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Examiners' Report
June 2015

GCE Design and Technology 6GR02 01

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Introduction

It is clear that the majority of candidates prepare very well for their examination and are able to demonstrate their knowledge and understanding well through their responses, be that in the form of written responses or annotated sketches.

The more able candidates tend to be those who read the question and respond with specifics relating to the topic of the question. These candidates gain more marks than those who write around the subject with generic responses which have a vague link to the question topic.

It continues to be disappointing to see candidates who believe that it is acceptable to respond to all questions with generic, generalised answers, such as 'strong, fast, quick, cheap, etc...' These are the typical low knowledge level responses which show only a basic understanding of limited aspects of the subject; therefore they can only gain low marks.

Candidates need to know the information and subject which they are being questioned about, and to organise this information effectively to answer the question set, rather than write as much as possible in the space provided in an attempt to try to gain marks from their response, hoping the answer meets some aspect of the mark scheme. Related to this, whilst it is clear that most candidates use the time in the exam well, some candidates still find the need to use additional pages to complete answers. The spaces provided in the examination paper are larger than we would expect any answer to take. Most candidates use this space wisely; however, given that additional pages continue to be used, centres should assist candidates during their exam preparation to write concisely.

It was disappointing to again see some very low level drawing skills evident in candidate responses; some candidates seem to be unable to transfer the skills which they have developed for their internally assessed work to examination questions.

Question 1 (a)

This question allows the opportunity for candidates to demonstrate their understanding of the safety signage which should be familiar in a Design and Technology environment.

The majority of candidates answered this question correctly, however there were some misconceptions about the meaning of the sign such as stating it would represent the way to a fire exit or similar.

Figure 1

(a) State the meaning of this sign.

(1)

Fire extinguisher

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Examiner Comments

Most candidates responded with short answers such as the one shown here; such an approach is acceptable for a state question.

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Examiner Tip

With questions where the command word is 'state' such as is seen here, the required answer is generally short and does not need to have any description, explanation or justification.

Question 1 (b)

This question is aimed at testing the candidates' knowledge of the properties of materials; specifically those of rigid polystyrene, and how these properties relate to the use of material for safety signage.

This is a knowledge based 'give' question, so a single word answer would be acceptable. It is useful to refer to the published mark scheme when looking at the examples to clearly see where marks are given.

Where candidates did not achieve marks, they often repeated the question by stating 'it is rigid' or properties which were not relevant to the application.

(b) The sign is made from rigid polystyrene.

State **one** functional and **one** aesthetic property of rigid polystyrene which makes it suitable for safety signs.

(2)

Functional

It is lightweight

Aesthetic

It has a glossed / shiny surface finish.

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Examiner Comments

This response is typical of a candidate who has correctly stated two properties of rigid polystyrene which make it suitable for safety signs. The candidate has been awarded one mark for the functional property (it is lightweight) with the second mark for the aesthetic property (it has a shiny surface finish). This combination of responses was commonly presented by candidates who gained both marks.

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Examiner Tip

In questions such as this where candidates are asked to link the properties of the material to the given application, it is important that these properties are relevant. In this response, both properties are relevant, therefore both marks can be awarded.

Question 1 (c)

This question is in the form of a 'describe' question and candidates are asked to describe how phosphorescent pigments can be used to enhance safety signage. As such, there should be reference to how the pigments absorb and then release light, with a link to improving the properties of the signage.

Most candidates responded well to the question scoring high marks; however a large proportion thought that the pigments worked by simply reflecting light, similar to a mirror.

(c) The safety sign features the use of phosphorescent pigments.

Describe how phosphorescent pigments use natural light to enhance safety signs.

(3)

they store energy in the daytime and slowly release it as light. This means that the sign will be clear and bright when its dark. Its a non-renewable source therefore its more sustainable than electric signs.

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Examiner Comments

This candidate has gained the full 3 marks available for the question. They have identified that the pigments 'store energy during the daytime' and then 'release it as light'. A third mark is awarded for stating that the 'sign will be clear and bright when it is dark'.

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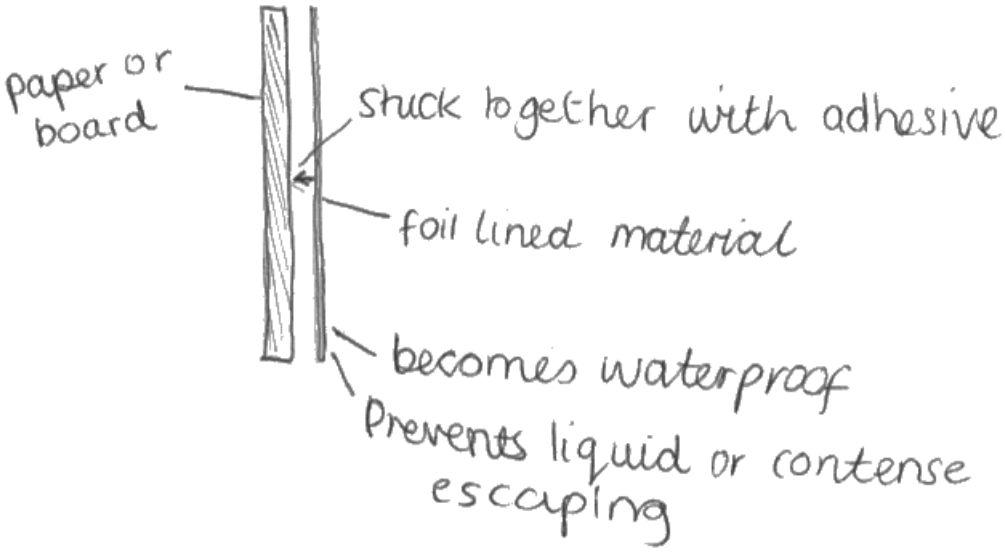
Examiner Tip

