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Examiners' Report June 2010

GCE Design and Technology 6GR03 01

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Introduction

Summer 2010 saw the first sitting of the new GCE2008 A2 specification paper for GCE Design and Technology: Product Design: Graphic Products 6GR03. The new specification is a follow on from the legacy specification so the style of the exam should be very familiar.

The paper consists of both questions that require a short, often single word or phrase answer through to questions designed to be answered in depth.

Centres should note that the amount of space provided in the booklet for answers is more than we would expect any answer to take.

The approach to individual questions is considered in the report. Examples of candidates responses in the examination are given for each question.

Examiners continue to report that handwriting is deteriorating to the extent where deciphering it is becoming very difficult.

Question 1a

In any question leading with the word "explain" examiners are looking for an in depth answer that includes both a why and also the because.

So why do designers exclude a percentage of people from their design considerations and then why, or how or because will need to follow the statement to complete the answer.

(a) Explain why designers have to exclude a percentage of a defined user group. (2)

The top and bottom 5% are excluded as these people are most unlike the "average human".



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Examiner Comments

This is a full answer giving both who will be excluded and a reason why. For this answer marks were awarded for "either end of the scale" and the second mark was for "not appropriate to cater for both" = meet everybody's needs



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Examiner Tip

Where the word "describe" appears in the question examiners are looking for a valid point followed by an explanation of why, who or because to complete the answer.

(a) Explain why designers have to exclude a percentage of a defined user group. (2)

There are small groups at either end of the scale, those are smaller and larger people. It would not be appropriate to cater for both.



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Examiner Comments

This answer identifies who is to be excluded, the top and bottom 5% but does not say why. Hence only 1 mark scored. At this level candidates should realise that it is not the average of people but the range.

Question 1b

Some rather vague guesses from candidates who had no knowledge of ergonomics. Of those who did know that it relates to human sizes, about only half mentioned human interaction.

This wasn't as universally well answered as expected. Some did, unfortunately, write about 'designing for the majority'. Most seemed to hover around the mid mark range, 3 or 4. Popular responses were: 'range of shapes / sizes'; 'comfort when in use'; 'related health issues'; 'fitness for purpose'; and 'user friendly / ease of use'.

(b) Discuss why it is beneficial to consumers that designers consider ergonomics during the design process.

(6)

~~Designs products are the same design of a product~~
~~is used~~ To ensure a product fits its purpose, designers must take the human body into account. Measurements are to be recorded and the average found in order for the product to be used by everybody. This is beneficial to consumers as they can buy a product knowing that they will be able to use it and ~~this also~~ ease ~~increase~~ of use is also increased. Safety is also a beneficial factor as products such as cars can become dangerous if the ~~components~~ components are not suitable for every user.



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Examiner Comments

- 1 mark for fits its purpose, line 2.
- 1 mark for ease of use, lines 7/8.
- 1 mark for safety, line 8.



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Examiner Tip

The question asks candidates to "discuss" why. In any question of this type candidates must look at the number of marks that have been awarded, in this case (5). Examiners are looking for 5 points, discussed, not just stated. So for 5 marks there should be 5 points outlined.

(b) Discuss why it is beneficial to consumers that designers consider ergonomics during the design process.

(6)

- so consumers can feel happy and comfortable with the product
- to make sure it is suitable for the specific needs of the consumer.
- to make it look more aesthetically pleasing
- it could make the products more cost effective as less material might be able to be used.
- it could make the product more sustainable in terms of reuse, recover and recycle as it could be reused for something else.
- ~~eg~~ ergonomics give the design a high quality look and finish, which could mean more people will purchase the product



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Examiner Comments

This example had 1 mark awarded for happy and comfortable in the first line. the other points are either repeating the first statement or not valid.



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Examiner Tip

The idea of using bullet points to answer this type of question is sound. It allows the candidate to identify how many points they have made.

Question 1ci

For full marks on this question both form and function must be evaluated.

Question 1cii

Again both form and function must be included in the answer.

The two examples usually are in contrast to each other and as such should help the candidate.

Evaluate how the designer has considered **form** and **function** as part of the design criteria of the Charles Rennie Mackintosh chair in Figure 2.

