

# Examiners' Report

## June 2013

### GCE Design and Technology: Product Design 6RM03 01

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## **Introduction**

The paper followed the same layout as previous years, with a 7 question format totalling 70 marks and covering a range of subject areas from the specification, undertaken in a 2 hour period.

## Question 1 (a)

This question focuses on benefits to the manufacturer of using internet marketing. Candidates are required to give four discrete points.

1 The advancement of information and communication technology (ICT) has brought many advantages to both manufacturers and consumers.

(a) Give **four** advantages to the manufacturer of internet marketing.

(4)

1 World wide use

2 Search engines can be used to help find information

3 Access to a wide range of information

4 Ability to use online banking



**ResultsPlus**  
Examiner Comments

This candidate scores marks for two relevant points, but the other two answers (2 + 3) are not really benefits to the manufacturer, more for the customer.



**ResultsPlus**  
Examiner Tip

It is very important to read the question and fully digest what is being asked, i.e. **advantages** are being asked for and the benefit to the **manufacturer**.

If the question had just asked for the advantages of internet marketing, then this candidate would probably have scored 4/4.

1 The advancement of information and communication technology (ICT) has brought many advantages to both manufacturers and consumers.

(a) Give **four** advantages to the manufacturer of internet marketing.

(4)

- 1 Increased audience due to advertising to internet users.
- 2 Quicker and easier to produce; less physical advertising material has to be manufactured, costing less as well (for companies)
- 3 Convenient to use; companies can quickly change their advertising to reflect changes in products or services
- 4 Convenient for consumers; links from advertising can bring customers to a site where they can buy the product/service



**ResultsPlus**  
Examiner Comments

This candidate has clearly given four discrete points with no overlap, scoring them full marks on this question.

## Question 1 (b)

This question focuses on Quick Response Manufacturing (QRM). Candidates are required to give 3 discrete points (for 3 marks) and 3 justifications/explanations (for the remaining 3 marks).

(b) Explain **three** advantages to the manufacturer of using a quick response manufacturing (QRM) strategy.

(6)

1. Saves costs of storing surplus products or components.
2. Saves raw material costs as ~~a~~ surplus goods shouldn't be manufactured.
3. Saves time between the product being made and the product being bought meaning the manufacturer will not be at financial loss in the time between ~~the~~ spending on manufacture and receiving profit.

(Total for Question 1 = 10 marks)



**ResultsPlus**  
Examiner Comments

This response scores 4/6, hitting four of the points on the mark scheme.



**ResultsPlus**  
Examiner Tip

It is important for candidates to remember to use link words in 'explain' type questions in order to lead them into a two-part answer. The first answer is just a single statement and therefore can only score a maximum of 1.

(b) Explain **three** advantages to the manufacturer of using a quick response manufacturing (QRM) strategy.

(6)

1 They will save material as products are only produced when they're needed

2 Due to them making a limited amount of product, less storage space will be required due to the fewer products and materials

3 Less money is wasted as they do not spend on making lots of products that won't sell.



**ResultsPlus**

**Examiner Comments**

The first response scores 2/2. Even though the words used by the candidate differ from those used in the mark scheme, they essentially make the same points, i.e. keep stock costs down and manufacture to order.



**ResultsPlus**

**Examiner Tip**

Responses 2 and 3 are really repeats of answer 1 just using different wording. It is best to plan **all** 3 separate points (with justifications) **before** starting on answer 1.

## Question 2 (a)

This question focuses on a range of additives and requires the candidates to give two properties/changes which are caused by the addition of the relevant additive.

2 The properties of polymers or plastics can be altered by mixing them with other materials.

(a) Describe how the properties of polymers are improved by the addition of the following additives:

- Plasticisers
- Stabilisers
- Fillers

(i) Plasticisers

(2)

Plasticisers are useful when plastic needs to be stretched and allowed to curve. For example PVC in electrical wires. This allows the carrying of wires to move freely and not remain stiff or for use in injection moulding.

(ii) Stabilisers

(2)

Stabilisers help prevent polymers and plastics from decomposing quickly. For example 'Heat' stabilisers prevent plastic granules from ~~de~~ being destroyed in high temperatures in plastic forming processes. ~~at such high temperatures.~~

(iii) Fillers

(2)

Fillers add bulk to polymers or plastic, increasing the amount you have, this can ~~save money~~ increase the amount of Capital earned as you have more of the stuff.



