Cambridge Assessment International Education

Cambridge International AS & A Level

DESIGN & TECHNOLOGY **9705/03**

Paper 3 A Level Written Paper **For examination from 2025**

MARK SCHEME

Maximum Mark: 100

Specimen

This document has **28** pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptions for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptions for the question
- the specific skills defined in the mark scheme or in the generic level descriptions for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptions.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptions in mind.

Guidance on using levels-based mark schemes

Marking of work should be positive, rewarding achievement where possible, but clearly differentiating across the whole range of marks, where appropriate.

The marker should look at the work and then make a judgement about which level statement is the best fit. In practice, work does not always match one level statement precisely so a judgement may need to be made between two or more level statements.

Once a best-fit level statement has been identified, use the following guidance to decide on a specific mark:

- If the candidate's work **convincingly** meets the level statement, award the highest mark.
- If the candidate's work **adequately** meets the level statement, award the most appropriate mark in the middle of the range (where middle marks are available).
- If the candidate's work **just** meets the level statement, award the lowest mark.

Annotation

- Ticks have no defined meaning for levels of response marking.
- Other annotations will be used by examiners as agreed during standardisation, and the meaning will be understood by all examiners who marked that paper.

Question	Answer	Marks	Guidance
1(a)	**State a suitable material for the stand shown in Fig. 1.1.** **Give <u>two</u> reasons to justify your choice.** Exemplar answers: Material: Aluminium Reasons: • It is strong enough not to deform or snap with regular use • It is lightweight for ease of portability • It is easy to bend into the required shape Material: Acrylic Reasons: • It comes in a choice of different colours • It is lightweight for ease of portability • It is easy to bend/mould into the required shape Material: Beech Reasons: • It has aesthetic qualities – beech wood has an attractive grain • It is environmentally friendly – beech wood is a sustainable/renewable resource/can use thin strips of hardwood for lamination, reducing wastage • It has a choice of finishes such as varnish or paint Accept all valid responses.	**3**	Award one mark for an appropriate material. Award one mark for each appropriate reason up to a maximum of two marks. The reasons must be relevant to the chosen material.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(b)</td><td>
Use sketches and notes to show how you would make one stand as shown in Fig. 1.1 in a school workshop.

In your response, you should give details of any tools and equipment you would use.

Marking grid for AO1a Knowledge and understanding

Candidates should be able to:

• Demonstrate knowledge and understanding of a range of materials, tools, equipment and components used in design and technological activity. (AO1a)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and detailed knowledge and understanding of an appropriate range of tools and equipment. (AO1a)</td><td>2–3</td></tr>
<tr><td>Level 1</td><td>Partial knowledge and understanding of an appropriate range of tools and equipment. (AO1a)</td><td>1</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>
</td><td>9</td><td>
Award up to a maximum of three marks using the marking grid for AO1a Knowledge and understanding.

Award up to a maximum of four marks using the marking grid for AO2a Application of knowledge and understanding.

Award up to a maximum of two marks using the marking grid for AO2b Communication using sketches and notes.

To award full marks, answers must:
• include the manufacturing method for all parts of the stand
• identify the correct tools and equipment.

Full details of CAD drawing and set up are required for 3D printing answers.
</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(b)</td><td>

Marking grid for AO2a Application of knowledge and understanding

Candidates should be able to:

- Apply knowledge, understanding and skills in a variety of contexts. (AO2a)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and detailed application of knowledge and understanding of an appropriate range of tools and equipment for the product. (AO2a)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>Partial application of knowledge and understanding of an appropriate range of tools and equipment for the product. (AO2a)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:

- Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and easily understood. (AO2b)</td><td>2</td></tr>
<tr><td>Level 1</td><td>Partial communication. (AO2b)</td><td>1</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Responses may include some of the following ideas, but all valid material must be credited.

</td><td></td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
1(b)	Methods of making the stand could be: • Prepare formers for lamination • Glue thin strips together to required thickness, protect strips when placing between formers • Cramp together until set – remove • Drill ∅25 forstner bit to depth • Finish with glasspaper, apply surface finish • Cut aluminium bar to length • Finish ends, file, abrasive paper or mill • Secure in vertical or horizontal miller to cut to shape • Secure in vertical miller to cut ∅25 recess to depth • Remove from mill • Ensure no sharp edges, polish finish • Cut acrylic strip of correct section to length (taking into account extra for bending) • Hold work firmly and use flat-bottomed drill for ∅25 recess (could cut ∅25 hole in 3 mm acrylic sheet and glue to top surface when bent) • Use line bender/strip heater and former to accurately bend to shape – final shaping and finishing Accept all valid responses.		

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1(c)</td><td>
Use sketches and notes to describe the changes which may be necessary to the design, manufacturing method and the materials selected, to produce 5000 identical stands.

