

# ResultsPlus

Examiners' Report

June 2011

GCE Design & Technology: Product  
Design 6RM02 01

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## Introduction

The structure of this paper followed the previous format in that it contained seven questions, with an average of 10 marks per question and had a time limit of 90 minutes. Most questions are broken into sub-sections (called items) in order to access a greater range of the specification. Where possible the sub-sections are generally related, though this is not always the case. Some questions, generally towards the end of the paper, require a more in-depth knowledge and can command a large number of marks. The minimum mark for an item is 1 mark, ranging up to a maximum of 12 marks for a full question. Questions can be structured to include some choice by the candidates, but this year's paper did not have any of this type of question.

The paper is written to test candidates' knowledge, understanding and application of the following:

- Materials and Components
- Industrial and Commercial Practice
- Quality
- Health and Safety.

There is a range of command words which are consistent across both A/S and A2 papers and are used to help guide the candidates. Understanding the command words will help candidates to structure their answers appropriately.

### **Give/State/Name**

- These are usually 1 + mark questions where all the marks can be gained by single 'stand-alone' answers.
- Responses to these questions usually require a single statement or single sentence for the 1 mark.

### **Describe/Explain/Identify/Justify/Outline**

- These are usually 2 + mark questions with 'linked' answers.
- Responses to these questions usually require a statement AND a development of that statement for the indicated further marks. The development might be:
  - A justification
  - An example
  - A development.

## Evaluate/Discuss

- These are usually 4 + mark questions.
- Requires a developed series of statements that contains arguments both for and against.  
**Full** marks will NOT be awarded without at least **one** for or against argument.

The following are points which have improved from last year's examination:

- Most candidates attempted the vast majority of the questions even if some were 'educated guesses'.
- Candidates are generally trying to answer questions more concisely.
- The use of bullet pointed answers seems to help many candidates clarify their responses.
- The majority of candidates are now staying within the clipped areas.
- More centres are clearly teaching the subject content in more depth.

The following are points which still need attention:

- Poor handwriting and grammar (*this made some answers difficult to decipher*).
- Not reading and digesting the question **fully** before answering.
- Not understanding the basic examination terminology.
- Answers that were not concise and went onto additional sheets, very often didn't score further marks on the extra sheets.
- Candidates must use more correct technical vocabulary in their answers as far too many answers are limited to 'general' descriptions of processes and procedures.

## Question 1 (a)

This question was aimed at getting candidates to demonstrate their knowledge of the properties of aluminium and was generally well answered by the majority of candidates. However, many candidates did not justify their answers, resulting in marks being lost. Also, some candidates put down the first three things they knew about aluminium without relating them to the 'frame of the wheelbarrow' which is stated in the question.

Figure 1

(a) Explain **three** reasons why the frame of the wheelbarrow is made from aluminium. (6)

- 1 aluminium is malleable (and soft) so it can be shaped into the frame with relevant ease
- 2 Aluminium is lightweight, hence relieving strain on user, as the wheelbarrow is going to be full with contents anyway, so by having a lightweight frame it relieves extra unnecessary weight for user.
- 3 aluminium has an oxide layer which will prevent it from rusting - this is useful as the wheelbarrow is used outside where it may get wet.



### ResultsPlus Examiner Comments

This answer clearly covers three points from the mark scheme and gives a justification for each scoring full marks (4/4).

- 1 - Hits bullet point 5 in the mark scheme.
- 2 - Hits bullet point 1 in the mark scheme.
- 3 - Hits bullet point 4 in the mark scheme.

Figure 1

(a) Explain **three** reasons why the frame of the wheelbarrow is made from aluminium.

(6)

- 1 Aluminium has a low melting point so it can be cast into that shape without using a lot of energy.
- 2 Aluminium is a non ferrous <sup>alloy</sup> metal so it will not rust.
- 3 Aluminium does not bend when under pressure.



**ResultsPlus**

**Examiner Comments**

Although the candidate shows some correct factual knowledge, e.g. aluminium's low melting point, they have not used knowledge which is relevant to the question.

No marks were awarded for anything to do with casting.

1 mark for not rusting (treat as not corroding) (BP4), but has no justification.

No marks as aluminium does bend relatively easily under pressure as shown in BP5. Don't confuse this with aluminium's properties of ductility when forming the product in the first place.

## Question 1 (b)

This question was designed to test candidates' knowledge about the differences in performance of a bush and a bearing. This question was not generally well answered as many candidates clearly did not know the difference between the two.

(b) Figure 2 shows an enlarged view of the wheelbarrow wheel.

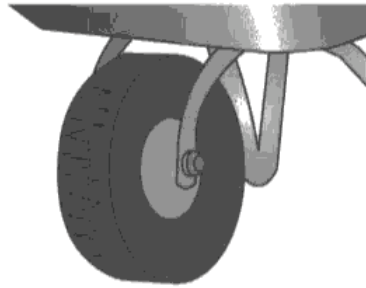


Figure 2

A bush is used as the bearing mechanism on which the wheel of the wheelbarrow rotates.