**ResultsPlus**

**Examiner Comments**

This response scores 4/6. Answers 1 and 2 only give one point that is correct/relevant, whilst answer 3 gives two correct/relevant points.



**ResultsPlus**

**Examiner Tip**

When answering a question like this it is important to structure an answer, e.g. a stabiliser makes the plastic more resistant to UV light THEREFORE increasing the product's lifespan.



2 The properties of polymers or plastics can be altered by mixing them with other materials.

(a) Describe how the properties of polymers are improved by the addition of the following additives:

- Plasticisers
- Stabilisers
- Fillers

(i) Plasticisers

plasticisers increase the flexibility of certain plastics to make them less rigid and they are easier to deform when heated, often used in clothing. <sup>make plastics</sup> (2)

(ii) Stabilisers

Stabilisers help protect plastics from going brittle/opaque when exposed to UV/sunlight, this protects the plastic from going often used in car headlamps to prevent covers from clouding up, restricting the power of the beam. (2)

(iii) Fillers

fillers ~~are~~ help to bulk-up and help make the plastic <sup>effectively</sup> cheaper as less of the raw material is being used, often chalk or even silica can be used which increases volume whilst staying cheap to purchase, properties can also be improved with some fillers. (2)



### ResultsPlus Examiner Comments

This candidate scores 6/6 as they have included two valid points for each additive.



### ResultsPlus Examiner Tip

It is important to mention 'sunlight/UV light' rather than just 'light'.

Even though the language the candidate uses differs from the mark scheme, there is enough in the statement 'easier to deform when heated' to suggest an understanding that this will improve the flow properties.

## Question 2 (b)

This question focuses on the importance of producing materials which can be recycled. Candidates should therefore focus their responses and not just discuss recycling in general.

(b) Explain **two** reasons why it is important to produce materials that are recyclable.

(4)

- 1 Recycling does not use up any new raw materials that are often nonrenewable, therefore recycling materials will not use up all our raw material, reserves. Also if a product is recycled it is not put into landfill.
- 2 It takes less energy to recycle an existing product rather than produce a new one, this means less electricity will be used therefore as ~~less~~ + greenhouse gases are released when electricity is produced recycling is better for the environment



**ResultsPlus**

**Examiner Comments**

This response scores 4/4 as each answer has two relevant points from the mark scheme.

(b) Explain **two** reasons why it is important to produce materials that are recyclable.

(4)

1 It saves the need of more raw materials being extracted to make the materials.

2 ~~It saves energy as not as~~ They can be used over and over again, so as long as they are recycled they can last a long time. Saves energy for making new ones.



### ResultsPlus Examiner Comments

This candidate scores 2/4 as there is only one point given in each answer. It is important for the candidate to give a two-part answer for 'explain' type questions.



### ResultsPlus Examiner Tip

The use of link words like 'because/so/as a result' helps candidates to give a second point.

### Question 3 (a)

This question focuses on Computer Aided Quality control (CAQ) and the way it links with Computer Integrated Manufacture (CIM). It is important for candidates to focus their answers on the advantages of CAQ and not on CIM in general.

- 3 Computer-aided quality (CAQ) control is an important part of computer-integrated manufacture (CIM).

(a) Give **five** advantages of using computer-aided quality control.

(5)

- 1 very fast + efficient
- 2 Data can be instantly uploaded to a database for reference.
- 3 Can help to see what a human eye may miss.
- 4 Can give accurate readings + measurements of Tolerances via use of probes + lasers.
- 5 new laser systems can provide 3D models for closer inspection at later stages to identify faults.



**ResultsPlus**

**Examiner Comments**

A well-structured set of answers. This response scores 5/5. Although the fifth answer is a little vague, there is enough there to suggest a knowledge that laser systems are capable of 3D Quality Control applications.

3 Computer-aided quality (CAQ) control is an important part of computer-integrated manufacture (CIM).

(a) Give **five** advantages of using computer-aided quality control.