(4)

This designer has clearly chosen form over function, ergonomics have not been considered as the seat is very low to the ground with a very tall back rest. Comfort was also not important in this design as the seat/back rest are very straight and not moulded to the shape of a human. Form is the main aspect as the design is unique and aesthetically pleasing. Charles Mackintosh is part of the Art Nouveau movement and this is shown in the design, especially the detail added at the top of the back rest, using curly lines.

(Total for Question 1 = 16 marks)



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Examiner Comments

This answer is full and complete identifying four points
 1 mark for identifying comfort was also not important, line 4.
 1 mark for straight back not moulded etc line 5/6.
 1 mark for aesthetically pleasing, line 7.
 1 mark for art nouveau, line 8.



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Examiner Tip

Again both form and function must be included in the answer.

Question 2a

This question was designed to assess candidates knowledge and understanding of the effect of using energy on the atmosphere.

The responses were very mixed. Some responded well and clearly had appropriate knowledge. Others were way off the mark. Popular responses were: 'the amount of CO₂ emitted'; 'impact on the environment'; 'greenhouse gases'; and 'switching lights off'.

(a) Explain what is meant by the term 'carbon footprint'.

(2)

Carbon footprint is the impact that every individual has on the environment, this could include the energy we use, waste or the pollutants that we emit into the air.



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Examiner Comments

A full answer gaining 2 marks clearly identifying what a carbon footprint is and then going on to how to reduce the footprint.



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Examiner Tip

1 mark for on the environment.
1 mark on how to reduce the effects. (On third line.)

Question 2b

This question looked for the advantages and disadvantages of biofuels. Very few candidates achieved full marks, the positives were answered well but the negatives poorly. Most candidates seemed to achieve 2 marks or better.

Popular 'advantage' responses being 'biofuels help the environment'; 'biofuels reduce CO₂ emissions'; and 'biofuels are sustainable / renewable';

Popular 'disadvantage' responses included 'limited energy from biofuels'; 'land used for food lost to biofuel crops'; and 'drop in food production'.

(b) Describe **two** advantages and **two** disadvantages of using biofuels instead of fossil fuels.

(8)

Advantage 1 Fossil fuels could not have to be dug mined from the earth so less damage is done to the environment.

Advantage 2 The plants used to make biofuel absorb carbon dioxide from the air and emit oxygen.

Disadvantage 1 Vast amounts of land are needed to grow the plants for biofuel which could lead to the destruction of countryside areas where there aren't enough farms.

Disadvantage 2 The process to make biofuel conveniently available would include a high set up cost so biofuel would be expensive for the consumer.



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Examiner Comments

This answer achieved 4 marks.

Advantage 1 achieved 2 marks for identifying not having to be mined and then stating less damage to the environment.

Disadvantage 1 achieved 2 marks for the general explanation of land needed and destruction of habitat.

Advantage 2 is more of a disadvantage as the plants would be cut down.

Disadvantage 2, research has not proved this point.



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Examiner Tip

This shows that if a point is made the second mark comes from the expansion of the point.

Question 2c

This question was looking for candidates understanding of world affairs.

Some candidates were able to talk about reducing global warming but this was from the question, they failed to discuss how the Kyoto Protocol has affected the outlook on global warming.

Generally quite well answered, but not a great number seemed to achieve the 4 marks available.

A small minority thought this was an alternative fuel, to replace petrol! A similar minority asserted it was a computer protocol of some kind, too much sci-fi.

Popular responses were: 'many countries agreeing, usually 169'; 'reducing CO2 emissions'; 'setting targets'; 'countries helping one another'; and 'cutting greenhouse gases'.

(c) Describe **two** ways in which the Kyoto Protocol could help reduce global warming.

(4)

- 1 The Kyoto protocol is about reducing the carbon dioxide by 5%, which is a green house gas, so this will help reduce global warming.
- 2 169 countries is a big difference in CO₂ emissions so when we see a difference more countries may join.



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Examiner Comments

This answer gained 2 marks. Only 1 mark awarded for each section.

1 mark awarded for identifying 5% reduction in greenhouse gas emission and 1 mark for identifying 169 countries involved.



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Examiner Tip

Candidates should remember to not only identify the point but also to develop the point with an explanation. It is not enough to just quote the question, in part 1 "help reduce global warming."

(c) Describe **two** ways in which the Kyoto Protocol could help reduce global warming.

