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Exemplification Booklet

June 2009

GCE

GCE Design and Technology:
Product Design: Graphic Products 6GR02

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Product Design: Graphic Products 6GR02***

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Introduction

Summer 2009 saw the first sitting of some AS units of the new GCE2008 specifications. As support for teachers, this booklet has been prepared as an exemplification of how marks were awarded to the written paper for GCE Design and Technology: Product Design: Graphic Products 6GR02 during the Summer 2009 examination. It features work produced by the candidates in the actual examination. It contains the questions and mark schemes, together with examples of student answers. It gives the marks awarded for each exemplar response plus commentary by senior examiners. It does not include exemplars for every question on the paper, but only those where contrasting levels of response could be produced.

Question 1(b)

(b) Describe **two** Health and Safety issues that must be considered when working on a computer.

(4)

1(b)

- Seating position (1) so that the spine is not put in a position that will cause back problems. / muscle tension(1)
- Glare from the computer screen (1) causing eye strain / headaches. (1)
- Repetitive strain injury (RSI) (1) causing strains to the wrist (1)
- Take regular breaks (1) to prevent eye strain/ aches/ RSI (1)

(2 x 1) & (2 x 1)

(4)



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Examiner Tip

For both marks in this type of question a suitable point must be identified clearly and a satisfactory solution offered.

Example 1: 2 marks

(b) Describe **two** Health and Safety issues that must be considered when working on a computer.

(4) 2 Q01b

1 By working on a computer all day especially at night eyes could be damaged from looking at it all day.

2 Computers can make you very tired so lots of breaks are needed.



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Examiner Comments

Although a solution has been implied it has not been clearly stated in the first answer. The second answer identifies a solution but does not identify a clear problem.

Example 2: 4 marks

(b) Describe **two** Health and Safety issues that must be considered when working on a computer.

(4) 4 Q01b

- 1 RSI, repetitive strain injury: This is an issue associated with the position of ~~at~~ the desk, computer, chair and keyboard. To prevent RSI these objects must be positioned in a comfortable layout for the user.
- 2 Damage to the eyes: This is caused from looking at a computer screen for too long. To prevent it regular breaks should be taken, the brightness and contrast settings should be customized for the user and a high quality screen should be used.



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Examiner Comments

Both examples clearly identify a problem and the cause of the problem. This has allowed the candidate to identify realistic solutions.

Question 2(a)

- 2 Once a greeting card design is completed it will be commercially printed.
- (a) Quality control (QC) will be needed to ensure a high quality colour printed image.
- (i) Describe how computers are used to ensure colour consistency in the final print run.

(3)



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Examiner Tip

The question asks how computers are used to ensure colour consistency. To answer this successfully, candidates need to realise that colour bars are needed. They then have to explain how the computer achieves colour consistency. Candidates need to ensure that they write at least as many valid points as there are marks for the question.

- (ii) State and describe **two** further methods of quality control used in high volume printing.

(6)



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Examiner Tip

The important words in this part are “two further methods”. Many candidates did not read the question fully and repeated the answer they gave in 2a.

Question Number	Answer	Mark
2(a)(i)	<p><i>A response that identifies any three of the following marking points.</i></p> <ul style="list-style-type: none"> • Optical scanners / sensors linked to computers (1) • They check the colour is correct (1) • If the colour falls out of specification (1) • Computers automatically adjust the colour (1) • Densitometer (1) • Reads colour bar (1) • To check the colour density is consistent (1) <p style="text-align: right;">(3 x 1)</p>	(3)
2(a)(ii)	<p>Registration marks (1)</p> <ul style="list-style-type: none"> • Used to line up the colours (1) / from the colour bar exactly (1) • Used to line up colours (1) to avoid hickies / blurring / bad register (1) <p>Grey scale (1)</p> <ul style="list-style-type: none"> • Similar to colour bar but checks shades of grey (1) / from black (at the weakest intensity) to white (at the strongest) (1) • Used to line up image (1) to avoid hickies / bad registration / blurring (1) <i>(do not award if stated in Reg marks)</i> <p>Crop marks (1)</p> <ul style="list-style-type: none"> • To show where the pages should be trimmed (1) / or to show where part of a picture is to be cut or positioned on printed matter / to avoid misalignment when cutting(1) <p>Visual checks / sample testing (1)</p> <ul style="list-style-type: none"> • Printer expertise (1) / to check overall quality (1)/ visually (1) <p style="text-align: right;">(3 x 1) & (3 x 1)</p>	(6)

Example 1: 3 marks + 3 marks

2 Once a greeting card design is completed it will be commercially printed.

(a) Quality control (QC) will be needed to ensure a high quality colour printed image.

(i) Describe how computers are used to ensure colour consistency in the final print run.

(3)

One of the methods used is the colour bars which are printed on the edges of sheets of paper. These colour bars allow ^{computer} scanners to ~~check~~ ^{assess} the density of ink on a page (densitometre) which ensures that colours are of the right consistency. This test also allows scanners to monitor the consistency of colour over multiple sheets to prevent against ink ^{loss}.



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Examiner Tip

This candidate gained full marks by identifying the need to scan colour bars using a densitometer and that it checks that the colour is correct.

It could also be said that the densitometer can adjust to the colour.

Both methods need to be identified.

For this section the correct identification of a method gets 1 mark, 2 further marks for 2 valid points describing the identified QC method is required.

(ii) State and describe **two** further methods of quality control used in high volume printing.

(6)

Method 1

Registration marks 

Description

used to ensure that the four colours (CYMB) cyan, yellow, magenta, black have printed squarely on the page and that blurring hasn't occurred as a result

Method 2

Colour Bars 

Description

these are printed to ensure colour consistency is maintained throughout the printing process. It does this by showing areas where colour is lacking and also by taking densitometric readings of when the bar is scanned by a computer.



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Examiner Comments

"Registration marks" is correctly identified and satisfactory description given so full marks awarded.

Method 2 not accepted as this was the answer to 2a (i) and not a further method. It could not be accepted.

Example 2: 2 marks + 4 marks

- 2 Once a greeting card design is completed it will be commercially printed.
- (a) Quality control (QC) will be needed to ensure a high quality colour printed image.
- (i) Describe how computers are used to ensure colour consistency in the final print run.

(3)

Computers are used to ~~apply~~ control the density of the ink and colour consistency using a densitometer. These accurately measure the grade of colour and can do so more precisely than human methods.



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Examiner Comments

All 3 answers given in this question failed to gain full marks
The wording in (i) fails to identify that the densitometer can adjust the colour.

- (ii) State and describe **two** further methods of quality control used in high volume printing.

(6)

Method 1

Registration marks

Description

These are used to ensure the ~~pur~~ colour separation plates are correctly aligned to get neat edges and ensure colours overlap in the correct places.

Method 2

Crop marks

Description

Crop marks are also printed on the pages so precise sizes of the pages are known, ensuring all pages are cut to identical size ~~to~~ everytime to produce a high quality product.



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Examiner Comments

- (ii) Method 1 fails to give second point i.e. blurring.
(ii) Method 2 identifies pages identical sizes but does not give a second point.

Question 2(b)(i)

(b) The gravure printing process is to be used for the commercial printing of a greeting card.

(i) Explain **two** benefits of using this printing process.

(4)

2(b)(i)	<ul style="list-style-type: none"> • It gives consistent colour (1) helped by the ink drying on evaporation. (1) • Allows high speed printing (1) and is good for long print runs (1) • Good results on cheap paper (1) and gives / cost effective high quality print (1) • A range of colours can be used (1) using different plates. (1) • Can print on wide rollers (1) for specialised applications e.g. vinyl flooring (1) <p><i>NB Gravure expensive to set up.</i></p> <p style="text-align: right;">(2 x 1)&(2 x 1)</p>	(4)
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Examiner Tip

When the word "explain" appears in a question examiners are looking for a valid point stated and a justification of this valid point.

Example 1: 3 marks

(b) The gravure printing process is to be used for the commercial printing of a greeting card.

(i) Explain **two** benefits of using this printing process.

(4)

- 1 It produces a high quality printed finish with a high amount of image detail (costly but very effective)
- 2 It can print onto large sheets such as posters because the width of rollers are larger than those used in offset lithography and other printing processes



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Examiner Comments

The "high quality print" has been linked to "costly".
The second benefit of printing on large sheets has nothing linked to it that develops the point.

Example 2: 1 mark

(b) The gravure printing process is to be used for the commercial printing of a greeting card.

(i) Explain **two** benefits of using this printing process.

(4)

- 1 It creates a high quality of finish because it is going straight on to the paper instead of onto a second rubber roller where there is the chance of smudging.
- 2 ~~it is~~ more higher quality equipment so there is a more precise level of detail.



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Examiner Comments

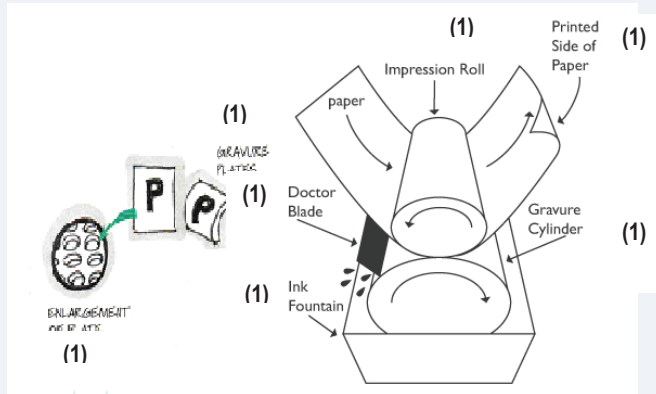
The "high quality print" is not linked to a valid development.
The second benefit statement is too vague and not developed.

Question 2(b)(ii)

(ii) Using annotated sketches, describe the gravure printing process.

(4)

2(b)(ii)



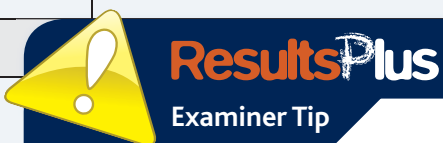
If no sketch then a max of 3 marks

A response that identifies any four of the following marking points.

- Ferric chloride used for etching. (1)
- Images etched onto a plate / cylinder. (1)
- Image is broken into dots. (1)
- Ink fills the dots. (1)
- Excess ink is removed, (1)
- Using a “doctor” blade. (1)
- Rubber covered cylinders press paper into the cell holes. (1)
- The deeper the holes the darker the image. (1)
- Copper electroplated on to solid steel cylinder. (1)
- Steel cylinder may be chrome plated. (1)
- Different plates for different colours (1)
- Paper goes through a dryer after painting (1)

(4)

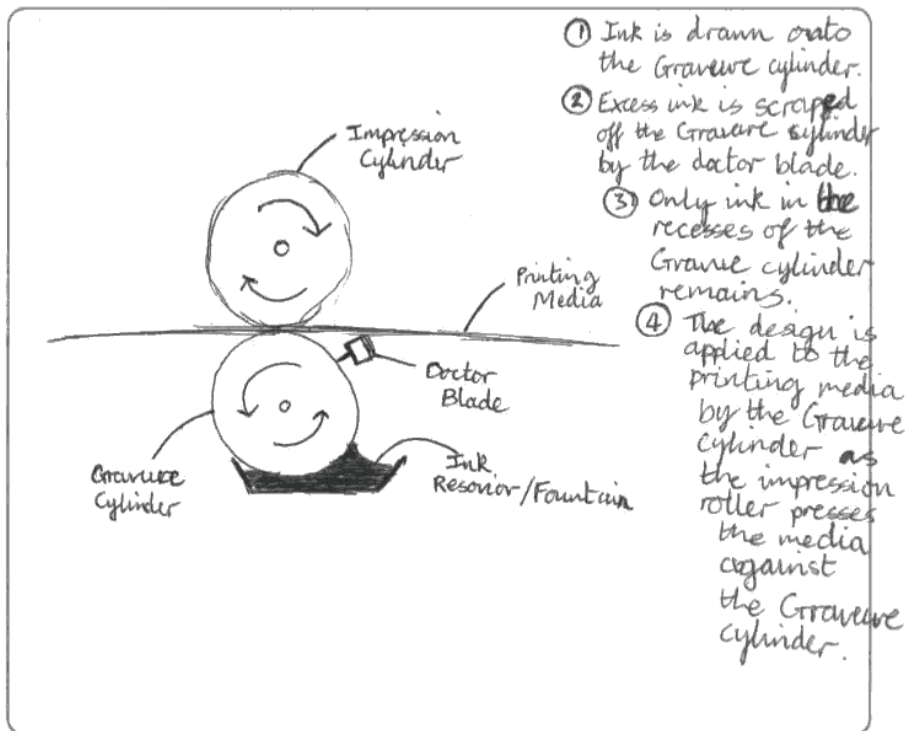
(4 x 1)



When asked to give annotated sketches candidates must make sure that the lines are darkened so that they can be picked up when put through the scanner.
If there is either no sketch or no annotation there will be a limit and reduced mark.

Example 1: 2 marks

(ii) Using annotated sketches, describe the gravure printing process. (4)



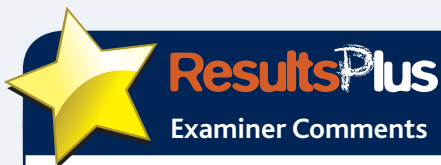
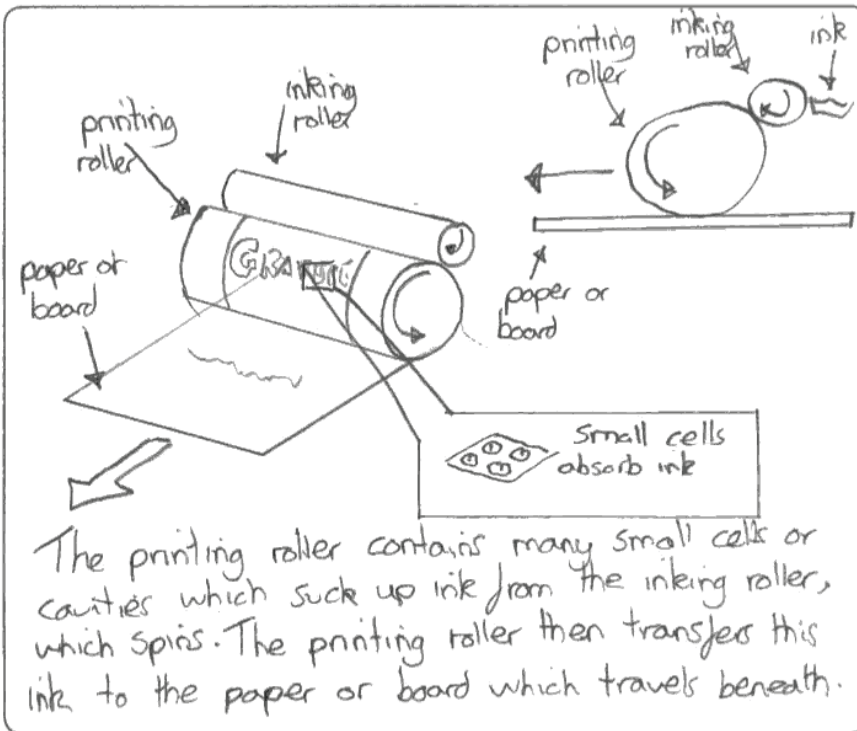
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Examiner Comments

The sketch shows a mix of both off set lithography and gravure processes. It deals with plate production hence marks were given for this.

Example 2: 4 marks

(ii) Using annotated sketches, describe the gravure printing process. (4)



This can be answered in many ways. The sketch and annotations give all the information on printing but leave the preparation of plates out. However the mark scheme allows for this.

Question 3(b)

(b) To show the internal details of the house, a virtual model has been generated on a computer.

Discuss the benefits of this method of modelling.

(5)

3(b)	<p><i>A response that identifies any five of the following marking points.</i></p> <ul style="list-style-type: none"> • Useful method for visualising the design in 3D. (1) • Different materials / colour schemes can be readily shown. (1) • Different times of the year / day / weather and sun positions can be shown. (1) • Wide variety of viewing angles can be shown. (1) • Clients can walk around / through building (virtually). (1) • Ready access to data from other programs. (1) • Time / cost savings involved as physical models do not have to be made. (1) • Changes can be made quickly without having to start again. (1) • Designs can be sent. (1) • Areas/ dimensions can be shown/ calculated (1) 	(5)
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Examiner Tip

When the word "discuss" appears in a question the answer requires a more detailed response. A number of key points (possible advantages and disadvantages) should be given in the answer. One word or simple phrase statements are not acceptable in a discuss type question

Example 1: 5 marks

(b) To show the internal details of the house, a virtual model has been generated on a computer.

Discuss the benefits of this method of modelling.

(5)

Virtual modelling ^{allows} the client to visual the house better as with many software packaging today there is an option to 'go on virtual ^{tour}' of the product. In addition, virtual modelling allow ~~you~~ the designer to make quick alteration to the design without having to start again as with some software you are able to change any given dimension so that any corresponding part changes in relation to it. Furthermore, it can be seen as less time consuming as before the introduction of CAD and virtual modelling drawing up internal details required highly skilled designers and could be very costly. Also, ~~there is a~~ ^{it allows} ~~method~~ for correction to be made early on in the design process. ~~Furthermore~~ ^{Moreover}, ~~it can be used for~~ ~~great~~ ~~and~~ the design can be visually assessed by the client in way that is not possible by using hand / 2D sketches and designs.



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Examiner Comments

This answer gives five clear key benefits that have been discussed in some detail, clearly and succinctly.

Example 2: 3 marks

(b) To show the internal details of the house, a virtual model has been generated on a computer.

Discuss the benefits of this method of modelling.

(5)

Using a virtual model rather than a real model means time is saved as it is much simpler and quicker, with the right trained ^{designer} ~~person~~, to produce a virtual model on computer. It also means that if there are ^{any features} ~~any things~~ that the client dislikes they can easily be changed. If the client lived far away, it is easy for the designer to e-mail the model to them rather than taking a real model with risk of it breaking. Lastly, it saves on costs - no materials are needed to produce a real life model, all that is ^{needed} ~~needed~~ is a single computer programme.



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Examiner Comments

There are some good benefits discussed but it is not well presented. It has assumed points with no or little detail. There are also some points made that repeat themselves in essence.

In this type of question candidates often repeat statements in slightly different forms which they cannot be awarded for.

The other error is that candidates tend to ramble in their answer.

Question 3(c)

(c) Figure 2 shows two orthographic views of a house.

From the orthographic views, produce a pictorial illustration of the house looking in the direction of the arrow shown.

Draw your response in the box on the facing page.

(6)

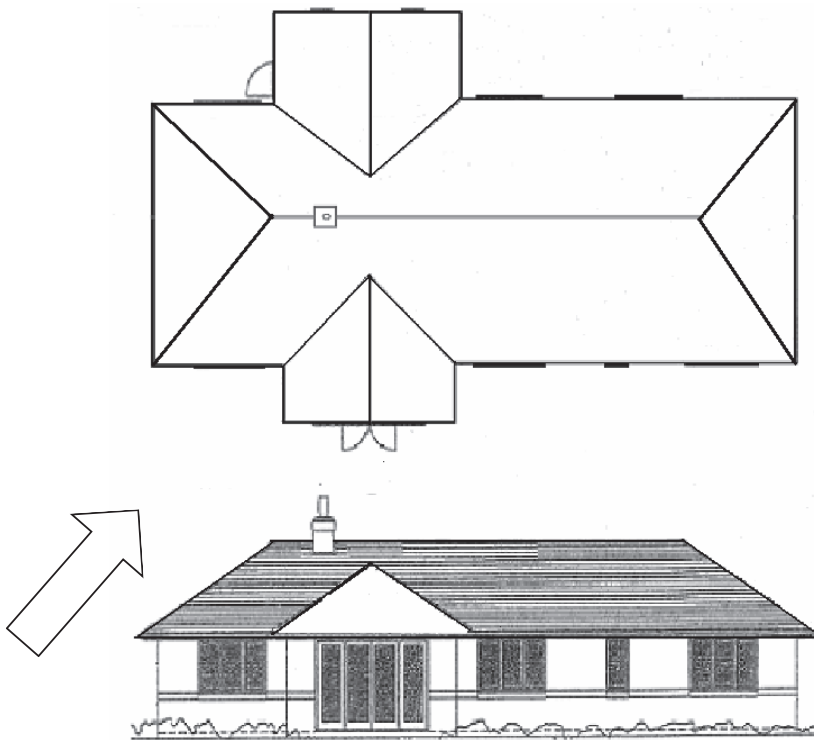
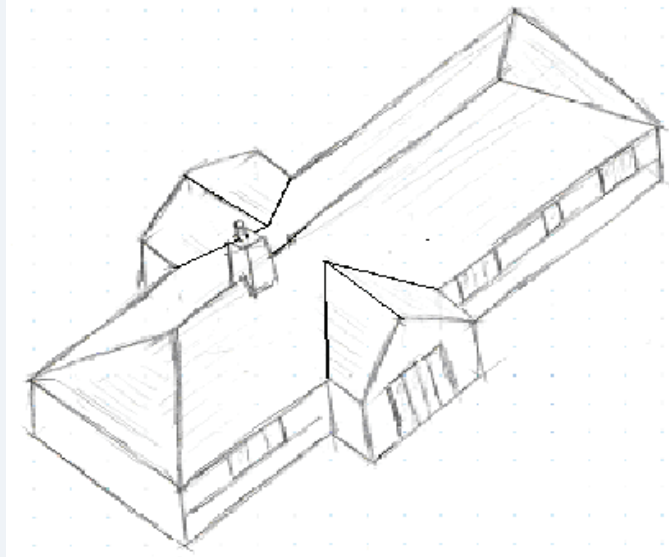


Figure 2

3(c)



- Drawn in direction of arrow (1)
- 3D pictorial drawing of a house. (1)
- 3D pictorial drawing showing 75% of the outline of house. (1)
- Drawn to reasonable proportions /scale. (1)
- Roof drawn with sloping ends as shown in sketch. (1)
- Valleys shown on roof at intersections (must be sloping / angled). (1)
- Correctly drawn windows / doors / chimney (1)

(6 x 1)

(6)

Total for question

15

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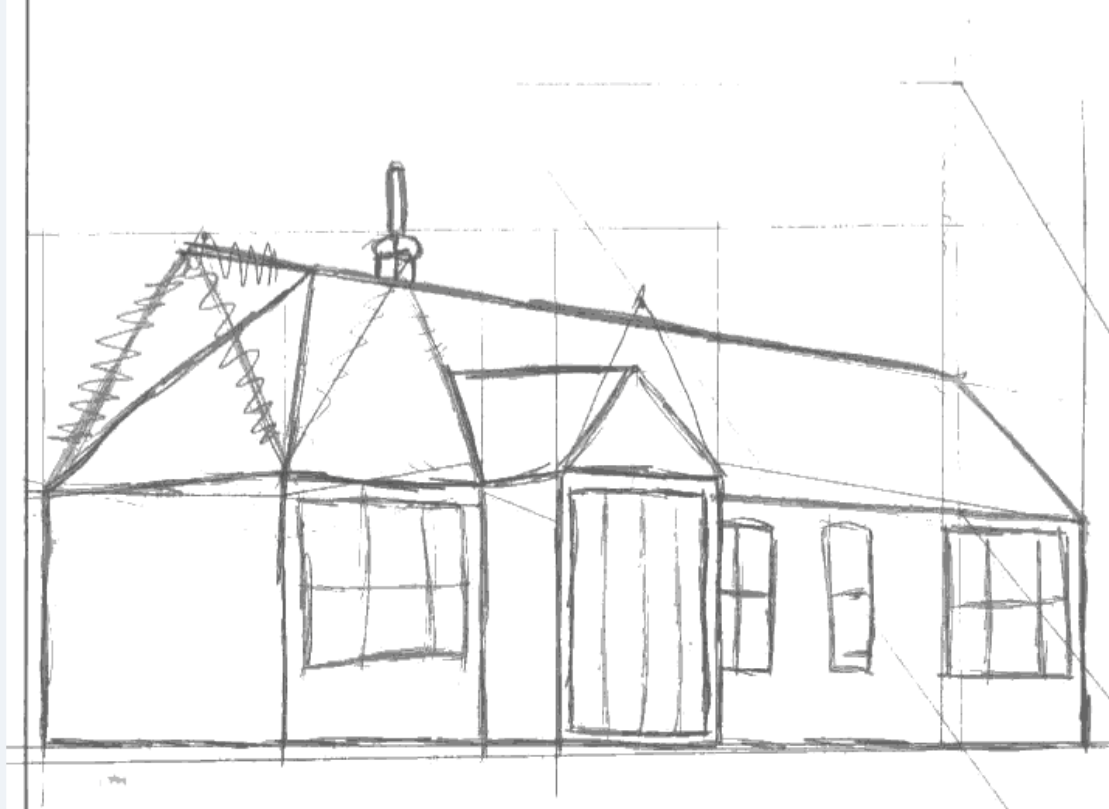
Examiner Tip

The question asks for a "pictorial sketch". Consequently it is not necessary to construct a drawing when all that is needed is a freehand sketch.
As noted earlier candidates should ensure that the finished answer is clearly lined in.

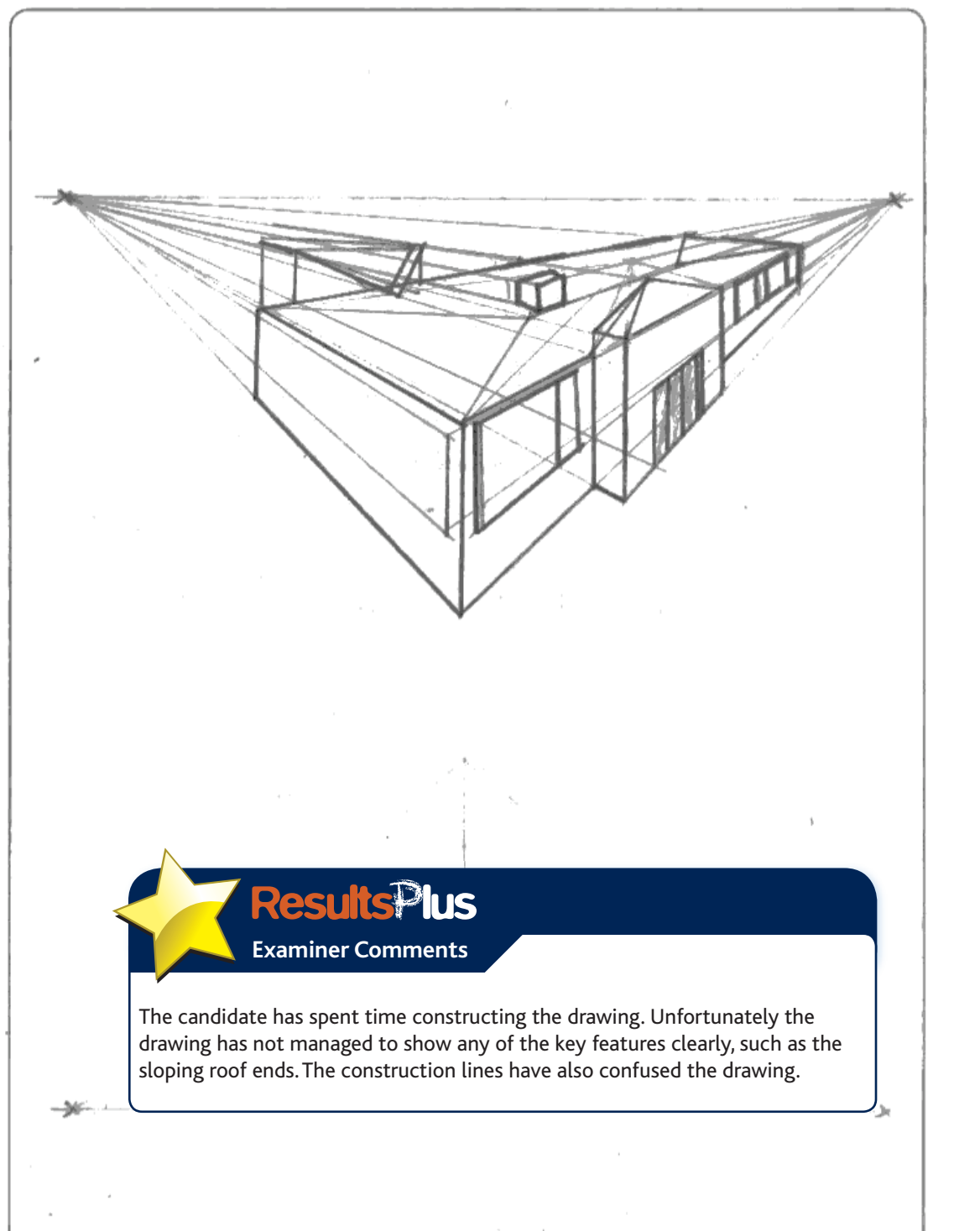
Example 1: 6 marks



The candidate has looked at the question and identified the key points that would be needed to produce a good pictorial drawing clearly including these points.



Example 1: 4 marks



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Examiner Comments

The candidate has spent time constructing the drawing. Unfortunately the drawing has not managed to show any of the key features clearly, such as the sloping roof ends. The construction lines have also confused the drawing.

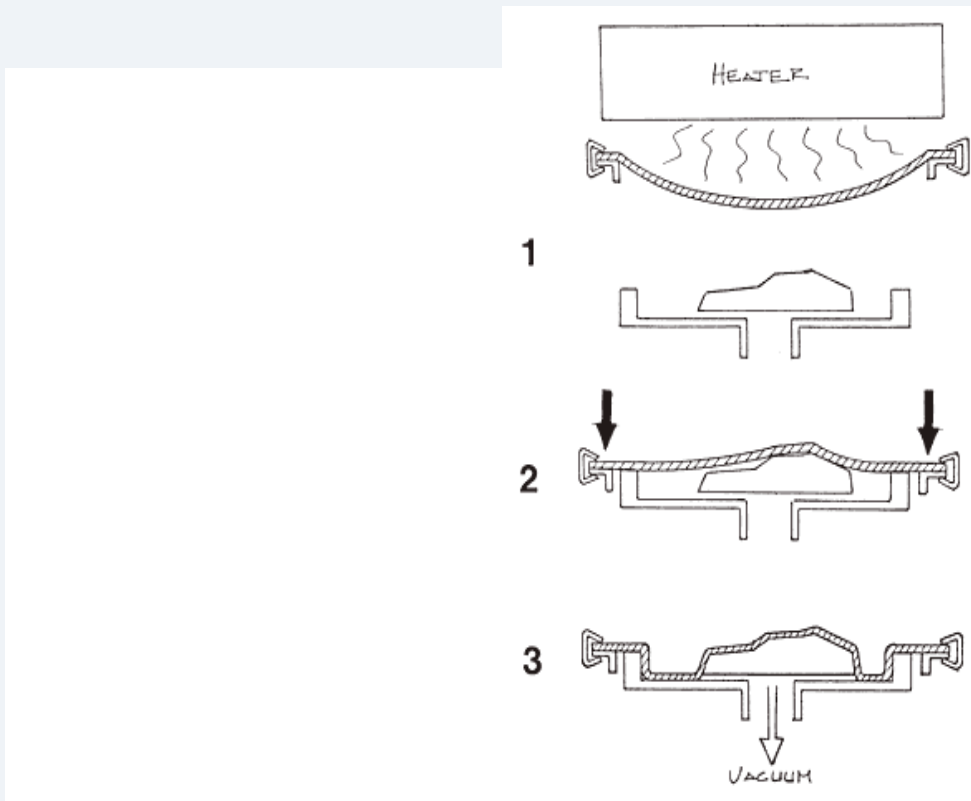
Question 4(a) (ii)

(ii) Using annotated sketches, describe the stages in vacuum forming the polymer blister.

(5)

4(a)(ii)

If no sketch then maximum of 4 marks



If no sketch then maximum 4 marks.

- Make former/ mould (1)
- Former/ put mould in position. (1)
- Polymer / plastic sheet is clamped / secured in position. (1)
- Sheet heated (1)
- Platform raised (1)
- Air sucked out (1)
- polymer/ plastic forms over former/ mould (1)
- Cold air pumped up to release polymer from former/ mould (1)
- Unclamp & release from former/ mould (1)

(5 x 1)

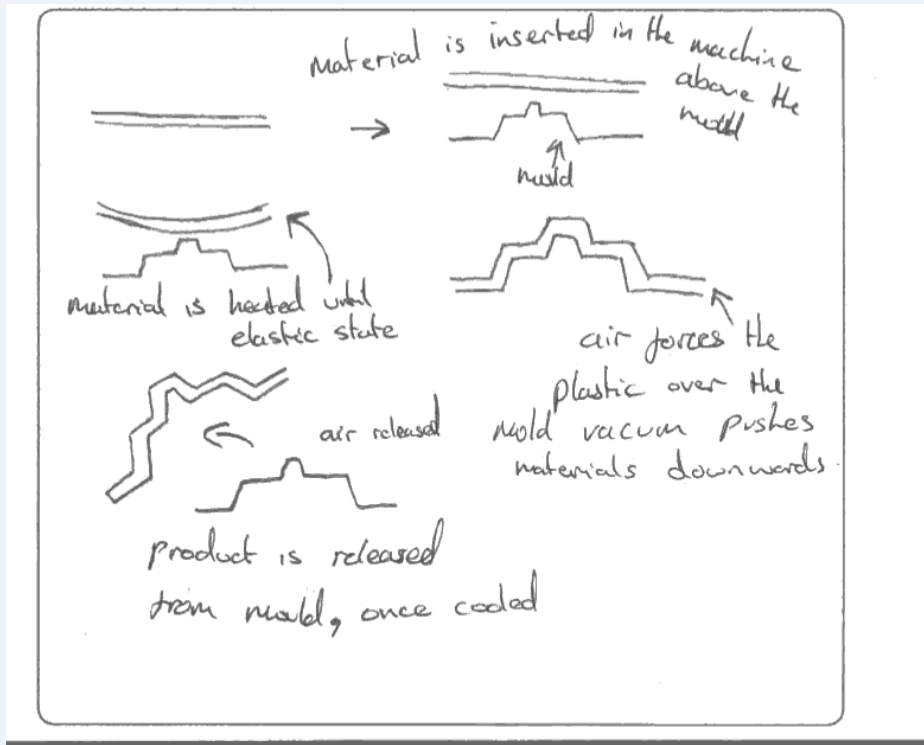


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Examiner Tip

When asked to describe with annotated sketches the stages in a process it is usually better to offer a series of sketches and notes covering each point.

Example 1: 5 marks

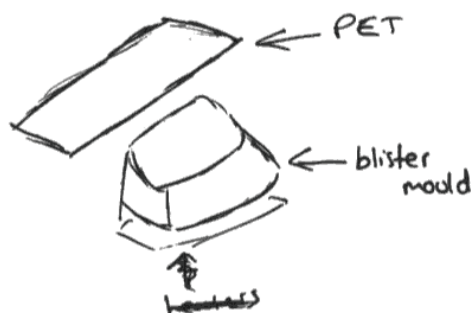


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Examiner Comments

This candidate has covered all the major points concerned with vacuum forming. The series of sketches and associated annotation are very clear and shows all the steps.

Example 2: 2 marks



1. Plastic is heated up
2. it is then pushed on to the mould and cooled
3. The mould breaks and the polymer is released.

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Examiner Comments

This response shows how a single annotated sketch limits the candidate's response. The sketch gives little information on the process, being very vague. The candidates must convince the examiner that they have a sound knowledge of the topic. This shows only a passing knowledge. The single sketch limits how much information can be given.

Question 4c

(c) Carton board is to be used for the backing card.

Outline the benefits of using carton board for this purpose.

(5)

4(c)	<p><i>A response that identifies any five of the following marking points. A single word / phrase not enough for an outline question.</i></p> <ul style="list-style-type: none"> • Allows total graphic coverage. (1) • Allows outstanding print quality / good surface to print on. (1) • Strong / durable / rigid material for packaging. (1) • Can be recycled / comes from a sustainable source. (1) • Relatively inexpensive / cost effective. (1) • Easy to die cut / cut / fold. (1) • Not easily damaged / protects the product. (1) • Blister pack easily attached to it / takes adhesive readily. (1) • Comes in a variety of thicknesses. (1) • Range of surface finishes can be applied e.g. varnish. (1) • Readily available material. (1) • Can make the product more eye-catching/ marketable (1) • Adds little weight to the product (1) <p style="text-align: right;">(5 x 1)</p>	(5)
Total for question		14



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Examiner Tip

For this type of question asking the candidates to "outline" a single word or short phrase is not enough to gain marks. The word / phrase need some sort of explanation / development.

Example 1: 5 marks

(c) Carton board is to be used for the backing card.

Outline the benefits of using carton board for this purpose.

(5)

Cartonboard ~~is~~ can be printed on to display various important information about product and company. It is ~~also~~ quite inexpensive, especially when purchased in bulk. Cartonboard is also recyclable after use. Another advantage of using cartonboard is that it is made in many different thicknesses, colours and finishes, it is also easy to apply a finish to give it a high-quality appearance. Rigidity is another important property so that it remains in the same state throughout transport and display on the shelf at ~~retailers~~ retailers.

(Total for Question 4 = 14 marks)



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Examiner Comments

Some points are weakly backed up, for example "recyclable after use". Other points fully backed up "quite inexpensive especially when purchased in bulk". Many candidates will write "cheap" alone. Cheap compared to what? The same can be said of the phrase "quite inexpensive". Statements such as these require some form of clarification.

Example 2: 5 marks

(c) Carton board is to be used for the backing card.

Outline the benefits of using carton board for this purpose.

(5)

It is available in many colour for ^{aesthetic} aesthetic reasons. It's structural properties are sufficient enough. ~~It~~ It is easily available, it can come in a range of different thickness and textured finishes for aesthetic reasons. It ~~be~~ can be recycled again and again. Under normal use pressure it will not bend. It is cost effective when compared to alternatives such as woods as it costs less. Carton board is easily malleable and can be cut to shape easily. A variety of finishes and texture can be applied to improve its aesthetic appeal e.g. printed.

(Total for Question 4 = 14 marks)



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Examiner Comments

What does "easily available" actually mean? The same is to be said about "cut to shape easily". Some well developed points but others need more clarification.

Question 5a

5 Figure 4 shows a hot drinks cup made from expanded polystyrene (PS).



Figure 4

(a) Describe **three** properties of expanded polystyrene (PS) that make it suitable to be used for a hot drinks cup.