(5)

- 1 computers are more accurate than humans
- 2 computers are faster than humans
- 3 information in computers can be re-programmed for a new product
- 4 they can work non-stop when a human can't
- 5 isn't affected by fatigue like humans



**ResultsPlus**

**Examiner Comments**

This candidate appears to be repeating the fifth answer, but repeating the previous answer in different words will not score an extra mark. This scores at 4/5.

### Question 3 (b)

This question is focused on the disadvantages of using robots in production. Candidates must limit themselves to the disadvantages of robots and not stray into other general problems which can occur in manufacturing.

(b) Give **five** disadvantages of using robots on a fully automated production and assembly line.

(5)

- 1 Robots are putting people out of jobs, harming the economy.
- 2 robots can not see or feel any faults in the product meaning faulty products may be released.
- 3 Automated machines are expensive to buy initially.
- 4 The machine can only do one task, so if one machine breaks the whole production line will stop because the machine can not adapt to a different job.
- 5 If a machine is programmed wrong this fault will be repeated and may be unnoticed.

(Total for Question 3 = 10 marks)



#### ResultsPlus Examiner Comments

This response scores 3/5 for answers 1, 3 and 4. Answer 2 suggests that robots are not capable of sensing, which is not correct. Answer 5 is not really related to robots as any system which is programmed incorrectly will not function.

(b) Give five disadvantages of using robots on a fully automated production and assembly line.

(5)

- 1 lacks vital human Senses + Judgement.
- 2 very expensive to purchase + install
- 3 replaces workers, leading to unemployment.
- 4 worker morale may drop as a consequence
- 5 Large cost in making Cells / workstations safe to use as humans are not allowed to enter.



### ResultsPlus Examiner Comments

This answer is thorough and scores 5/5, though there are six correct points given.



### ResultsPlus Examiner Tip

The first answer is a prime example of what many candidates do, i.e. put two answers into the same response, e.g. lacks human senses AND judgement. Where there are 5 marks available and five spaces for answers, it is important for the candidate to be very careful when using link words as they can often put two correct answers in one space. This will not penalise the candidate as both will be credited, but it is not good exam practice.

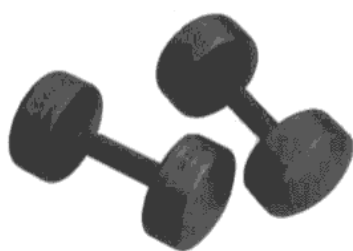


## Question 4 (a)

This question focuses on the ergonomics of the dumbbells shown in the question. It is important for candidates to use the examples shown and give examples of ergonomic design in the dumbbells and not just quote a definition of what ergonomics is in general.

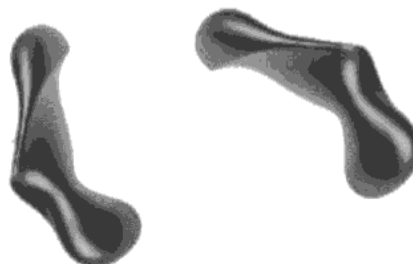
- 4 Ergonomics is an important consideration when designing a product for human interaction.

Figures 1 and 2 show exercise dumbbells.



Traditional design

Figure 1



Philippe Starck design

Figure 2

- (a) Discuss how ergonomics has been considered in the design of these dumbbells.

(4)

Ergonomics is the science in making sure that the product fits the purpose to be used by a human effectively. Figure 1 has been ergonomically designed to have a grip for the hand that will fit every human being, for example, one size fits all. Both figures have been designed to not be too long in length as users would have balancing problems using only one hand. Figure 2 has been designed ergonomically as a lighter product. Meaning <sup>weaker</sup> less strong users can use it. Also, the twist grip ensures that the hand can comfortably wrap around the dumbbell.



### ResultsPlus Examiner Comments

This candidate scores 4/4 as they clearly identify four discrete points.



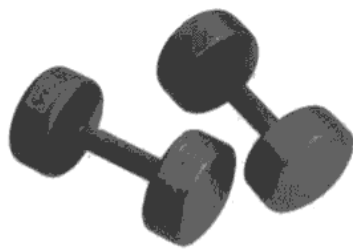
### ResultsPlus Examiner Tip

It is possible to score marks using reference to either or both of the dumbbell examples as the disadvantage of one will often be the advantage of the other. However, answers can become confused if the candidate doesn't plan them carefully before committing to paper.