Give **two** reasons why a bush is used in preference to a ball-bearing for the wheelbarrow.

(2)

1. A ball bearing is too expensive, a bush is cheaper.
2. The wheel doesn't need to spin very fast or smoothly so a bush can be used.

(Total for Question 1 = 8 marks)



**ResultsPlus**

**Examiner Comments**

This example shows that the candidate has hit two relevant bullet points, scoring maximum marks.



**ResultsPlus**

**Examiner Tip**

It is not necessary (and wastes time) for the candidate to put that a ball bearing is too expensive and then put that the bush is cheaper - this is a 'repetitive' answer.

(b) Figure 2 shows an enlarged view of the wheelbarrow wheel.

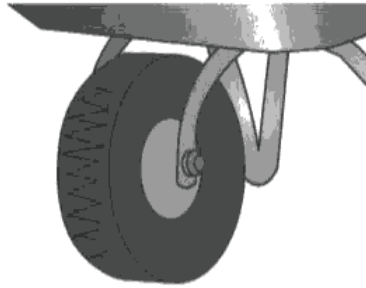


Figure 2

A bush is used as the bearing mechanism on which the wheel of the wheelbarrow rotates.

Give **two** reasons why a bush is used in preference to a ball-bearing for the wheelbarrow.

(2)

1. because there is less friction  
between the mechanism <sup>and</sup> the wheel.
2. The wheel only moves backwards  
and forwards; it doesn't need a 360°  
rotation.

(Total for Question 1 = 8 marks)



**ResultsPlus**

Examiner Comments

This example shows a lack of understanding of the subject content. The first answer seems to suggest a relevant mention of reducing friction, but in fact a ball bearing would give even less friction, making the answer incorrect.



## Question 2 (a)

This question was aimed at getting candidates to show their knowledge of Health & Safety in the 'workplace'. Many candidates answered this well, showing an in-depth knowledge and understanding of the subject. However, many candidates limited their answers to several applications of PPE, resulting in a low score.

2 Risk assessment is a necessary part of health and safety legislation.

(a) Explain **three** control measures that an employer can use to reduce the chances of an accident occurring in a workshop.

- (6)
1. Make sure that nothing sharp ~~or~~ <sup>or anything</sup> normal is left lying around or unsecured on a work bench.
  2. Supervised or somebody else in workshop whilst using the machines.
  3. Always wear an apron and goggles to hold back loose clothing and to protect your eyes.



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#### Examiner Comments

The candidate shows an understanding of the dangers of untidiness or leaving things lying about, but does not justify. The second answer is related more to a school workshop as industry generally won't have 'supervised' work. The third answer clearly shows an example of PPE and the reasons for it.



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#### Examiner Tip

The wording of the question is very important and candidate should take time to analyse it. The word 'employer' in the question should guide candidates away from answers based on a school workshop. The question also states that risk assessments are necessary, therefore candidates should NOT be putting 'do a risk assessment' as one of their answers. A good way for the candidate to make sure they get both marks for each section of a question like this is to use a word like 'therefore', or 'so'. This tends to push them towards justifying their initial point.

2 Risk assessment is a necessary part of health and safety legislation.

(a) Explain **three** control measures that an employer can use to reduce the chances of an accident occurring in a workshop.

(6)

1 One control measure that could be used is to have an emergency stop button at each workstation, this way if there is any problem the machine could be stopped.

2 Another control measure that an employer can use is to give staff appropriate safety material such as goggles or steel-toe cap boots to prevent injury.

3 One final control measure that could be used is to set up safety zones around all machinery which are marked out and only let 1 person in this zone at a time.



**ResultsPlus**

**Examiner Comments**

This candidate is succinct in all answers and clearly hits three separate bullet points from the mark scheme. Even though the candidate uses different wording from the mark scheme in answer three, it is clear that they have a good understanding of the point and justify it well. Full marks scored.

## Question 2 (b)

This question was designed to allow candidates to show their knowledge of a range of aspects of 'quality' in products.

This question was not generally well answered as too many candidates focussed on describing the symbol, or giving the BSI name, rather than focussing on what the symbol tells the customer about a product which has the symbol on it.

(b) Figure 3 shows the 'Kitemark'.



Figure 3

Outline what the symbol signifies in terms of a product's quality.

(4)

This symbol signifies that the product being bought/used has been tested appropriately and has met all the British standards that the specific product should have. It shows to the customer that it is of a good quality for what they want it for.

(Total for Question 2 = 10 marks)



### ResultsPlus Examiner Comments

This example is quite well written and covers a number of points from the mark scheme. Although it does not score full marks (3/4), it would appear that this was all the candidate knew as there is still some space left for an answer.