(4)

- 1 Each energy supplier are to use at least 10% of recycled energy by 2010 and then ~~to~~ rise it to 15% by 2015, thus being more eco friendly and ~~then~~ having more sustainable energy.
- 2 The use of sustainable energy is increasing. for example, wind turbines, solar cells / photovoltaic cells. these are becoming ~~more~~ more popular when it comes to energy, this will then reduce global warming as they donot create ^{CO₂ emissions}



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Examiner Comments

This answer is far to general and does not identify that the Protocol was responsible.
The answers come from the fist three words of the question.



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Examiner Tip

The answer must respond to the whole question, not part of it. On many occasions this year many answers indicated that candidates had not read the question carefully enough and consequently failed to answer the key points.

Question 2d

This was a well answered question by the majority of candidates. They appeared to have sound knowledge of this topic in the main.

Popular responses were: 'recycled paper has reduced quality / strength'; 'limits on number of recycles'; 'virgin paper needs to be added'; and 'some paper cannot be recycled'.

(d) The ability to recycle materials and products is an aspect of life cycle assessment.

Describe **two** problems associated with recycling paper.

(4)

1 ~~App~~ A problem with recycling paper is that the more and more it gets recycled, the lower the quality of the paper becomes due to the fibres becoming weakened in the process, resulting in paper that can only be used for lower grade goods such as toilet roll.

2 ^{Some} Paper naturally loses its white colour due to sunlight, over time, and as paper goes through the recycling cycle the colour of the paper gets washed out, so bleach is used to whiten the pulp again, then the bleach must be disposed of as it is dangerous to the environment.

(Total for Question 2 = 18 marks)

The majority of candidates' appeared to have sound knowledge of recycling paper.

Popular responses were: 'recycled paper has reduced quality / strength'; 'limits on number of recycles'; 'virgin paper needs to be added'; and 'some paper cannot be recycled'.



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Examiner Comments

This response gained full marks, both answers being full with a point identified and the point then amplified/explained.



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Examiner Tip

Candidates need to be careful not to over explain their answer. The second point is over explained here. Much of the lines 2 and 3 could be left out.

Question 3

This question tested the understanding of blue/green screen technology.

A high proportion candidates showed considerable depth of understanding of this technology, many gaining full marks.

Of those who are familiar with the process, most included “silhouettes created, one black on white background; other white on black background, there are four pieces of film, pieces of film are layered to make a composite.”

Some candidates seemed to think they were answering last years question about CGI and talked about table tennis balls a lot.

A small minority had no in depth knowledge and merely stated that it was a TV / film makers' technique for making 'Avatar', 'Lord of the Rings' and the weather bulletins.

Some thought that a green/blue screen is replaced solely by a projected background, against which actors performed.

*3 Digital special effects are increasingly being used in film making.

Describe the process of using blue/green screen technology in creating digital special effects.

(6)

Blue / green screen is where a ~~background~~ any background can be added to a person acting in the foreground.

It is done by filming an actor who is stood in front of a blue or green background. A composite is then made up of four layers including; a white background with a black silhouette, a black background with a white silhouette, the background footage and then the foreground footage of the actor. The background and black silhouette ^{and} white silhouettes are then put

together with the final layer being the actor which then fits into the silhouettes. This is because the silhouettes allow the ~~fit~~ actor to be placed in the composite better as the background and foreground blend together much easier.

(Total for Question 3 = 6 marks)



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Examiner Comments

This example scored 5 marks as follows
 1 mark for, actor in front of blue/green background, lines 3/4.
 1 mark for, composite, line 4.
 1 mark for, four layers, line 5.
 1 mark for, silhouettes, lines 5-7.
 1 mark for, put together with the final layer.
 It was felt that fitting the actor into the silhouette was not detailed enough, that the word hole in the silhouette was needed.



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Examiner Tip

This could have been answered as a series of bullet points, which may have helped the candidate identify the 6 required points for full marks.

Question 4ai

The three questions in 4a all refer to the control system shown.

(i) Name the type of control system shown in Figure 3.

(1)

A closed-loop system.



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Examiner Comments

Only one answer to this question.



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Examiner Tip

Any question including "name" or "state" only needs a simple word or statement for the answer.

Question 4aii

(ii) State the purpose of box A.

(1)

This is a process or action that needs to take place

A very well answered question by the vast majority. Sound knowledge demonstrated. Most gained the mark. No problems.

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Examiner Comments

Several answers accepted for this question.
Refer to the mark scheme.

Question 4aiii

(iii) Explain the purpose of box B.