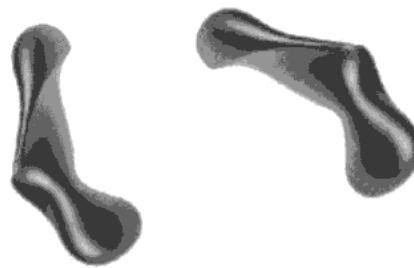
- 4 Ergonomics is an important consideration when designing a product for human interaction.

Figures 1 and 2 show exercise dumbbells.



Traditional design

Figure 1



Philippe Starck design

Figure 2

- (a) Discuss how ergonomics has been considered in the design of these dumbbells.

(4)

Ergonomic is defined as ~~the~~ something which is taken into consideration to make something a product easier and safer to use. Ergonomics have been considered within ~~the~~ figure 2 as it is easier to hold as it is much more suitable for a human hand in comparison to the other design making it easier to use. It is also more ergonomic as there is less chance of an injury occurring, ~~so~~ in comparison to the other design as the end of the dumbbell could break and fall. Figure 2 is a one piece product, figure 1 consists of many components.



### ResultsPlus

Examiner Comments

This response scores 2/4 for reference to 'easier to hold' and 'suitable for the human hand'. The rest of the answer tends to make design points about the dumbbells, but does not reference them to ergonomics.



### ResultsPlus

Examiner Tip

This response has strayed into the area of defining ergonomics, which is not asked for in the question - a common mistake made by candidates.

## Question 4 (b)

This question focuses on how anthropometrics have been used in the design of the chair. The phrase 'philosophy of form follows function' is also in the question to guide candidates to look at anthropometric factors of both form and function.

Describe how anthropometrics has been used in the design of the chair keeping to the philosophy that 'form follows function'.

(4)

- The philosophy 'form follows function' is that the physical form of the chair should be based on its function (use) before aesthetic values. This has been considered in:
- The height of the ~~chair~~, lounge. This will be decided by anthropometric data to make it easy to get in and out of the chair and also a comfortable sitting position.
  - The curve and height of the upper back horizontal piece has been designed so that it does not interfere with the user's head or, back or neck.
  - The depth of the seat will be based upon the 90<sup>th</sup> percentile (the middle 90%) of the population so it is the correct length for the average person's legs.
  - The height of the arms will be designed using anthropometric data to be the correct height for resting the ~~user's~~ user's arms.
  - The adjustability of the seat ~~angle~~ will be based upon anthropometric data to ~~how~~ <sup>how</sup> much a person can rotate in this plane.
  - The width of the chair will use anthropometric data to fit as many people as possible whilst not being too big for smaller users.



### ResultsPlus Examiner Comments

This candidate scores 4/4 but potentially there are several other marks possible in this response.



### ResultsPlus Examiner Tip

The use of bullet points has helped this candidate to avoid repetition.

Describe how anthropometrics has been used in the design of the chair keeping to the philosophy that 'form follows function'.

(4)

Anthropometrics has been considered in the design of this chair as the human has a average size and proportion. A single chair may never be perfect for everyone, but it can be comfortable for most as average boundaries of human size and shape can be used to accommodate for the function and if something fits a human comfortably then its form will certainly have some degree of design that makes it functional. eg the legs are at a certain length that means the users feet will reach the floor,

Overall if anthropometrics has been used well the function will be good, and if it works well, and is shaped to fit the human body the form will naturally follow.



### ResultsPlus Examiner Comments

The candidate scores 2/4 for this response. The first paragraph is too generic as it focuses on what anthropometrics is and how it can be used in general, rather than how it was used to design the chair.



### ResultsPlus Examiner Tip

It is very important to focus this type of response on the example given in the question. The marks were awarded for 'comfort' and 'length of chair legs' (which suggests anthropometrics were used to determine seat height).

It is a rather vague answer and the candidate would have been better planning four points before committing the answer to paper.

## Question 5 (a)

This question is focused on the advantages to the manufacturer of built-in obsolescence. Candidates are not asked to define built-in obsolescence so should keep their answers related to the benefits a manufacturer gains.

5 Products are often designed with built-in obsolescence.

(a) Explain **two** advantages to the manufacturer of built-in obsolescence.