1 mark for appropriate testing (BP2).

1 mark for has met all British Standards (BP4).

1 mark for good quality (BP5).

(b) Figure 3 shows the 'Kitemark'.



Figure 3

Outline what the symbol signifies in terms of a product's quality.

That the product with this on has met <sup>(4)</sup> all minimum safety requirements and is safe to distribute to the public. Any product with this will therefore be safe enough for people to use without the risk of it failing or falling apart on them maybe injuring them.

(Total for Question 2 = 10 marks)



**ResultsPlus**

**Examiner Comments**

This example only scored 1 mark as it only hit the 'safety' bullet point in the mark scheme.



**ResultsPlus**

**Examiner Tip**

It is really important for candidates to think through their answers before writing. Hopefully this will stop candidates repeating themselves numerous times and therefore not scoring further marks. This example mentions safety on **four** occasions.

### Question 3 (a)

This question was intended to allow candidates to explain a number of reasons why mass production techniques are suited to the chosen product. Generally this question was either well answered or very poorly answered and was all to do with whether the candidates had justified their response.

Figure 4

(a) Justify **three** reasons why mass production methods would be used to produce plastic clothes pegs.

(6)

- 1 because there is a High demand for clothes pegs which means mass production is needed to supply for this demand.
- 2 because of the shape and design they are well suited to mass production techniques such as injection molding which can produce multiple identical products at low cost.
- 3 because they are a relatively cheap product a lot of them would need to be sold for a reasonable profit to be made.



**ResultsPlus**

**Examiner Comments**

This candidate clearly thought through their answer in all three cases and gives a reason or justification for each answer.

2 marks for high demand and mass production is needed to supply this demand (BP3).

2 marks for suited to mass production techniques and multiple identical products (read - repetitive quality) (BP4).

2 marks for cheap product and large volume needed for reasonable financial turnover (BP6).

Figure 4

(a) Justify **three** reasons why mass production methods would be used to produce plastic clothes pegs.

(6)

- 1 Everyone ~~needs~~ <sup>family needs</sup> about 100 pegs for washing so ~~several~~ billion need to be made.
- 2 Pegs break or get lost easily so there will ~~be~~ be a demand for the ~~for~~ foreseeable future.
- 3 They are purchased in high quantity so one off and batch production would not produce enough.



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#### Examiner Comments

Planning is lacking in this example as each answer is really covering the same point.

0 marks for 1 as it repeats some of the answer given in 3.

0 marks for 2 as it repeats some of the answer given in 3.

2 marks for purchased in high quantity and one-off/batch production would not produce enough (BP3).



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#### Examiner Tip

The candidate does not phrase the answer well by giving examples, e.g. one off and batch production that **would not** be suitable, rather than saying high volume methods **would** be the best/only way to meet such high demand, but the implication is correct so the marks are awarded

### Question 3 (b)

The question is focussed on Total Quality Management, but far too many candidates answered with a focus on Quality Control, which is only a single element of a TQM philosophy. As a result, this question was not a high scoring one in general, with the exception of a few candidates who had been taught and clearly understood the topic.

(b) Outline what is meant by total quality management (TQM).

(4)

Total quality management is a management where they will use QCM (quality control machines) and other resources to make sure the product being manufactured will be at perfect with everything in the right place, it is a system where everything is checked and is very much like quality control and will make sure the everything is going to be alright, so on machines TQM will be used to make sure the machine is doing the right thing.

(Total for Question 3 = 10 marks)



**ResultsPlus**

**Examiner Comments**

This example scored 0 marks as it clearly misses the point of the question and focuses entirely on QC and not TQM.

(b) Outline what is meant by total quality management (TQM).

(4)

TQM is where products are tested for quality at each step of manufacturing. Each department has to test the products to British standards or an in house standard. Any problems found in the product are reported to the other departments to ensure they do not happen again. Company which perform TQM are awarded BSI 9000 which is an award given out by the British Standards Institute. Benefits of this are repeat business and good reputation of high quality goods.

(Total for Question 3 = 10 marks)



**ResultsPlus**

**Examiner Comments**

The candidate, although not always expressing themselves well, does show an understanding of the main concepts of TQM and as a result scored 3/4.

1 mark for products tested at each step (BP7).

1 mark for any problems are reported to other departments (BP4). NOT a well written answer but it does suggest that the candidate understands the employee involvement.

1 mark for ISO9000 leading to repeat business and good reputation of quality (BP8).



## Question 4 (a)

This question was designed to test candidates' knowledge of the working properties of a material (polypropylene), using an everyday object on which to 'hang' their answers. Generally this question was answered well, with many candidates scoring full marks.