In 'describe' questions answers can be a series of points; however these should be related and linked to the focus of the question. A series of points which have only a tenuous link to the question context will rarely achieve full marks.

Question 2 (a)

Most students understood the basic principle of this question although many candidates produced sketches which only showed 2 layers – one layer being foil and other one being either paper or board as a backing layer. The common error amongst such candidates was to omit the middle ply from the diagram. Only a limited number of candidates produced an accurate sketch of foil-lined board with accurate labels or annotations. The higher scoring candidates often represented the construction of the board as an exploded view, often as an isometric representation. This approach allowed them to use annotations effectively in order to describe the construction of foil-lined board.



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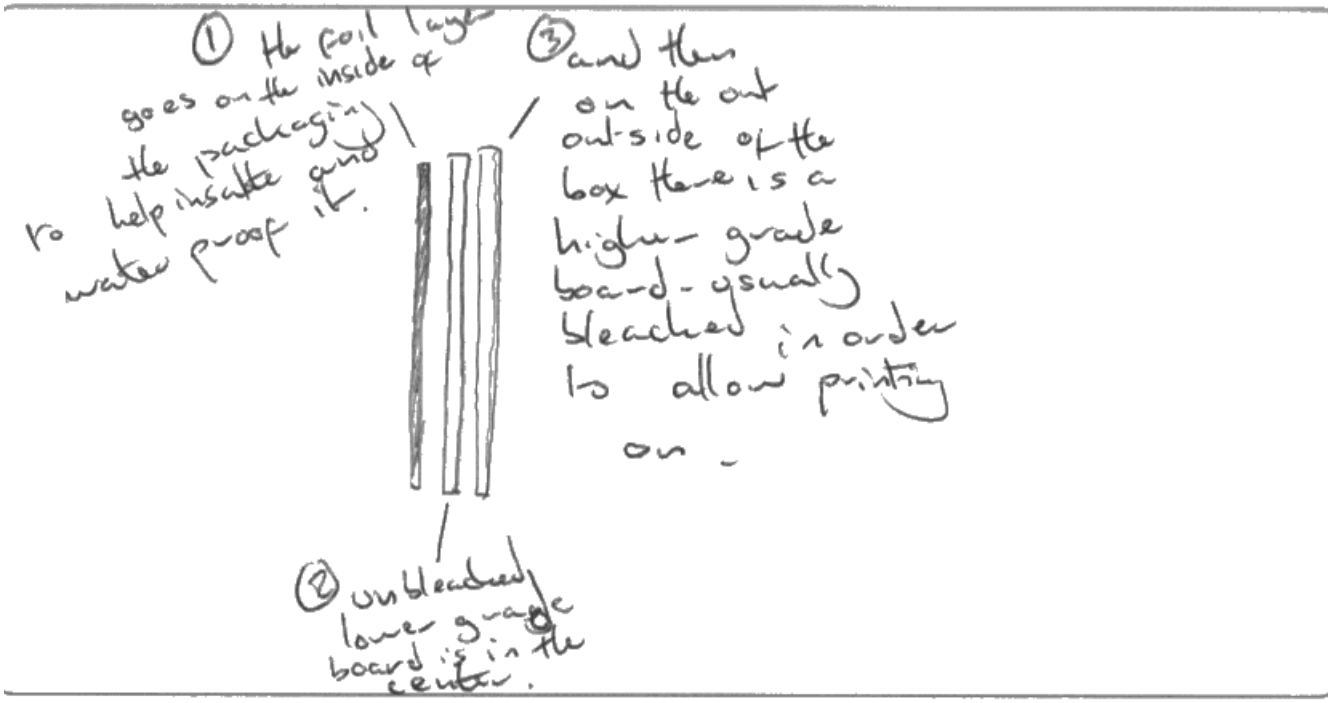
Examiner Comments

This is a typical lower level response made by candidates who had a limited awareness of the structure of foil-lined board. In this instance the candidate has presented an exploded two-dimensional sketch which indicates an outer foil layer and a paper or board backing. The annotation is helpful, as this indicates the materials used.

(3)



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Examiner Comments

This candidate has been awarded all 3 marks for the following reasons:1 mark for a diagram showing at least three flat layers; 1 mark for indication of inner layers of board; board is acceptable here as a reference to the plies or liners; 1 mark for annotation stating that a layer of foil is added to the board, and the reference to the higher grade board on the outside of the box.

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Examiner Tip

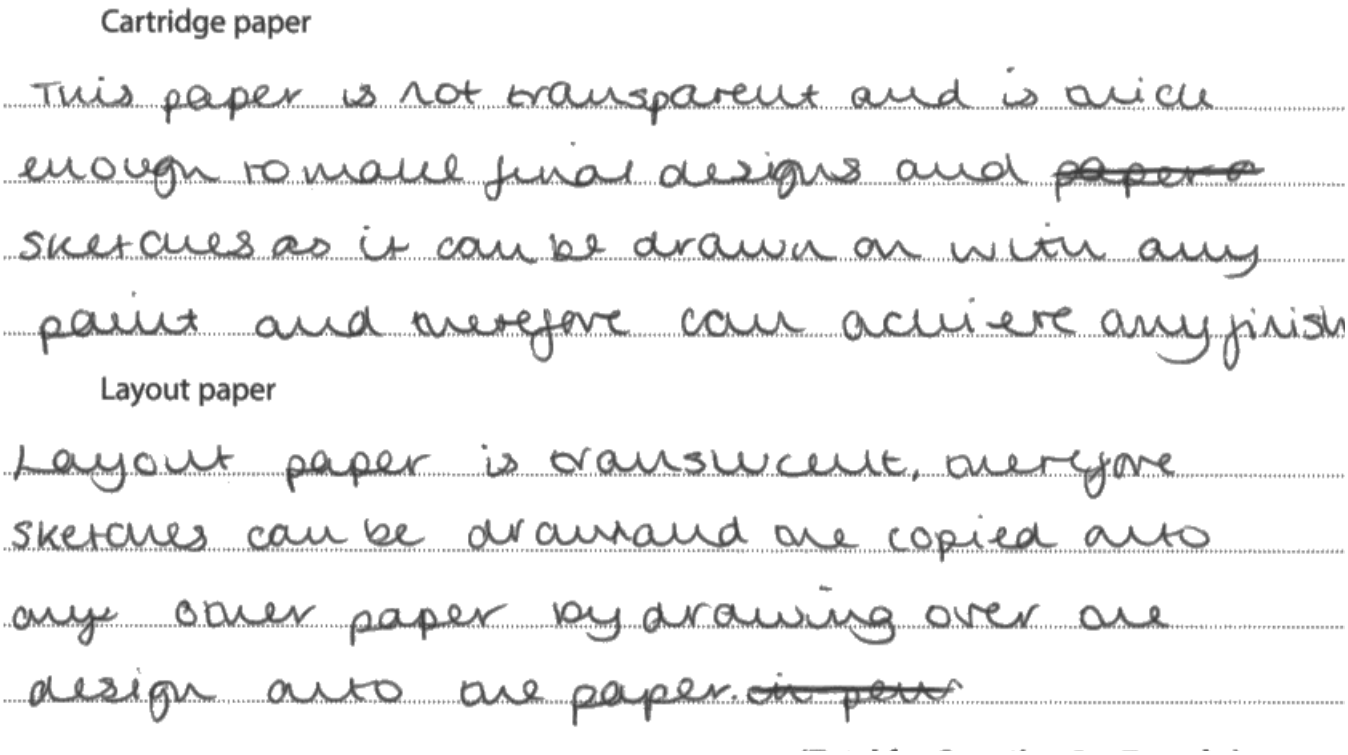
If a question asks for annotated sketches, a candidate's answer should include both a sketch and at the very least labelling.

This particular candidate has used annotations effectively to describe the structure of the board, highlighting the key features such as the 'foil layer goes on the inside' and 'outside of the box there is a higher grade board'

Question 2 (b)

This question focuses on two of the materials which are listed in the specification, namely cartridge paper and layout paper, and how these can be used by designers. As an 'outline' question it is acceptable for points to be made, but not necessarily linked.

Where candidates failed to achieve full marks this was due to them explaining the properties of the materials, rather than evidencing typical applications of each.



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Examiner Comments

This candidate has achieved full marks as they have identified two uses of each type of material. For cartridge paper they have stated the material is used for 'final designs' as it 'can be drawn on with any paint'. They have also considered that layout paper can be used for 'sketches' which can be 'copied'.

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Examiner Tip

It is important to fully read the question before offering an answer. In this case many candidates made the mistake of answering the question which they thought they had been asked, rather than the actual question set.

Question 3 (a)

This is an 'explain' question and therefore requires one valid point with a relevant (and related) explanation. It is not sufficient to write single word answers, or a collection of unrelated points.

The question focuses on the reasons for using styrofoam for prototype block models, rather than comparing styrofoam to other materials. Responses which related to general properties of styrofoam such as 'it is lightweight' attracted no marks. Most candidates did however score well, with most of the points in the mark scheme being covered by candidates.

Many candidates would be expected to have had experience of working with styrofoam as a modelling material, therefore they were able to draw upon this knowledge to answer the question.

3 Figure 2 shows a prototype block model for a fragrance bottle.

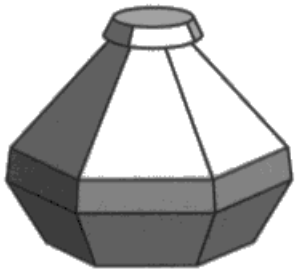

Figure 2

(a) Explain **one** reason why styrofoam is used for the prototype block model.

(2)

Styrofoam is easy to cut and shape so it would be easy to create the shape of the fragrance bottle using hand tools.

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Examiner Comments

This is an example of the most common type of response made by candidates. Two marks are awarded here for the material being 'easy to cut' 'using hand tools'.

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Examiner Tip

For 'explain' type questions the justification given for the reason must be linked. If there is no link, then only one mark would be awarded.

Question 3 (b)

Often, questions at AS level involve 'completing the table'. These often require short phrase responses and for the responses to be linked together in some way. In this case the link is between advantages and disadvantages of two modelling materials which could be used for block modelling.

This is a knowledge based 'state' question, so a single word or single phrase would be acceptable; however some candidates tried to squeeze as much content as possible in to the table.

To achieve marks for this question, it was important that candidates noted the advantages and disadvantages of the materials with regards to the application; in this case the block model. Some candidates identified more generic advantages or disadvantages, however these did not gain credit.

(b) The designer could use a combination of materials to develop the prototype block model.

Complete the table below to give **one** advantage and **one** disadvantage for each material.

Material	Purpose	Advantages	Disadvantages
Jelutong	For making the main body of the model	(i) Low density Good So it's easy to cut through (1)	(ii) hardwoods are expensive to buy (1)
PVC	For making the lid for the model	(iii) it can be easily moulded to the specific shape required	(iv) PVC is ~~Plastics are~~ hard to recycle making it unsustainable

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Examiner Comments

This response has gained 3 marks for identifying appropriate advantages and disadvantages for jelutong, and 1 mark for the disadvantage of using PVC. No mark could be awarded for 'can be easily moulded' for PVC as there is no reference to heat or a specific forming process.

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Examiner Tip

Try to avoid generic terms such as 'lightweight' as these are unlikely to gain full marks, and will limit achievement on questions such as this one.

Question 3 (c)

Most candidates were able to answer with correctly named methods, and gave valid descriptions of the processes; however it was disappointing to see so many candidates who were aware of appropriate techniques who treated this as a 'give' rather than an 'outlines' question, thereby failing to access the second mark in each case, e.g. '3D printing' achieved one mark, '3D printing which builds up the prototype model in layers using a polymer' achieved both marks.

Common specific responses were 3D printing, Stereolithography and Selective Laser Sintering. Laser cutting was also a popular response; however candidates were not always able to describe how it could be used to create a block model.

There was quite a range of errors and apparent misinterpretations of what was required. 'Vacuum forming'; 'injection moulding' and 'wire frame modelling' were commonly offered as incorrect responses. A minority referred to virtual modelling which is not appropriate for producing a block model, hence these candidates did not receive any marks.

(c) In recent years, prototype block models have rarely been produced by hand.

Outline **two** modern methods of producing prototype block models.

(4)

1 3D printing may be used to make a model. The design can be made on the computer and printed in a a few hours.

2 laser cutting can be used as a quick way to produce a 3 model.

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Examiner Comments

This is a typical lower level response from candidates. As stated above, candidates could achieve 2 marks for the identification of two modern methods of producing block models, in this case 3D printing and laser cutting. Neither process is expanded upon, hence no further marks can be awarded.

(c) In recent years, prototype block models have rarely been produced by hand.

Outline **two** modern methods of producing prototype block models.

(4)

1 Selective laser sintering - Solidifies polymer powder by each cross section to create a 3D lowering the platform after

model prototype.

2 Stereolithography - Solidifies a liquid photo - polymer resin by each cross section, lowering plat after each layer to create a 3D prototype.

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Examiner Comments

This response gained full marks for the candidate. They have identified two specific methods of producing prototype block models. They have also expanded their responses explaining that selective laser sintering involves solidification of a polymer powder (acceptable as an alternative to fusing) and that in stereolithography a polymer resin is solidified.

Whilst neither description is a 'mark scheme' response, the descriptions note key features of each process, therefore credit can be given.

Question 4 (a)

Most candidate responses showed a good understanding of how developments in LCD technology have been beneficial to the hand-held games console market. Overall this question was answered well with candidates receiving marks across the full mark range.

Common correct responses focused on: 'lower power consumption; extended battery life; improved screen graphics and resolution; better quality of colour images; thinner / smaller; lightweight'.

Some responses described how LCD technology worked rather than looking at the advantages it had brought; such responses did not attract marks.

In order to gain full marks, candidates were required to identify and discuss how the development of advanced LCD technology has been beneficial to the hand-held games console market, as opposed to generic responses regarding games consoles, or how LCD screens function.

(a) Discuss how the development of advanced LCD technology has been beneficial to the hand-held games console market.

(4)

LCD is used for the screen on the games console as it produces a high resolution image with a range of bright colours. This makes the game look visually appealling. LCD uses little power so improves the battery life of the games console

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Examiner Comments

This candidate has been awarded full marks for their response. In the second line of the answer they have identified the 'high resolution image ' whilst the third line indicates the display would have a 'range of bright colours'. The response continues explaining the LCD display 'uses little power' with a link to 'improves battery life'.

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Examiner Tip

For 'discuss' type questions, candidates should be including four distinct points within their responses in order to gain full marks.

Question 4 (b)

This question focuses on one of the processes which are listed in the specification, namely saddle wire stitching, and asks why this is the most suitable method of binding for a small booklet. As a 'discuss' question, to gain full marks the response should be presented logically and relate the features of the process to the application.

(3)

saddle-wire stitching is most suitable as there aren't many pages and it is unnecessary to spend alot of money on a more expensive method of binding. Saddle-wire stitching is one of the cheapest methods, it can be done by a computer during the printing process and it allows all the pages to open fully without bending the spine.

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Examiner Comments

Whilst the candidate has not presented an answer which features responses which are directly stated in the mark scheme, 3 marks have nevertheless been awarded. The candidate has stated that 'there aren't many pages', that saddle wire stitching is 'one of the cheapest methods' and it 'allows the pages to open fully'.

ResultsPlus
Examiner Tip

When a question asks for reasons why a process is suitable for an application it is important to ensure that the identified features of the process have a direct relationship to the application.

Question 4 (c)

A large proportion of candidates clearly understood the suitability of both materials for use in the packaging of the games console, however technical terms and explanations were often generic and non-specific. The majority were able to identify that thermoplastics were more suitable for moulding into the specific contours, that they can be formed into complex shapes and are able to be reformed and recycled. A common misconception amongst candidates was to describe thermoplastics as being highly impact resistant, often in comparison to recycled board.

Many candidates identified the point that plastics were made from finite resources, that they contribute to landfill, and use large amounts of energy in their production.

The majority of responses identified the increased sustainability and relative environmental benefits of using recycled board as opposed to thermoplastics, although very few considered the relative disadvantages of recycled board such as the perceived lower quality or the difficulty of producing precise shapes.

(c) The internal protective packaging holds the games console in place during transit.

The packaging could be made from either recycled board or a thermoplastic.

Discuss the suitability of these two materials for the internal protective packaging.

(4)

recycled board is made more ethically as it is made from reused materials, & thermoplastics are made from oil (however they can be recycled)

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Examiner Comments

The candidate has provided a balanced response which considers both of the materials in the question. Firstly, for recycled board they have stated it is made 'more ethically' (1st line) and 'can be recycled' (3rd line). The consideration of thermoplastics includes 'made from oil' (3rd line) and a comparison with recycled board in that it is 'easier to mould and shape' (4th line).

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Examiner Tip

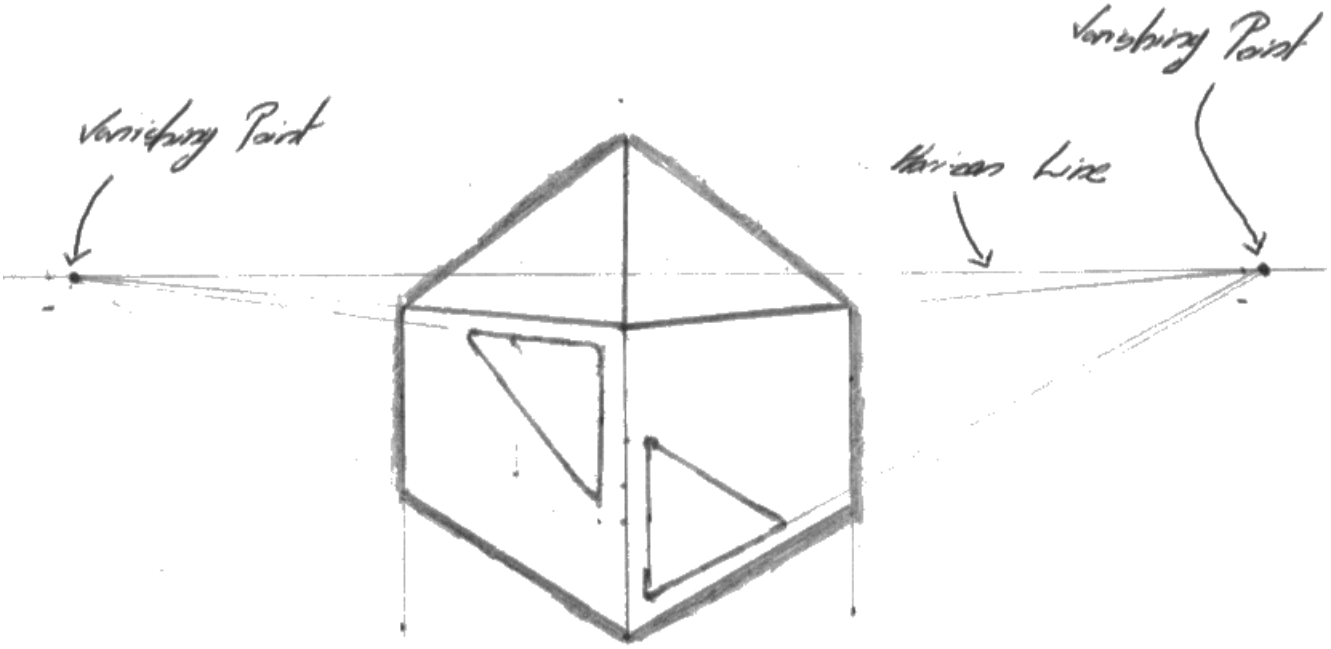
If a question asks for a discussion which considers more than one factor, in this case two materials, then in order to gain full marks a candidate should make reference to both factors in their response.

Question 5 (a)

The purpose of this question is to examine the candidates' ability to interpret a given drawing and then to present the information in a different format. In this instance the net of a package had to be interpreted in order to produce a two-point perspective drawing.

The majority of responses showed a good understanding of the two-point perspective technique. They were able to visualise the net as a 3D product and communicate the packaging features in the drawing. A common error, however, was for candidates to not show the overlap of the windows, or they attempted to draw the package on its side or from underneath.

In order to gain full marks candidates were required to show evidence of the construction of their two point perspective drawing.



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Examiner Comments

In this response, the candidate has achieved full marks. The marks have been awarded for:

a 2 point perspective drawing, showing construction details

- the base of the package being in proportion
- the pyramid top being clearly shown
- windows drawn in the correct location and in the correct orientation
- the windows being the correct shape and size

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Examiner Tip

For sketching questions it is important to make sure that the response is drawn to an appropriate size, as this allows the examiner to identify the features which are being looked for.

Question 5 (b)

The specification lists numerous materials and processes, some of which may be commonly used in schools, whilst others may be more frequently found in industry. This question requires the candidates to have knowledge of one of these materials, i.e. solid white board.

In this question, candidates were asked to discuss the use of solid white board as a packaging material as opposed to generic properties of the material. As a 'discuss' question, bullet pointed short answer responses or unlinked statements can gain credit. In all cases, however, there must be a link to the context of the question.

It is useful to refer to the published mark scheme when looking at the examples to clearly see where marks are given.

(b) The packaging is produced from solid white board.

Discuss the use of solid white board for this packaging.

(3)

Solid white board is strong, but ~~too~~ lightweight. One side it is made from bleached pulp and it is expensive.

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Examiner Comments

This candidate has provided a concise response which meets three of the marking points indicated in the mark scheme. They have noted that solid white board is strong, that it is made from bleached pulp, and that it is expensive.

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Examiner Tip

This is a concise answer in which the candidate presents ideas logically. Answers such as this demonstrate the knowledge of the candidate clearly.

Question 5 (c)

This is an 'explain' question and therefore requires a valid point and a relevant (and related) explanation for each of the two reasons given. It is not sufficient to write single word answers or a collection of unrelated points. A valid point without expansion will only gain one mark.

The question focuses on the unsuitability of screen printing for the production of large batches of items, and although comparisons with other forms of printing were not asked for, where a disadvantage was given which makes a valid comparison with a different process, credit was given.

The question focuses on the disadvantages of the screen printing for a batch of packaging; therefore it is appropriate for candidates to include scale of production, efficiency and costs in their answers.

(c) The packaging will include printed photographic images of the chocolates.

Explain why screen printing would not be suitable for producing large batches of the packaging.

(4)

Screen printing will take a long time if the product is batch produced. this process isn't very quick. The paints or inks take a long time to dry. the gauze may become thin. the inks may smudge together creating a blurred image. each packaging may be slightly different, this is also an expensive process.

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Examiner Comments

Whilst this is not a model answer, the candidate has presented two linked responses in order to gain full marks. They have noted that 'screen printing will take a long time' as 'inks take a long time to dry'. They have also indicated that 'inks may smudge together' meaning 'each packaging may be slightly different'. Candidates are marked positively, therefore despite these two responses not being explicitly stated in the mark scheme, the points are relevant and credit given.

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Examiner Tip

Answers are always marked positively and credit will be given providing the overall context of the response is correct.

Question 6 (a)

This question tests the candidates' wider knowledge of levels of materials, and more specifically that of tin. The focus of the question is on the use of tin for the manufacture of cans for baked beans. In this instance, candidates are expected to provide a response which identifies the benefits of using tin, rather than generic responses which made reference to the benefits of canning.

There is no credit for providing a description of the canning process.

6 Baked beans are often contained in tin-plated steel cans.

(a) Outline the benefits of using tin in the manufacture of cans for baked beans.

(4)

tin is a relatively inexpencive material allowing it to beable to be mass produced the material is long lasting and it doesnt contaminate the food the tin is malvable allowing it be shaped easily. once used it can be recycled to be used again the tin creates the barrier against chemicals

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Examiner Comments

This is a typical example of a mid-range response where the candidate has noted that tin 'does not contaminate' and that it 'can be recycled'. As this is an outline question, four distinct and relevant points were required to achieve full marks.

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Examiner Tip

Where a question asks for an 'outline' type response, the number of points required is generally indicated by the marks available. In order to achieve these marks, candidates must make sure that they can give distinctly different answers. Often a candidate will repeat the same point several times, and as a result does not gain further marks.

Question 6 (b)

Evaluation questions require candidates to answer fully, using detailed justified responses that flow in paragraph form. Short responses for evaluation questions gain little credit.

Candidates must ensure they include reference to both advantages and disadvantages for maximum marks. In this case, only presenting one side of the argument will result in a maximum of 5 marks rather than 6.

The focus of this question is the use of the continuous production for the manufacturing of baked bean cans.

Most candidates were able to demonstrate good understanding of continuous production, and why it is used for certain products such as those which are in high demand. Most candidates were able to explain a range of benefits for using continuous production for the cans. Candidates also identified the use of automation within continuous production and the low unit costs. For the disadvantages, candidates referred to the inability of continuous production to quickly respond to changes in demand and that faults would halt production.

Some candidates were able to evaluate and discuss both the advantages and disadvantages, resulting in the achievement of full marks.

*(b) Cans for baked beans are often manufactured using a continuous production method.

Evaluate why this scale of production is appropriate for the cans.

(6)

the cans for Baked beans are all the same size and shape. This means that the design of the Product will Never have to be changed. Therefore lots can be made continuously. Continuous Production means that the cans are always being manufactured this is good as it means the cans will always be available if demand of Baked beans rise. Shops are more likely to order the Products in bulk and want a continous amount of them. This means that the manufacturer will have to Produce the cans continuously to make sure enough are made.

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Examiner Comments

This is an example of a typical mid-range response where the candidate has considered the benefits of continuous production, with references to the cans all being the same size and shape, that continuous production means that the cans are always being manufactured (as a link to 24/7 production), and that cans will always be available if there is demand.

The response does not consider any negative issues and as a result would not be able to gain full marks.

A typical response which included negative issues tended to focus on the high set-up costs, the lack of employment opportunities or lower paid jobs or the inability of the process to respond quickly to changes in demand.

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Examiner Tip

When a question asks for an evaluation, it is important that both points for and against are considered. Failure to consider both sides of the evaluation will result in candidates not achieving full marks.

Question 6 (c)

This question allows the opportunity for candidates to describe the process of flexography using annotated sketches.

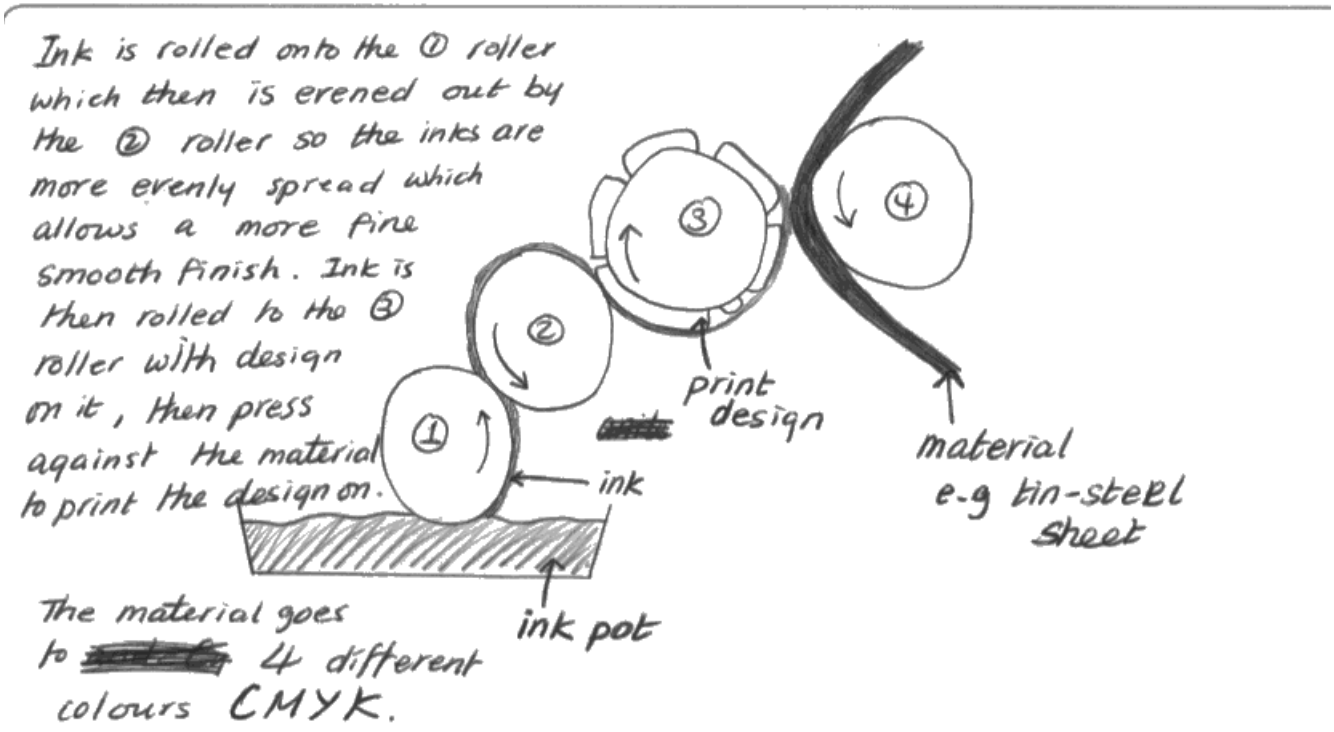
It provides the opportunity for candidates to show they have a sound understanding of process and the equipment needed in order to complete the process.