(4)

1 Products will have a predefined life span so a manufacturer can plan better when new products will be required

2 Increased sales of up-to-date products as customers always want the latest version to keep up with fashion



### ResultsPlus Examiner Comments

This candidate scores 4/4 with a well-structured answer. Both responses are backed up with a justification or explanation.



### ResultsPlus Examiner Tip

Excellent structured responses using 'so' and 'as' as link words to push the candidate into a two-part response.

5 Products are often designed with built-in obsolescence.

(a) Explain **two** advantages to the manufacturer of built-in obsolescence.

(4)

1 ~~Build~~ Built-in obsolescence allows the product to last longer which leads to customer satisfaction. ~~The~~ A result of this is that the demand for the product may increase ~~thereby~~ as it is of a high quality.

2 Built-in obsolescence is also good for the manufacturer as it provides its own quality check at the end of its production, avoiding costs in money, effort and time.



### ResultsPlus Examiner Comments

This response scores 0/4 as the candidate has not really grasped the concept of built-in obsolescence. Although there is a suggestion of a 'predetermined life span' in the sentence 'allows the product to last longer' it is in the wrong context.

## Question 5 (b)

This question is aimed at the way a consumer can benefit from built-in obsolescence. Candidates must focus their point and give an explanation/example for both marks.

(b) Explain **one** advantage to the consumer of built-in obsolescence.

(2)

one advantage is you can keep up to date with technology meaning you always have the newer product.



### ResultsPlus Examiner Comments

This response scores 1/2 as 'have a new product' is not really any different to 'keep up to date'



### ResultsPlus Examiner Tip

Care needs to be taken to read through a response to see if it is targeting two points or just rewording the same point.

(b) Explain **one** advantage to the consumer of built-in obsolescence.

(2)

~~Consumer will have to keep buying latest versions of the product to keep up with fashion trends~~  
Consumer is able to always buy latest version of product and so can easily keep up with fashion trends as upgraded products released quicker.



### ResultsPlus Examiner Comments

This response scores 2/2 as there is an understanding shown that the consumer benefits from both being 'able to buy the latest' (because the manufacturer has to keep up with new products if they are to continue being successful) and 'keeping up with fashion trends'.



### Question 5 (c)

This question focuses on smart materials, specifically their application and the change that occurs in response to a stimulus.

Explain **three** applications where smart materials have been used in an innovative way.

(6)

- 1 Photochromic paint is used in security sensors.  
~~and~~ It changes colour as it is exposed to different light conditions, ~~the light changes~~ ~~the~~ ~~the~~
- 2 Reactive glass can be used in ~~primary~~ <sup>welding visors</sup> ~~visors~~. When an arc is struck, glass turns from clear to ~~opaque~~ <sup>dark</sup> protecting users eyes from bright light. When arc is removed it turns clear again.
- 3 Electro-luminescent (LED) lighting can be used on <sup>computer</sup> laptop screens. Uses reduced amount of energy yet performs at <sup>high</sup> ~~same~~ level ~~as~~ Reduces energy costs but has no effect on level of quality.



**ResultsPlus**

**Examiner Comments**

This candidate scores 6/6 as they cover each smart material in detail and give two responses of either a name, a description of what they do, or an application.

Explain **three** applications where smart materials have been used in an innovative way.

(6)

1 no-stick paint prevents any other material from attaching to surface of product which keeps it clean.

2 glasses with photochromic lenses with a silver halide change <sup>darken</sup> to block UV light when it is exposed to UV.

3 miniaturisation of products through the use of quantum tunnelling composites allows products to be made smaller and more compact.



### ResultsPlus Examiner Comments

This response scores 3/6.

The first response may well be correct factually, but it is not classed as a smart material.

The second response scores 2/2 for glasses/response to UV light/changing colour. Any two of the three would score the marks.

The third response scores 1/2 for Quantum Tunnelling Composites, but the second mark is not awarded for miniaturisation as this is not a response to a stimulus, but a consequence of the physical nature of the material.



## Question 6 (a)

This question focuses on the environmental impact of transportation and what a company can do to limit the resulting impact. Candidates need to focus on various strategies to limit these effects.

6 Global manufacturing has led to an increase in transportation.

\*(a) Describe how companies could reduce the environmental impact of their transport needs.

(5)

One step a company could take is to reduce their ~~mileage~~ distance travelled to deliver products, this will reduce the use of fuel as well as carbon dioxide released. They could do this by carefully locating their distribution centres near to their customers, so shorter journeys are made. ~~It is~~ It's very expensive to relocate, but in the long term could also be cost efficient. An alternative way to lower mileage is through the use of efficient packaging when transporting goods, by maximising the amount of goods carried in one journey, fewer journeys will need to be made in the long run. Packaging could be included in the design of the product, reducing the space taken up. Rather than the use of lorries that use fuel, electric cars ~~and~~ and trucks could be used for smaller transportation, no fuel is burnt then reducing the effect on the environment. Another low energy form of transportation is trains, and they also have the ability to hold a lot of stock, and could be used by large companies. However there is a restricted amount of space on train lines for transportation, so it is more viable for use on long distance journeys.



**ResultsPlus**

**Examiner Comments**

This response scores 5/5 for a well-structured answer which covers numerous points in the mark scheme.

6 Global manufacturing has led to an increase in transportation.

\*(a) Describe how companies could reduce the environmental impact of their transport needs.

(5)

Companies could do a lot to reduce environmental impact of transportation by using transportation with Bio-fuels that don't emit  $\text{CO}_2$  which damages the atmosphere. They could use manufacturers close to largest market so the distance travelled is shorter. They could ship in larger quantities so the amount of journeys is reduced. It is also possible to skip having a warehouse and ship to customers in a system that produces products ~~per~~ as they are ordered.



### ResultsPlus Examiner Comments

This response scores 3/5 for bio-fuels, close to target market and shipping in larger quantities.



### ResultsPlus Examiner Tip

The final sentence is really a rewording of the point on 'proximity to market' so a carefully planned list of 5 points would help a candidate structure their answer better.

Some candidates lost marks on this question because they focused their response around just reducing transport, i.e. don't make as many products, so don't have to transport them. The question is worded to say that a company HAS transport needs, therefore this is an unavoidable fact. The answer then needs to talk about alternative strategies to offset the effect of these needs.

## Question 6 (b)

This question is focused on the effectiveness of using fossil fuels to satisfy the electricity needs of the National Grid. Responses need to be focused on providing both pros and cons of fossil fuels for this purpose. Responses should therefore, really avoid domestic power supplies as this is on a completely different scale and not really relevant to the question.

(b) Evaluate the use of fossil fuels for the commercial production of electricity for the National Grid.

(7)

Using fossil fuels for producing electricity for the National Grid is not good. Although it has been used for years and provides a lot of electricity to be used, it will run out. This is the main reason why it is not good to use them. Fossil fuels cannot be ~~made~~<sup>used</sup> again once they're gone unless you wait a few thousand years. However by using renewable resources, the ~~grid~~ National Grid can continue to produce electricity ~~for~~ forever. Although it takes a lot more energy than fossil fuels, it can be used again and again.



### ResultsPlus Examiner Comments

This response scores 2/7. The candidate has two points - 'produces a lot of electricity' and 'will run out'

These two points are close enough to the points in the mark scheme on providing a large amount of power quite efficiently and being finite. However the bulk of the response gets caught up in repeating the finite nature of fossil fuels.



### ResultsPlus Examiner Tip

A simple list of pros and cons would help the candidate plan their answer more effectively.

(b) Evaluate the use of fossil fuels for the commercial production of electricity for the National Grid.

(7)

- ~~Using fossil fuels to~~ Fossil fuels are finite resources and will eventually run out if ~~we~~ if they are continued to be used for the commercial production of electricity for the national grid.
- However, they provide large amounts of electricity compared to renewable resources to create electricity.
- Power plants that use fossil fuels ~~can~~ to produce ~~electricity~~ electricity can be located almost anywhere.
- Using fossil fuels creates greenhouse gases that add to global warming. The more fossil fuels we use the more the climate is changing.
- Making power plants that use fossil fuels for commercial production ~~has~~ of electricity has cheaper set up costs than some renewable resources that produce electricity.
- Fossil fuels can be used at any time of the year and at any time of the day to produce commercial electricity for the national grid unlike some renewable resources like solar power. So the electricity produced from ~~the electricity that~~ fossil fuels ~~doesn't~~ <sup>don't</sup> need to be stored because ~~it is readily available~~ they are readily available.



### ResultsPlus

Examiner Comments

This response scores 6/7 for a range of pros and cons in a well-reasoned answer.



### ResultsPlus

Examiner Tip

The use of bullet points helps the structure of this answer and generally avoids repetition by the candidate.

## Question 7

This question is focused on reducing waste when designing a product. The toothbrush was used as an 'everyday' item, on which candidates could hang their answers. It is important in this question to focus on eight different areas where waste is generated and discuss how this could be reduced.

Describe ways in which waste could be minimised in the design and production of electric toothbrushes.

(8)

In producing the product manufacturers could consider using a process that has very little waste material for example injection Moulding, which only uses the amount of material required.

Waste could also be reduced by reducing the amount of materials in the product this decreases waste by not using as many materials.

The manufacturers could consider a flexible manufacture system with a just in time policy, which reduces wasted time producing products that haven't been sold, saves on wasted space as storage isn't ~~needed~~ required and saves on wasted money in raw materials and stock that isn't being used.

When designing the product they could consider the shapes that need to be cut from sheet material like the base or the charger <sup>and circuitboards</sup> and consider how it can be efficiently cut <sup>by</sup> to reduce off-cut materials.

Manufacturers could batch produce the product so can make the body, charger and head on the same site which reduces wasted space on many factories and wasted money on shipping.



**ResultsPlus**

**Examiner Comments**

This response scores 3/8 because too much of the answer repeats points which already score a mark.



**ResultsPlus**

**Examiner Tip**

A sentence like the one used in this response could so easily be reduced and avoid repeating information with a bit of careful planning, prior to starting the written response. It is particularly important on longer responses which are found towards the end of the paper.

'waste could also be reduced by reducing the amount of materials in the product this decreases waste by not using as much material'



Describe ways in which waste could be minimised in the design and production of electric toothbrushes.

(8)

In the design process for the toothbrush a designer should consider what <sup>suitable pattern</sup> materials would provide the easiest production method for the ~~the~~ longest life <sup>v</sup> for the brush head, to ensure

that energy wastage is minimised from their production.

The charging unit should be made as small as possible to ensure that no excess material is used in producing the base shells.

The body of the toothbrush has to be considered to ensure that excess materials aren't produced for the manufacture of the toothbrush body.

Time could be saved in the design process by using an existing product as a template, which can then be adjusted, to ensure time isn't wasted in the design process.

Simplicity of parts could be a way of minimising energy wastage; making the toothbrush an easy-to-assemble unit means that machinery would require less energy to assemble them.



### ResultsPlus Examiner Comments

This response scores 2/8 with two valid points. However, this candidate tends to focus on one point, i.e. the reduction of materials used and then repeats this point for several components of the toothbrush. This is only going to score the mark once.

A range of factors is vital for high marks.



### ResultsPlus Examiner Tip

A list of points made before writing the answer would help the candidate avoid unwanted repetition.

This is really important in the longer answers where candidates who just start writing, may forget what they have already written when under exam conditions.

## Paper Summary

It is pleasing to see that year on year there are fewer blank answer spaces, which means that candidates are performing at a higher level and are able to attempt more of the questions. There are however, one or two areas which candidates/centres still need to address. Based on their performance on this paper, candidates are offered the following advice:

- Questions which start with trigger words like 'explain' and 'justify' require TWO parts to an answer in order to score full marks. There are still a number of candidates who limit themselves to a maximum of half marks for this reason. Inserting simple joining words/phrases like 'therefore', 'so' or 'as a result' into an answer automatically encourages the candidate to give a two-part answer.
- Plan your answer: there are still far too many examples where candidates don't plan answers (especially towards the end of the paper) and therefore repeat themselves, rather than stating new points. This is particularly prevalent in 'evaluate' type questions which require both pros and cons. Once a candidate has given a pro, no extra marks will be given for stating the exact opposite as a con. For example, if a candidate states that wind power is an emission-free source of energy, no mark would be given for saying that fossil fuels give off harmful emissions.
- Read the question properly: some candidates miss out on marks due to misreading the question. It is vital to read the question in full before attempting to answer.
- Overall the standard of answer is increasing and it is good to see more subject specific, technological language being used in the candidate responses.



## **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>

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