(6)

Question Number	Answer	Mark
5(a)	<ul style="list-style-type: none"> • Has good insulating properties (1) which means it will keep the liquid hot / heat resistant. (1) • Heat will not pass through the walls (1) to make it uncomfortable to hold. (1) • Suitable for injection moulding (1) which means it can be mass / continuously produced. (1) • It is lightweight (1) so not uncomfortable to hold. (1) • Has low water absorption / waterproof / does not leak(1) so liquid does not seep through the walls. (1) • Retains structure / shape (1) when hot water liquid is poured into it. (1) • Non toxic (1) hence safe to use for this purpose. (1) • Does not react with the drink (1) so does not spoil the taste. (1) • Can be recycled (1) but is expensive to do so (1) <p style="text-align: right;">(2 x 1) (2 x 1) & (2 x 1)</p>	(6)

Example 1: 6 marks

(a) Describe **three** properties of expanded polystyrene (PS) that make it suitable to be used for a hot drinks cup.

(6)

- 1 light weight . It has easily be picked up even with liquid instead and is easily transportable because of its shape and weight
- 2 water proof , ~~from~~ its contents will not leak from it and will not be contaminated as easily.
- 3 it is sufficiently heat resistance , the user will not burn their hands if there is very hot fluid inside . and the hot liquid will not melt the cup.



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Examiner Comments

Three very good answers that identify a property and then explain why that property makes expanded polystyrene suitable for use.
Presented in an easy to read style.

Example 2: 4 marks

(a) Describe **three** properties of expanded polystyrene (PS) that make it suitable to be used for a hot drinks cup.

(6)

- 1 The boards ~~not~~ which make polystyrene are strong enough to keep in any water put in it.
- 2 Polystyrene insulates heat so that when you put in hot water or a hot drink, it won't burn your hands.
- 3 Polystyrene ^{cups} can be used ~~for many different purposes~~ ~~as easily~~ for mass production and because of this are cheap and easy to buy.



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Examiner Comments

The second point shows a good answer. Points one and three fail to. This shows both an acceptable answer and those that actually fail to give a property but have given acceptable reasons why the material can be used, hence gaining one mark of the two available.

Question 5b

Figure 5 shows an aluminium pavement sign.

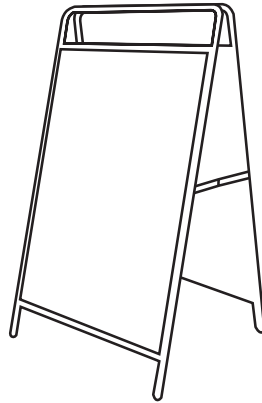


Figure 5

(b) Evaluate the use of aluminium in the construction of this pavement sign in preference to other materials.

(6)

<p>5(b)</p>	<p><i>A response that identifies any six of the following marking points.</i></p> <p>What makes it suitable & also unsuitable; there must be points for and against. Max 5 marks if only one side of discussion put forward.</p> <p>For</p> <ul style="list-style-type: none"> • Takes a variety of finishes / paint / anodising. (1) • It is a flexible material. (1) • It can be printed on. (1) • It can be recycled. (1) • It is a lightweight material that can be easily moved.(1) • It does not rust.(1) • It is durable / good strength to weight ratio / sturdy. (1) • Robust to withstand conditions used in/ Fitness for purpose (1) <p>Against</p> <ul style="list-style-type: none"> • It can easily be blown over in a high wind / may lack stability. (1) • Not as sturdy as steel. (1) • More expensive than steel. (1) • Not easily welded. (1) • Easily damaged (1) 	<p>(6x1) (6)</p>
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Examiner Tip

An "evaluation" type question requires a discussion giving both advantages and disadvantages.

Failing to give both sides of the argument will mean that the candidate cannot gain full marks for the question.

An evaluation question usually occurs towards the end of the paper.

Statements made in this question should have both a point made and some development presented in a cohesive style.

Examiners are usually looking to award one mark per valid point made in detail.

Example 1: 5 marks

preference to other materials.

(6)

Once aluminium is produced, it coats itself in an oxide layer which means it resists weather and ~~erosion~~ corrosion. It is also a very lightweight material, important for ~~moving~~ ^{moving} the sign around by hand. Whilst being light, it is also strong and will not suffer any deformation unless ~~extreme~~ ^{extreme} force is applied. It is also a ~~reliable~~ ^{it} relatively inexpensive material and is easy to mould and shape in production. After use, aluminium is easy to recycle and ~~thus~~ ^{thus} re-use. With aluminium, it is also easy to alloy it with other materials, should it need different properties from ~~those~~ ^{those} it already bears. Other materials such as stainless steel are much more difficult to work in production and lack the lightweight advantage that aluminium ~~has~~ has. Duralumin is a very strong material but also heavy and this requires four ~~seper~~ separate elements which ~~means~~ means it would be expensive to produce. Tin ~~is~~ ^{is} very light but not ~~very very~~ very strong without being alloyed with other materials. Aluminium with its strength to weight ratio and more inexpensive production would therefore



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Examiner Comments

A common error in this type of question is that candidates fail to structure their argument.

Because of this they go off at a tangent and write a considerable amount that has nothing to do with the question, thus wasting their time.

With any evaluation question both points for and points against are required. This example has given 6 points for and none against. Hence a maximum of 5 only can be awarded. (See mark scheme note.)

Example 2: 4 marks

The use of aluminium in the sign is good as it has given a sturdy, strong sign. The use of aluminium tubing for the legs & main skeleton was a good idea as aluminium doesn't rust unlike other metals such as iron or steel. This means that the sign will be weather proof throughout the year & not rust. Also by using aluminium it has made the sign light weight so it can be carried in & out of the shop easily. The only place I don't think they should have used aluminium was for the center board in the middle as it could have just been made from two pieces of transparent acrylic plastics so posters/signs could be stuck between the two but by using aluminium I suppose that they have made a strong back board that could have a personal sign painted on it overall I think that aluminium was used well in the sign.

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Examiner Comments

This is another example of a candidate who has identified some key points hidden in with a lot of unnecessary information. More careful planning before starting to answer the question would help focus the candidate's thoughts.

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