In this case it is a 'describe' question so requires features to be identified and also annotation to provide a basic description of the process.

(c) The graphics on some cans are applied using the flexography printing process.

Using annotated sketches, describe the flexography process.

(5)



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Examiner Comments

On the whole, this was a well answered question. The example response here is similar to most of the higher scoring answers which included the 4 cylinders, ink pan and media in the correct layout. The candidate has described the function of the fountain roller and has shown the plate roller clearly.

Many diagrams were labelled correctly. Some responses included all labels and descriptions of the process.

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Examiner Tip

Where a question asks for an annotated sketch, candidates should ensure that their annotations can clearly explain any aspects of the process which are not explicitly clear from the sketch drawing.

Question 7 (a)

Although this was an 'outline' type question, many students appeared to have very little knowledge on this topic. The answers they offered seemed to be just guess work, with only a minority of candidates stating that the ISO is the body responsible for setting standards. A common misconception was that the ISO performed product testing.

7 (a) Outline the role of the International Standards Organisation (ISO).

(3)

The International Standards organisation, set the standards and regulations that should be applied to different products. Based on the danger of the product, strength ect... These products can be tested and defined by these standards. If something doesn't reach the international standards, it will need to be re-evaluated or re made and won't be allowed to be sold.

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Examiner Comments

As indicated above, the common response from candidates who gained any marks for this question was to indicate that the ISO sets standards. This is exemplified in the answer shown. In order to gain further marks, the candidate could have made reference to national standards being based upon those set by the ISO or that meeting ISO standards ensures technical standards can be met worldwide.

Question 7 (b)

*(b) Total quality management (TQM) can improve the quality of products.

Discuss other ways in which total quality management (TQM) can impact on the design and manufacture of commercial products.

(6)

TQM is very similar to ISO 9000 in the way that it makes sure things (rules) are in place to keep the quality of goods up. It regulates the product from the design stage to the manufacture and provides freqents inspections and gathers data/information to look for impurities/imperfections and improve upon them, so that the end product is not effected. It also monitors the quality of the equipment and machinery to spot any defects such as using UV radiation, a colour difference and laser in order to prevent and fix whatever it is, making sure the production goes smoothly. It will test the product to its specification and make sure it is as it should be as well as keep everything running at top notch. It makes sure the design is done well and will satisfy the consumers needs as well as keeping it practice and cheap yet well made. Every stage is tested. Helps for future.

(Total for Question 7 = 9 marks)

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Examiner Comments

This is a high level response which has been awared the full 6 marks. The candidate has gained marks as follows:

- 1 mark for 'make sure things (rules) are in place'1 mark for 'regulates the product from the design stage to the manufacture'; 1 mark for 'frequent inspections'; 1 mark for 'monitoring equipment'; 1 mark for 'test product against specification'; 1 mark for 'satisfy the customer needs' (increased customer satisfaction)
- The response itself is detailed and logically presented, with some specific quality control checks noted.

ResultsPlus
Examiner Tip

When a question asks for a discussion, it is important that both points for and against are considered. Failure to consider both sides of the discussion may result in full marks not being awarded.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Read questions thoroughly so that you understand the focus of each specific question
- Produce neat and well presented sketches and drawings which make good use of the space available
- Annotate diagrams and sketches with detailed information which adds further depth to the response
- Use the drafting skills which have been developed for internally assessed work to answer questions which involve sketching or drawing
- Remember that an 'explain' question requires a valid point and a relevant (and related) explanation for each valid point made
- Give answers which include only the information which is asked for and not everything you know about the subject.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

Llywodraeth Cynulliad Cymru
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