Figure 5

(a) Give **four** reasons why the wastepaper bins are manufactured from polypropylene (PP). (4)

- 1 Polypropylene can be coloured to a wide variety of colours.
- 2 ~~Pro~~ PP can be recycled so it can be reused over again if the bin breaks.
- 3 PP can be moulded into the shape required quickly & as efficiently as possible.
- 4 PP is <sup>slightly</sup> flexible so it can handle the daily knocks and not break.



### ResultsPlus Examiner Comments

This example shows a good understanding of what is required in from the question and scored full marks (4/4).

1 mark for variety of colours (BP1).

1 mark for recycled (BP10).

0 marks for moulded into shape quickly as this does not give enough information.

2 marks for flexible (BP4) AND handle daily knocks and not break (BP3).



### ResultsPlus Examiner Tip

This candidate has clearly given FOUR reasons and even though TWO of them are in answer 4 the candidate gets the credit. Planning would have enabled the candidate to separate out the two correct responses given in answer 4.

Figure 5

(a) Give **four** reasons why the wastepaper bins are manufactured from polypropylene (PP).  
(4)

- 1 The bins can be remelted and reused - This makes it eco friendly
- 2 The material is cheap and cost efficient - Manufacturers make profit
- 3 can be ~~self~~ finished by being coated in paint or can have a gloss effect to attract ~~customers~~ buyers.
- 4 can be injection moulded, this process is fast and cost efficient due to it's production.



**ResultsPlus**

**Examiner Comments**

This example shows two correct answers (1 + 4) and two which scored no marks. Whilst a gloss effect is possible (answer 3) there is no clear understanding of it being a part of 'self-finishing'.

## Question 4 (b)

This question allowed candidates to give a reasoned argument for the Pros and Cons of using Carbon Fibre, using the motorcycle helmet as a product to 'hang' their argument on. Generally it was answered well by many candidates and there was a wide spread of marks, from those who knew about strength and lightness, to those who were well informed about the materials properties as well as the manufacturing issues.

This type of question requires arguments FOR and AGAINST in order to score full marks. A maximum of 5 marks can be awarded for a single-sided argument.

\*(b) Figure 6 shows a motorcycle crash helmet which is made from carbon fibre.

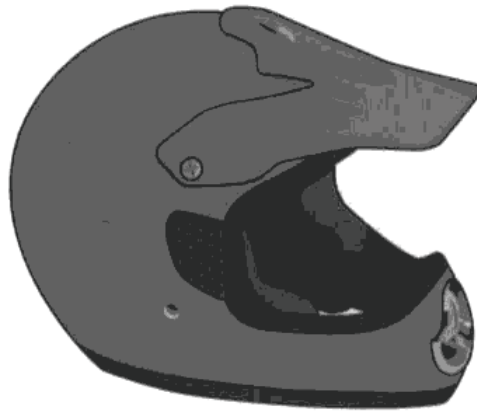


Figure 6

Evaluate the use of carbon fibre in the manufacture of crash helmets.

(6)

Carbon is a very strong and light weight material, which means it is suited to its purpose. It can be easily manufactured, and is relatively easy to work with to produce the required shapes.

However it is a ~~very~~ relatively expensive material and requires highly skilled ~~workers~~ workers to synthesize the material. The material has a ~~very~~ good aesthetic quality and ~~can be~~ many different finishes can be applied.

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#### Examiner Comments

This answer is concise and hits a range of bullet points from the mark scheme.

- 1 mark for strong (BP1).
- 1 mark for lightweight (BP2).
- 1 mark for easy to work with to produce the required shapes (BP5).
- 1 mark for expensive material (BP11).
- 1 marks for requires highly skilled workers (BP13).
- 1 mark for good aesthetic qualities (BP10).

### ResultsPlus

#### Examiner Tip

Many candidates try to put each point they are trying to make into separate sentences. This is not necessary. This example shows how the candidate has scored full marks (6/6) and hasn't even used all the allocated space.

\*(b) Figure 6 shows a motorcycle crash helmet which is made from carbon fibre.

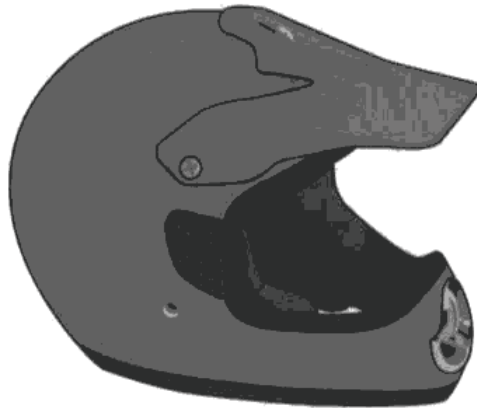


Figure 6

Evaluate the use of carbon fibre in the manufacture of crash helmets.

(6)

Carbon fibre are mixed elements created and formed into the shape of a helmet. Its dense material makes it strong from impact heavy impact. Composites like carbon fibre are tested, using crash dummies with the helmets one to see how long the helmets can last.  
Carbon fibre is ductile and strong ~~to~~ on heavy impact.



**ResultsPlus**

**Examiner Comments**

This example shows a candidate who has a limited knowledge of carbon fibre so only scores 1 mark for the mention of strength.

The candidate has then expanded their answer to cover elements of the make-up of the material, how it is tested with dummies and how long it will last, which move away from the question.

### Question 5 (a) (i)

A factual question which a surprising number of candidates did not know the answer to.

Figure 7

(a) (i) State why knots occur in timber.

(1)

Knots occur in timber because it was where the branches previously were on the tree.



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**Examiner Comments**

1 mark for where the branches were previously on the tree (BP1).

Figure 7

(a) (i) State why knots occur in timber.

(1)

Knots occur in the growing process of the tree.



**ResultsPlus**

**Examiner Comments**

Although the answer is technically correct, it is far too vague to score the mark.

## Question 5 (a) (ii)

This question was designed to let candidates show their working knowledge about the properties of knots in timber.

The question was either answered very well, by those who had clearly experienced the problems associated with 'working' timber with knots in, or extremely poorly. Far too many candidates focussed on the aesthetics of the knots which are not a 'working' property.

(ii) Describe why knots are a problem when working timber.

(3)

In knots it deforms the grain structure, therefore producing a weak point. Also in manufacturing they can fall out as grain is in different direction making the wood no good for production. Not very aesthetically pleasing if in a finished piece of wood. If chiseled work will break away uneven ~~not~~ plan.



### ResultsPlus Examiner Comments

This candidate describes various bullet points from the mark scheme.

- 1 mark for weak point (BP3).
- 1 mark for they can fall out (BP4).
- 1 mark for work will break away uneven or not to plan (difficult to read) (BP2).



### ResultsPlus Examiner Tip

Although the use of English is not marked, some answers, like the final sentence, require a good deal of interpretation by the examiner. A little more thought about the answer would no doubt lead to a clearer meaning.

(ii) Describe why knots are a problem when working timber.

(3)

They affect the grain of the timber which means it makes the wood piece ~~more~~ prone to splitting easy when working across it.



### ResultsPlus Examiner Comments

This candidate has clearly experienced some difficulty of splitting when working across the grain, but the answer is close to scoring no marks (though it was awarded 1 mark) as it is so badly worded.

- 1 mark for make the wood prone to splitting when working across it (read difficult to work) (BP2).

## Question 5 (b)

This question was designed to allow candidates to show and explain their understanding of the benefits of kiln seasoning.

Most candidates scored some marks, though few scored the full 6 marks, often due to repetition or lack of justification in their answers.

The question asks for the advantages of kiln over natural seasoning. Many candidates gave their answer in the form of **disadvantages** of natural over kiln seasoning. Whilst this does score the marks (if the points are correct), it is not good exam technique.

(b) Once a tree is felled, the timber is usually seasoned before it can be used.

Explain **three** advantages of using kiln seasoning in preference to natural seasoning.

(6)

1. ~~Kiln~~ Kiln seasoning is artificial so it can be made to help the wood last longer against weathering and corrosion more than natural seasoning.

2. Kiln seasoning could make the wood look more appealing ~~with~~ to the users than the natural seasoning could.

3. It could protect the wood from various creatures eating away at it and making it rot or the creatures living inside of the wood.

(Total for Question 5 = 10 marks)



**ResultsPlus**

**Examiner Comments**

This candidate has a limited knowledge of the subject content of this question. 1 mark was awarded for the inference that the kiln seasoning process kills 'creatures which eat away at the wood'.

0 marks - incorrect.

0 marks - incorrect.

1 mark for protect the wood from creatures eating it (BP4).



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**Examiner Tip**

Candidates need to be taught to use 'technical subject' words carefully as the use of 'corrosion' in relation to timber, clearly indicates a lack of knowledge and understanding.

(b) Once a tree is felled, the timber is usually seasoned before it can be used.

Explain **three** advantages of using kiln seasoning in preference to natural seasoning.

(6)

- 1 The kiln seasoning makes the level of seasoning customisable and allows the manufacturer to get the best level of seasoning required.
- 2 Kiln seasoning is much faster than natural seasoning so the rate of production is much quicker for the manufacturer & the ~~is~~ customers.
- 3 If the wood is kiln seasoned, it gives it more desired characteristics which can be custom chosen to be the choice of the customer.

(Total for Question 5 = 10 marks)



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**Examiner Comments**

This candidate clearly knows about kiln seasoning, but fails to score full marks as the third answer is repeating that given in answer 1.

1 mark for seasoning customisable (BP1). 1 mark for allows manufacturer to get best level of seasoning required (read more reliable moisture levels) (BP1).

1 mark for much faster (BP3). 1 mark for is quicker for the customer (BP3) - vague, but does infer the need to get it ready for sale quickly.

0 marks as this answer is a repeat of answer 1.



## Question 6 (a)

This question was designed to test candidates' knowledge of cam followers. Far too many candidates focussed their answers on the shape of the cam and the movement this made. Consequently some candidates scored very few marks whilst others who described the characteristics of the followers scored well.

6 Figure 8 shows three different types of cam follower.

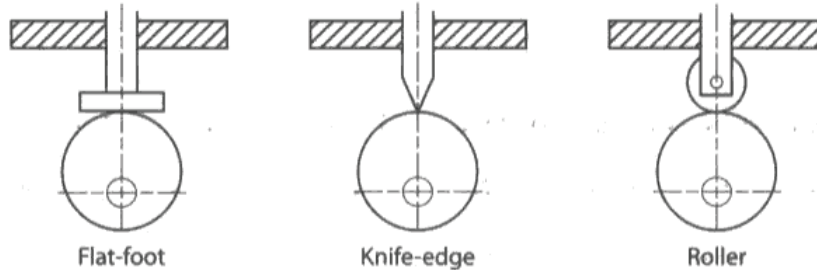


Figure 8

(a) Give **two** operational characteristics for each of the cam followers.

(6)

Flat-foot

- 1 Gives ~~an~~ a <sup>larger</sup> ~~more~~ even distribution of increasing and decreasing.
- 2 Generally moves at a slower speed (in height)

Knife-edge

- 1 Gives a small distribution of increasing and decreasing.
- 2 Generally moves faster in height

Roller

- 1 Gives an even and more smooth distribution of increasing and decreasing
- 2 Generally moves in an even measure of speed



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Examiner Comments

This candidate's answer focussed on the cam shape and therefore scored 0 marks. The use of language here also demonstrates a very limited knowledge of this particular subject matter and would not have scored well, even if the question had been about cams.



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Examiner Tip

Correct use of technical language is really important in questions like this.

6 Figure 8 shows three different types of cam follower.

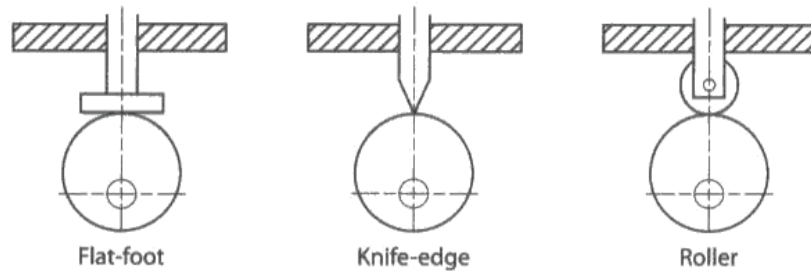


Figure 8

(a) Give **two** operational characteristics for each of the cam followers.

(6)

Flat-foot

- 1 Has the most <sup>friction.</sup> ~~surface area~~ between the cam and the follower.
- 2 Produces a movement which is gradual and smooth.

Knife-edge

- 1 Second most friction between the cam and the follower.
- 2 Big oscillations movement, sharp movements upwards and downwards.

Roller

- 1 Lowest <sup>friction</sup> ~~space area~~ between the ~~cam and the roller~~ <sup>roller</sup> and the follower.
- 2 Gives a steady and smooth movement.



### ResultsPlus Examiner Comments

This candidate scored 3 out of 6 marks as the first point of each answer was correct, but the second point in each answer focused on the cam, not the follower.  
 1 mark for has most friction (BP2). 0 marks for gradual and smooth movement - this describes the cam, not the follower.  
 1 mark for second most friction (BP9) (this indicates the candidate understands the varying levels of friction in all three followers). 0 marks as this answer describes the cam and not the follower.  
 1 mark for lowest levels of friction (BP10). 0 marks as this answer describes the cam and not the follower.



### ResultsPlus Examiner Tip

Quite often in questions like this, the answer to one part will be the direct opposite to another, e.g. the **high** friction of the flat-foot follower and **low** friction of the knife-edge follower, **both** score a mark.

## Question 6 (b)

This question was designed to allow the candidate to **describe how** the process which occurs in reactive glass when exposed to a stimulus.

Candidates answered this question in a wide variety of ways and due to the 'mixed messages' between the specification and the textbook, candidates were awarded the marks for photochromic glass/reactive glass.

(b) Reactive glass is used in a range of products.

Describe how reactive glass is able to change its state from clear to tinted and back again.

(2)

reactive glass has a reaction with light  
so when a certain amount of light is  
present they will fine and then unfine  
when the light are certain amount of light



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**Examiner Comments**

This example shows how the candidate has read the question and then just written a brief outline, without giving any facts. 0 marks awarded as the candidate just rewords the question and doesn't describe HOW or WHY the process works. Just mentioning, a certain amount of light, is too vague.

(b) Reactive glass is used in a range of products.

Describe how reactive glass is able to change its state from clear to tinted and back again.

(2)

When there is high amount of  
ultra-violet light, the chemicals in the  
glass change from being clear to being  
opaque but, once the UV source has  
been removed it becomes transparent again.



**ResultsPlus**

**Examiner Comments**

A clear answer which covers the necessary bullet points to score full marks (2/2).

1 mark for ultra-violet light (BP2). 1 mark for chemical change (BP3).

## Question 6 (c)

This question allowed candidates to show their knowledge and understanding of solar panels and their application.

The question clearly focusses on solar panel for **domestic hot water**. Too many candidates answered outside this and therefore failed to score well.

(c) Give **two** advantages of using solar panels to heat domestic hot water.

(2)

- 1 Using solar panels to heat domestic hot water saves energy from being used from man made sources.
- 2 Using solar panels lowers the production of CO2 emissions.

(Total for Question 6 = 10 marks)



**ResultsPlus**

**Examiner Comments**

Although the candidate does not use the ideal terminology, they do express both points correctly so get full marks (2/2).  
1 mark for saves energy being used from man-made sources (read don't use finite/man-made resources) (BP5).  
1 mark for lowers production of CO2 (BP4).

(c) Give **two** advantages of using solar panels to heat domestic hot water.

(2)

- 1 Once they are installed you will no longer have to pay monthly heating bills.
- 2 You will no longer need the gas or oil which was before burning creating carbon dioxide, you will have lowered your carbon foot print.

(Total for Question 6 = 10 marks)



**ResultsPlus**

**Examiner Comments**

Sometimes candidates answer in such a way as to cross between two bullet points in the mark scheme as can be seen in the second answer.  
1 mark for no longer have monthly bills (BP1).  
1 mark for no longer need gas and oil (EITHER BP4 OR BP5).

## Question 7 (a)

This question was focussed on whether candidates understood the advantages of modelling in a non-physical way.

Many candidates were aware of the more simple concepts, e.g. making changes easily, but a surprisingly small number of candidates were able to give 4 reasons.

7 Computer aided design (CAD) can be used to create 3D 'virtual' models.

(a) Outline **four** advantages of using a 'virtual' model as part of the design development process.

(4)

- 1 Allows you to make changes to the design quickly.
- 2 Enables you to electronically share the design so that others can see it & give feedback.
- 3 ~~the~~ You are able to see your design in the colour & material it will be made in.
- 4 You can simulate scenarios on the computer before you ~~to~~ even start production & testing.



### ResultsPlus Examiner Comments

Although the candidate's answers do not contain many of the words used in the mark scheme, the answers are generally correct and are awarded the marks as they can be linked to separate bullet points in the mark scheme.

1 mark for changes to design quickly (BP1).

1 mark for electronically share the design (BP3).

1 mark for see design in colour and material it will be made in (BP6).

1 mark for simulate scenario on computer (BP5).

7 Computer aided design (CAD) can be used to create 3D 'virtual' models.

(a) Outline **four** advantages of using a 'virtual' model as part of the design development process.

(4)

- 1 it gives a rough idea of what to expect from the final ~~two~~ product.
- 2 its cheaper than making a normal model.
- 3 it ~~gives~~ makes it easier to tweak parts of the model that need changing.
- 4 it requires less machinery to make it than to make a life model.



**ResultsPlus**

**Examiner Comments**

This answer doesn't score as well as possible as the candidate is both vague in places and repeats answers.

0 marks for rough idea - too vague.

1 mark for cheaper than a normal (read physical) model (BP2).

1 mark for easier to tweak (read change) parts of the model (BP1).

0 marks for less machinery which is implying it is cheaper, which has already been credited in answer 2.



**ResultsPlus**

**Examiner Tip**

'Slang' words like 'tweak' are best avoided.

## Question 7 (b)

This question requires a good deal of thought prior to starting the answer. It is designed to get candidates to give Pros and Cons of Computer Aided Manufacture, using the chess pieces as a vehicle to hang their answer on.

Many candidates scores reasonably well on this question as it allows for a wide variety of knowledge to be included.

\* (b) Figure 9 shows a number of turned aluminium chess pieces which have been manufactured using a computer numerically controlled (CNC) lathe.

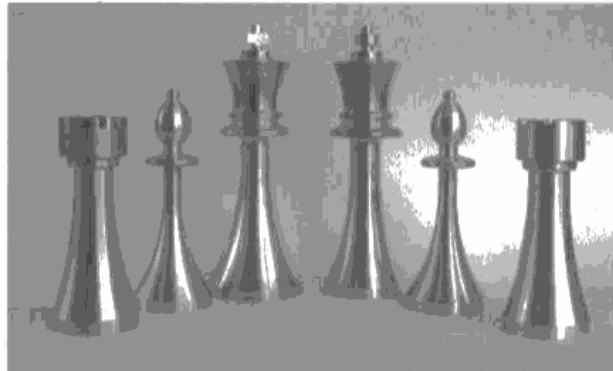


Figure 9

Evaluate the use of computer aided manufacture (CAM) in the production of these chess pieces.

CAM (8)  
~~can~~ has most likely been used to make  
the measurements, accurate and made  
the pieces proportioned to one and other.  
It has given the designers an insight

to there final product, and a chance to change things they dont like about it.

The ~~CAM~~ of these chess pieces, have allowed the designers to have an accurate and detailed finish added to there product.

CAM has also allowed for more details to be added. CAM has ~~pr~~ most likly made it cheaper to make the final product, and can also make it easier to make the product in batch or maybe even mass production.

(Total for Question 7 = 12 marks)



## ResultsPlus

### Examiner Comments

The candidate appears to have seen some key words in the question and then written down all they know about the topic rather than relating it to the thrust of the question. 1 mark for accuracy (BP2).

The rest of the answer is vague and makes reference to things which are not specifically related to CAM production.



## ResultsPlus

### Examiner Tip

A quick double column list of pros and cons will enable candidates to see whether they have 8 separate points, including at least one pro or con.



\*(b) Figure 9 shows a number of turned aluminium chess pieces which have been manufactured using a computer numerically controlled (CNC) lathe.

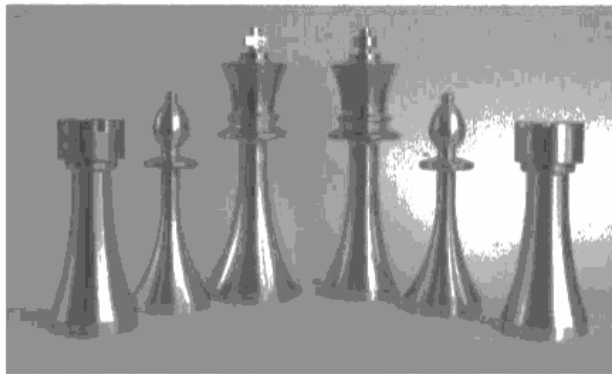


Figure 9

Evaluate the use of computer aided manufacture (CAM) in the production of these chess pieces.

(8)

CAM is a very good process to use when creating products like these chess pieces because of many reasons. CAM reduces the labour costs because only 1 person is needed to ~~overlook~~ <sup>overlook</sup> the machine and he does not interact with the production.

~~safe~~ <sup>this</sup> therefore means human error is eliminated because after the design has been finished machines do the rest. Using a CNC lathe also means that each mass piece will be 100% accurate and the pieces where more than one is produced will be identical, this would be impossible to do if they were handmade.

Using the CNC machine also reduces the production time because it ~~take~~ would take a person weeks to hand make mass pieces whereas the machine would produce all of them in a matter of hours, therefore as mentioned before costs of labour are reduced significantly. So overall these points show that using CAM is a very high quality productive process. It also is much safer than hand producing the pieces.  
(Total for Question 7 = 12 marks)



## ResultsPlus

### Examiner Comments

Many good points are made by the candidate but either they did not count up how many points they had made, or their knowledge did not stretch to 8 separate points which meant they only scored 6 out of 8.

1 mark for less labour (BP9). 1 mark for human error is eliminated (BP15). 1 mark for 100% accurate (BP2). 1 mark for where more than one is produced will be identical (BP4). 1 mark for reduces production time (BP3). 1 mark for much safer than hand production (BP11).

## Paper Summary

In order to maximise marks the following points should be observed:

- Make sure that candidates understand the trigger words in the question.
- Avoid unstructured answers. The use of bullet pointed statements, even in extended evaluate type questions, can help **some** candidates to score better marks.
- Questions can come from **all** parts of the specification to ensure that the candidates have covered **all** of the specification.
- Make sure that candidates use technical language where appropriate.
- Use past question papers and mark schemes as part of the preparation for the exam.

Exam technique:

- If at all possible, candidates should **not** go outside the clip (designated answer space) with their answers.
- Candidates must think/plan **before** answering.
- Candidates should spend a moment reflecting on whether they have justified/given an example for questions which require it.
- As a general rule, there are **two** lines given per mark awarded for an answer.
- There should be sufficient space in the answer booklet to score **full** marks without going onto a separate sheet.
- If the candidate is word processing their answers, they should try to structure them so that they are in the same format as the question paper, i.e. if there is a 'give **four**' type of question, then the answers should ideally be on four separate lines.
- The most common 'fault' is repeating facts in different words, which wastes time and often results in unnecessary extra pages being used.
- If an answer does exceed the space given, it is helpful if the candidate puts some sort of indicator for the examiner.

## **Grade Boundaries**

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