Most incorrect responses referred to wearing music style headphones rather than ear defenders as well as incorrect references to toxic in the COSHH symbols.

4(a) The majority of students correctly identified the polymer classification as thermoplastics.

4(b) This question was well answered and the most popular applications were carrier bags or detergent bottles for LDPE and remote control casings or similar for ABS.

4(c) In higher attaining responses the material properties were clearly linked to product use, e.g. ABS has good impact resistance so will not break if it accidently falls off a sofa. Lower level responses were unjustified and tended to be simple non-credit worthy statements such as, ‘it is strong’.

Section B

5(a)(i) The majority of students were able to suggest a suitable man-made board, with plywood being the most popular response.

5(a)(ii) Explanations were generally well linked to product use and students made appropriate points such as 'available in long wide boards unlike solid timber where planks would need to be glued together', 'has no grain so is easier to cut or drill into with no weaknesses, unlike solid timber', 'grains are placed at right angles so there is no weakness across the board as is found on natural timber' and 'aesthetically pleasing due to the light colour and layers of material'. Students did not attain credit for unexplained references such as, 'strong', 'available in many sizes' and 'cheap'.

5(a)(iii) The quality of response varied considerably with some students clearly having an adept understanding of timber processing. Many students however described lower level responses which lacked mention of specific tooling and processing. There were many simple references to 'cut to length', 'make a hole' and 'screw the table together'. Higher attaining students were able to suggest specific tooling such as a band saw or jigsaw, pillar drill, the use of pilot and clearance holes, PVA adhesive, clamping etc.

5(b) Students appeared to have a good understanding of the advantages of flat pack furniture over ready assembled and there were many positive comments addressing the benefits to both consumer and manufacturer. Most popular answers centred around flat pack being easy to take home the same day in a car thus avoiding delivery costs or delays from order to take home, flat pack being easy to assemble with simple tooling such as a screwdriver or Allen key which is often included in the pack and the reduced costs to the manufacturer due to lack of assembly and/or the employment of skilled workers.

6(a)(i) This question appeared very accessible to students and the most popular higher attaining responses centred around, 'chemical resistance to allow the bottle to hold the shampoo', 'thermoplastic which can be blow moulded to produce the thin walled bottle shape', 'impact resistant so will not smash if accidently dropped in the shower' and 'can be pigmented to indicate brand colours and for aesthetic appeal'. Lower level responses focussed on simple statements such as, 'waterproof', 'can be coloured', 'can be printed on'.

6(a)(ii) The level of response showed more variation than 6(a)(i) but was still very accessible for most. Lower attaining responses tended to contain far more generic, unexplained terms such as 'strong' or 'can be cut/folded easily'. The better answers made good reference to the compliant nature allowing the card to be die cut into a net shape, the insulating properties of corrugated card enabling the pizza to be kept warm, the corrugated design providing impact resistance, the lightweight nature being advantageous for delivery on vehicles such as mopeds.

6(b)(i) Students were primarily able to correctly identify the symbol as Forest Stewardship Council.

6(b)(ii) Most students were able to suggest good reasons why the symbol was used. It was noted that those students who failed to correctly name the symbol were still able to give appropriate reasons in this question part. Students showed a very good level of understanding regarding environmental issues, forest management, consumer issues and the importance of sustainability.

Section C

7(a)(i) Students demonstrated a good knowledge of a suitable material for the kettle body. Stainless steel was the most frequently stated correct material.

7(a)(ii) This question was generally well answered and students demonstrated good use of technical language with a link to product use. The most popular were aspects such as the metal's (e.g. stainless steel) non corrosive qualities thus not contaminating the water, shiny silver colour for aesthetic appeal, malleability to allow the curved shaped to be produced, as well as references to food safe and chemical resistance properties. Unjustified statements such as, 'can be cleaned', 'easy to shape' and 'cheap material' did not attain credit.

7(a)(iii) The quality of response varied greatly and the general trend showed a lack of familiarity with the spinning process. Higher attaining students included clear diagrams with comprehensive explanations and descriptors including aspects such as the metal sheet or blank, the inclusion of the mandrel or former with details of how the rolling tool is used to form the shape. The numerous incorrect responses included modifications of polymer processes such as rotational and injection moulded, cutting the shape from a block of metal and sand casting.

7(b) Although students generally showed a good understanding of ergonomic and safety aspects, many answers contained repetition of the same point, via written text and/or diagrams. The higher attaining responses addressed a variety of features, primarily with good evaluative statements and/or proposed improvements. The range included features such as the length and thickness of the handle and how this may pose difficulty for users with small hands, the proximity of the handle to the body of the kettle which may pose a burn risk for those with large hands, the position of the water level behind the handle making it difficult to read, the swivel base making the kettle suitable for left and right handed users and references to the lack of grip on the handle. Low attainment responses were primarily generic unexplained statements such as, 'using plastic makes it safe', 'the switch is easy to reach' or 'the handle is an ergonomic shape'. Students who described purely functional or aesthetic aspects or wrote simple statements such as, the kettle 'should' have a handle or 'should' be made from plastic, did not attain credit.

7(c)(i) Students were largely able to suggest suitable reasons for using Urea Formaldehyde for the plug socket. Reasons most frequently referenced were: scratch resistance meaning it would not be scratched by plug pins, electrical insulation making it safe for use with mains supplied electrical devices and the thermosetting property meaning the plug would not instantly melt in the event of a small electrical fire or short circuit. There were a number of notable areas of misunderstanding between the terms electrical insulator and electrical conductor.

7(c)(ii) Although the question specifically named the compression moulding process, many students opted to name and subsequently describe other processes such as vacuum forming, thermoforming or injection moulding. Lower level responses often included diagrams and explanations similar to metal press forming or made reference to a polymer liquid being poured into an open mould and being left to cool. Within the higher level answers there were detailed descriptions including aspects such as the slug of pre-weighed polymer, cure time and ejection of the polymer whilst still warm, with clear accompanying sketches.

7(c)(iii) Students showed a good understanding of environmental issues and were able to accurately describe issues such as the cross links in the thermosetting polymer, meaning it could not be recycled, the use of a non-renewable finite resource for production, long degradation time leading to landfill issues such as litter being an eyesore, potential contaminants being released into the ground as the polymer degrades as well as the potential harm to wildlife.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator