



**General Certificate of Education
June 2010**

**Design and Technology:
Product Design (3D-Design)
2551**

**PROD3
Design and Manufacture**

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

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Question 1

01

Candidates may begin/ or include a definition of 'iconic design' e.g.

- Exhibits elements of – originality, excellence, utility
- Stands the test of time
- Sets bench marks for others to follow etc

Anticipate examples being given to support explanations, links to modern design, principles of form/ function, innovation/ invention.

Marks:

Low: Simple statements, which show weak/ poor understanding of what constitutes good design. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-4 marks

Inter: Shows understanding but lacks detail, generalised statements with minor factors or few point made. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

5-9 marks

High: Wide and varied range of methods described with both detail and depth of understanding. Candidate has expressed complex ideas extremely clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

10-14 marks

02

Example iPod although not yet perceived to be long lasting, has originality, sets bench mark for other MP3 players, status as fashion icon, uses new technology, simple aesthetics etc.

Marks:

Low: Selected product is generic and lacks sufficient detail to support selection and identification of valid criteria. Sketches are poor and do little to provide clarity. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-4 marks

Inter: Suitable product is identified and has a small number of key features identified which relate to the stated criteria. However, although it shows understanding it lacks detail and has more generalised statements and minor inaccuracies. Reasonable sketches with suitable annotation. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

5-9 marks

High: Wide and varied range of key features described with both detail and reference to the stated criteria and highly appropriate to the chosen product. Excellent sketches and annotation. Candidate has expressed complex ideas extremely clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

10-14 marks

TOTAL FOR QUESTION 1: 28 marks

Question 2

03

Example should be specific and as required provide the detail of both when and why they are used. Do not expect the answers to separate out the two elements.

Better candidates will hopefully provide actual example of the method when feasible e.g. freehand sketches.

- i. Used when generating initial ideas/ exploring concepts. Quick to produce, little equipment.
- ii. In planning or to guide/ show procedures to work through. Scheduling to provide structure and organisation.
- iii. In communication with/ to manufacture. Working drawings to convey details necessary for manufacture – dimensions material etc.
- iv. In development or modification of designs, experimenting with changes, easy to edit designs, links to CAM, provides accuracy etc.
- v. Prior to production to aid selection of design through physical testing. Saves cost of changes once manufacture set up is in place. To show to clients/ user evaluations.
- vi. Prior to idea generation, in establishing target market/ style focus etc. To create image, inspiration, suggestions for colour/ fashion/ style.

Marks:

Low: Non-specific or inappropriate examples. Fails to show when/why method of communication is used. Shows limited understanding of method and/or use. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-2 marks

Inter: Specific examples used which are appropriate and demonstrates reasonable appreciation of methods and use. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

3-5 marks

High: Accurate and appropriate examples which show excellent appreciation of when/ why methods are used. Candidate has expressed complex ideas extremely clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

6-7 marks

Max of 7 x 4
marks

TOTAL FOR QUESTION 2: 28 Marks

Question 3

04

Ensure that the two products discussed are quite different so that repeat/ overlap of information is limited. Some modern products have been specifically designed/ modified to limit effect on the environment. Washing machines, light bulbs, motor vehicles, kettles, heating system, electronic products etc. Eco design, green design legislation etc.

Answers are required to make reference to four different aspects relevant to sustainability but these are not required to be covered equally in depth or detail. More able candidates will, no doubt include most/ all aspects in their answers.

Raw materials – effects of excavation/ processing, finite or re-newable resource, use of energy.

Manufacture – wastage of material, use of energy, efficiency, stockpiling.

Use & Function – efficiency of product, energy consumption.

Disposal – Re-use, re-cycle, disassembly.

Marks:

Low: General descriptive issues only, does not show real understanding of sustainability/ environment. Only one or two points, with poor descriptions. Considerable repeat information. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-4 marks

Inter: Shows basic understanding of sustainability etc and provides a number of relevant examples which are relevant to issues. Some elements of repetition/ overlap. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

5-9 marks

High: Fully appreciates environmental/ sustainability issues across two different products. Candidate has expressed complex ideas extremely clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

10-14 marks

Max of 14 x 2
marks

TOTAL FOR QUESTION 3: 28 Marks

Question 4

05 Correct answer required as only a single mark award.
E.g. mobile phone/ medical thermometer/ control system/ central heating/
portable power tools/ mobile communications 4 x 1 marks

06 Ensure that a specific product has been used and that it is the application to
function/ use rather than design or manufacture which has been enhanced.