(2)

Box B is known as a process box, this is basically the box that checks to see if there are any flaws or mistakes within the subchart, usually if they are, Box B will go back to the previous box to try and rework whereas if there aren't any problems the box will carry on to the next one.

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Examiner Comments

Candidates showed a good knowledge overall. A minority only achieved one mark. Popular responses were: 'quality control'; 'if not return to previous box'; and 'to monitor the process'.

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Examiner Tip

The reason for candidates only achieving 1 mark for this question would be that only one aspect of the answer was given. For example, stating that it was quality control but not discussing what would happen from this.

Question 4b

Candidates showed varying degrees of understanding of Artificial Intelligence. The majority achieved 2 or 3 marks, so good overall. A minority wrote about the related feature film, AI, but tended to be descriptive of the film, including no mark worthy statements. Popular responses were: 'learns / adapts'; 'makes decisions'; 'expert systems'; 'think for themselves'; and 'act like humans'. conveyor belt manufacturing systems.

(b) Explain what is meant by the term 'artificial intelligence'.

(3)

Artificial intelligence is a point when a computer begins to learn and adapt on its own without any input from a human operator. There is a more advanced level of AI which is said to be when a computer achieves sentience and free thinking. Most computers now have some degree of AI now such as the ASIMO robot which can walk and climb stairs without human assistance.



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Examiner Comments

This example gained full marks awarded as shown below:
1 mark for learn and adapt, line 2.
1 mark for free thinking, line 5.
1 mark for climbs stairs without human assistance, line 7.



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Examiner Tip

Candidates should avoid writing beyond the space allocated in the question paper. Examiners only see clipped sections, not the whole paper. If the answer is completed outside the area allocated it may not be noted by the examiner and consequently that part may not be marked.

Question 4c

There were some confident responses to this question clearly demonstrating appropriate knowledge of computer-aided quality control, Most candidates achieved 3 or 4 marks.

Popular responses were: 'all products checked'; 'efficient'; 'quicker than humans'; 'removes human error'; and 'can work 24 / 7 - doesn't get tired'.

There were a number of poorly constructed responses, particularly from candidates who had a weak grasp of this topic. Some thought that CAQ aided the design process.

There were many 'catchall / stock' answers such as 'faster', 'more accurate' without comparing with human performance, thus gaining no mark.

Very few mentioned that CAQ could check several aspects simultaneously.

(c) Discuss the benefits of using computer-aided quality (CAQ) in the manufacturing process.

- Can be more accurate than a human.
 - Can check more than one product at once.
 - Can be integrated into a production line.
- Products are less likely to have defects.
- Company less likely to get sued (5) over defects as machines are so accurate.

Computer aided quality allows a mechanised system to check to see if any objects/products on the line have defects. The benefits of using (CAQ) are that it is more accurate than a human checking and can compare a 3D image of the product. Also it can scan many products at one time making it highly efficient and quicker than a human which means that it has better productivity. The (CAQ) can be assembled into a FML line and check the products before they get distributed. ~~Due~~ Due to (CAQ) the company will have better quality products as the defects are won't make it past the check.



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Examiner Comments

Many candidates identified that CAQ was more accurate than humans. This is not the case as humans can be as accurate.

This example scored 3 marks as follows:

1 mark for, scanned many products at one time, line 5.

1 mark for, highly efficient, line 5.

1 mark for, quicker than a human, line 6.



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Examiner Tip

This style of question often elicits stock responses such as 'faster', 'more accurate' without comparing with the statement with a datum, in this case humans.

At this level examiners expect a response to be related to a datum. If this does not appear then no marks will be awarded.

Question 4d

There were very few candidates achieving the maximum marks for this question on quick response manufacturing.

However, a high proportion had sound knowledge of the topic, many scoring 4 marks.

Unfortunately there were quite a few zero marks awarded to candidates who either knew nothing of the topic or misread the question.

Popular responses were: 'JIT - reduced storage'; responds to demand / pull system - producing when needed not ahead of time'; and 'flow - not batch or mass production'.

Some responses were ambiguous and, where unclear, did not receive a mark.

(d) Describe **three** characteristics of quick response manufacturing (QRM).

(6)

- 1 Allows products to be manufactured when there is a market demand rather than manufacturing for expected demand for products.
- 2 Very small amounts of products are stocked, with raw materials coming in when needed, this results in no money used to pay for storage.
- 3 Products can be manufactured very quickly with all the focuss on one product. This allows it to be on the market quicker increasing a companies market share.

(Total for Question 4 = 18 marks)



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Examiner Comments

This example scored 5 marks, the marks awarded as follows.

Part 1, achieved 2 marks by identifying manufacture from demand rather than expected demand.

Part 2, Little storage space needed saving money. JIT implied, not stated, but mark given.

Part 3, 1 mark for identifying quicker to market only.

Question 5a

This was a well answered question with many sound responses, giving a range of both advantages and disadvantages.

However, many thought that email is completely free, failing to realise that someone has to pay the line rental etc.

Popular responses were: 'paperless'; 'attachments'; 'saved / edited / stored'; 'instantly sent / received'; 'convenient / easy communication method'; 'privacy issues / hacking'; 'viruses'; 'spam'; 'limits on size of attachments'; 'impersonal'; and 'no face to face contact'.

*5 (a) Evaluate the use of e-mail as a means of communication between manufacturers and retailers.

(6)

Advantages of email - ~~email~~ email is really easy to use and files can be transferred electronically, and it's inexpensive as well as being a popular and convenient way to communicate.

Disadvantages - limited file sizes can be sent. Privacy issues you don't know whose reading it, could take a long time to open and they could be misinterpreted. Email based on the advantages and disadvantages above is much more suited to normal internet users or perhaps small scale businesses. This is because it would be too risky and inefficient for it to be used between manufacturers and retailers. For example you would expect lots of financial information to be shared which you wouldn't want to ~~be private~~ ^{be private} and important business decisions to be made which you couldn't ~~misinterpret~~ ^{misinterpret} being misinterpreted. Also going back to file size



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Examiner Comments

This example achieved 5 marks.
1 mark line 2/3 for files attached electronically.
1 mark line 5 for file size limitations.
1 mark line 6 for identifying privacy issues.
1 mark line 8 for misinterpreting information.
There are 2 arks in the last two sentences for efficient and paperless society.



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Examiner Tip

When a question asks for an evaluation of something there must be both points in favour and points against the topic.
Again this question may be better approached using bullet points provided they are not just simple one word responses. They must be statements.

You are ~~also~~ too limited to the amount you can send which would be inefficient for large businesses wanting to send really large CAD files for example. Most companies nowadays use EDI which is a much more efficient way of doing paperless business with transferring large important documents.

Question 5b

This question was well received by candidates with many achieving full marks.

Some went off-point by describing in some detail the system used.

Although some answers were vague, by not giving enough depth to their answer.

Popular responses were: 'no need to travel'; 'saves time'; 'allows face to face contact'; 'training is possible'; 'connections can fail'; 'lack of eye contact'; and 'camera shyness'.

(b) Outline the impact of video conferencing on a multinational company operating



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Examiner Comments

This example gained full marks. It is clear and concise. The allocation of marks and where they have been achieved is given below.

- 1 mark line 3
- 1 mark line 4/5
- 1 mark line 11
- 1 mark line 15
- 1 mark line 16
- 1 mark line 17

(6)
a huge advantage
is. Firstly a global



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Examiner Tip

Candidates should try to be more focused on their answer and as has already been noted, check the number of marks available and then ensure that they have given the same number of points. To help with that it may be useful to use bullet points.

through it ~~to~~ that you
face meeting when you

Presentations can be made in ~~an~~ one place and seen in a number of others. A possibility for a company like this is to also use video conferencing for training purposes. ~~However,~~ furthermore, these can be set up easily through a conferencing system or even a desktop system. However, with big business meetings through video conferencing there is a lack of eye contact and also may be problems identified with camera shyness. Another problem globally is time zone differences.

(Total for Question 5 = 12 marks)

TOTAL FOR PAPER = 70 MARKS

This question was well received by candidates with many achieving full marks.

Some went off-point by describing in some detail the system used.

Although some answers were vague, by not giving enough depth to their answer.

Popular responses were: 'no need to travel'; 'saves time'; 'allows face to face contact'; 'training is possible'; 'connections can fail'; 'lack of eye contact'; and 'camera shyness'.

Grade Boundaries

Grade	Max. Mark	A*	A	B	C	D	E	N	U
Raw boundary mark	70	48	43	38	33	28	24	20	0
Uniform mark scale boundary	80	72	64	56	48	40	32	24	0

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