- i.** Mobile telephone hands-free, system (central heating), remote control, PC to
peripheral (mouse/ printer) links etc.
- ii.** Thermo-chromic, shape memory, smart textiles, glass etc.
- iii.** IC – ditigisation, miniaturisation, programme and control systems.
- iv.** Size reduction, portability, safety etc.

Marks:

Low: Candidate shows limited understanding or knowledge of the different
terms. Response is largely a generalised description with concentration on one
or two aspects only. Answer appears to be confused and/ or does not relate to
appropriate application. Sentences and paragraphs may not always be well
connected. Arguments may stray from the point or be weakly presented.
There will be a number of errors of grammar, punctuation and spelling. 0-2 marks

Inter: Candidate understands the principles/ application of each of the terms
and applies them to an appropriate chosen product. There may be a small
number of errors or confusion with the application to the chosen product.
Candidates express moderately complex ideas clearly and with reasonable
fluency, through well linked sentences and paragraphs. Arguments are
generally relevant and well structured. There may be occasional errors of
grammar, punctuation and spelling. 3-4 marks

High: Candidate fully understands the application of the technology and
provides a sophisticated analysis of the chosen product, making reference to all
of the potential improvements and provides a detailed and accurate description.
Sentences and paragraphs follow on from one another smoothly and logically.
Arguments are relevant and well structured. There are few, if any, errors of
grammar, punctuation and spelling. 5-6 marks

Max of 6 x 4
marks

TOTAL FOR QUESTION 4: 28 Marks

Question 5

07

It is expected that a specific industrial application is stated and that answers will separate out the two aspects required with little overlap or repeat of information.

- Manufacture – accept both CAD and CAM/ CNC linked together. Small scale for accuracy as well as volume production issues CIM/ CAE/ robotic control systems, applications to FMS etc.
- Marketing/ supply – QRM, EPOS – JIT, Kanban, MPS, Telematics etc.

However, as the question is written, candidates may blend elements of their answers together and so should not be penalised. Marks could be awarded as shown below.

Marks:

Low: Candidate provides explanations at a very basic level only. Simplistic statements and concentrates on a small number of obvious/ generic points. Application to industry is non-specific. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling. 0-9 marks

Inter: Candidate shows understanding and is able to explain the importance of ICT to both areas separately. There may be minor inaccuracies or repetitions but points will be supported by explanation and detail. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling. 10-19 marks

High: Candidate shows very good understanding and appreciation of the applications of ICT in various ways to improve both production and marketing/ supply to specific industry. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling. 20-28 marks

TOTAL FOR QUESTION 5: 28 Marks

Question 6

08

The answer does not require candidates to separate ergonomics from anthropometrics but it is anticipated that the better candidates will show that they understand each as separate entities which contribute to the success of a specific product.

The selection of a suitable product/ environment will, no doubt, have some influence upon the quality/ variety of the answer and points covered. Anticipate – hand tools, hand held products – iPod/ kettles. Use for disable or specific market. Environments such as buildings, vehicles etc.

Marks:

Low: Candidate shows only basic knowledge of the terms (or may concentrate upon one only) and how they are linked to the specific needs of the user. Chosen product/ area will have given limited opportunity and issues will be elemental. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-6 marks

Inter: Candidate has a reasonable understanding and knowledge of the terms and their application. Can link these to appropriate products/ environments to show understanding. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

7-12 marks

High: Candidate fully appreciates how both terms and how they meet specific and varied needs, links these both comfort and function/ use. Sentences and paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

13-18 marks

09

Answer relates to safe use of **one** of the products not its manufacture.

(i) and (ii) have similar considerations – electrical safety, guarding, ease of use/ weight etc, although low voltage power supply is not appropriate to hair dryer.

Marks:

Low: Simple statements, generic non-specific to product, some inaccuracies. Few number of issues described, shows a lack of knowledge of the problems and how they may be eliminated. Sentences and paragraphs may not always be well connected. Arguments may stray from the point or be weakly presented. There will be a number of errors of grammar, punctuation and spelling.

0-3 marks

Inter: Shows understanding but lacks detail, generalised statements with minor inaccuracies. Candidates express moderately complex ideas clearly and with reasonable fluency, through well linked sentences and paragraphs. Arguments are generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.

4-7 marks

High: Wide and varied range of issues described with both detail and reference to the specific application, appropriate to product. Sentences and

paragraphs follow on from one another smoothly and logically. Arguments are relevant and well structured. There are few, if any, errors of grammar, punctuation and spelling.

8-10 marks

TOTAL FOR QUESTION 6: 28 Marks