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:
• Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>• The sketches are detailed and are successfully communicated with precision and clarity. (AO2b)
• The sketches have detailed and correct annotations, including where relevant appropriate conventions and specialist vocabulary. (AO2b)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>• Partial communication through simple sketches. (AO2b)
• The sketches have limited annotations, with limited conventions and specialist vocabulary. (AO2b)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Exemplar answers:

<u>Materials</u>
Any two from:
• Nylon
• Acrylic
• Aluminium
• Mild steel
• Polymer resins
</td><td>8</td><td>Award up to a maximum of four marks using the marking grid for AO2b Communication using sketches and notes.

Award up to a maximum of two marks for the materials.

Award up to a maximum of two marks for the manufacturing method.</td></tr>
</table>

Question	Answer	Marks	Guidance
1(c)	Manufacturing method Any **two** from: • Injection moulding • Extrusion • Profile formed wood section • Pressing • Automated milling Accept all valid responses.		

Question	Answer	Marks	Guidance
2(a)	**Explain what is meant by the term quality assurance.** Exemplar answers: • Quality assurance is completed by a company to ensure that the product meets the quality standards set [1] at every stage of the production process [1] • Quality assurance is a system of planned actions and procedures set up to check at every stage of the process [1] before, during and after manufacture [1] Accept all valid responses.	**2**	Accept a similar meaning.

Question	Answer	Marks	Guidance
2(b)	**Explain <u>two</u> benefits of introducing Total Quality Management (TQM) procedures in a manufacturing company.** Any **two** benefits from: • It can reduce errors/prevent recurrence of similar errors [1] resulting in the customer benefiting from a better product and lower costs [1] • It can reduce waste [1] which is better for the environment/reduces the cost [1] • Testing can guarantee the manufacture of a quality product [1] eliminating faulty products [1] • It can increase customer approval/satisfaction [1] by reliability recognition [1] • It can increase the sales of the company [1] through company reputation [1] • It can improve processes/increase employee involvement/make the employee feel like a valued member of the company [1] resulting in a happier/more satisfied workforce [1] Accept all valid responses.	**4**	Award up to a maximum of two marks for each relevant benefit.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>2(c)</td><td>
Use sketches and notes to show a method of testing the hardness of a material.

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:
• Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and easily understood, showing force applied and indentation shape. (AO2b)</td><td>2</td></tr>
<tr><td>Level 1</td><td>Partial communication. (AO2b)</td><td>1</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Exemplar answers:
• Hardness testing involves indentation of the material [1].
The hardness is calculated by measuring the force applied and comparing this to a geometrical aspect of the indentation, such as the surface area or depth [1]
</td><td>4</td><td>Award up to a maximum of two marks using the marking grid for AO2b Communication using sketches and notes.

Award one mark for the hardness described.

Award one mark for the method of measurement.

Test could be based on the Brinell test, the Vicker’s Diamond test or the Rockwell test.</td></tr>
</table>

Question	Answer	Marks	Guidance
3(a)	**A company is designing a product for a target group of customers.** **Explain why information about the socio-economic background of target customers is important to have when designing a product.** Exemplar answers: • Knowledge of the socio-economic background of the target customers helps to identify a group of customers to design for [1]. Focusing on one group of customers reduces the number of needs to consider [1] • Knowledge of the socio-economic background reduces the list of requirements [1] • Knowledge of the socio-economic background helps design companies to more easily produce a product that fulfills the needs of the customers [1]. Each group of customers may have a specific need, such as cost or product shape/features [1] • Knowledge of the socio-economic background can help companies to know how appealing the product could be before they launch it to market [1] • Demographic and socio-economic segmentation is based on a wide range of factors, including age, gender, family size, income, education, social class and ethnic origins [1]. Information gained from breaking down the market in this way helps to build the profile of people who purchase a company's product or services [1] • Designers can offer variations of the same product [1] to increase the company's market presence [1] Accept all valid responses.	**3**	Award one mark for each relevant point. Award one additional mark for a developed response.

Question	Answer	Marks	Guidance
3(b)	**Explain <u>one</u> factor that a company would consider when setting the price of a product.** Exemplar answers: • One factor that a company could consider when setting the price of a product is the direct costs of producing the product [1]. The direct costs such as the price of raw materials, the cost of the energy used in the production process or other manufacturing costs are variable – the more a company produces the higher the direct costs will be [1]. The price for the product needs to ensure that all the costs of producing the product, direct and indirect costs, are covered [1] • One factor that a company could consider when setting the price of a product is the indirect costs of manufacturing the product [1]. The indirect costs could be employment costs, premises rent or marketing or advertising costs [1]. Indirect costs tend to be fixed, and are not dependent on how many products the company sells [1] • A company should have a pricing strategy to help them set the price of their product [1]. For example, a company launching a new product could choose to set a relatively low price to help them build market share [1]. Or, it could follow the opposite approach, setting a high price that early adopters will be prepared to pay to get hold of a new and exclusive product [1] Accept all valid responses.	**3**	Award one mark for the identification of an appropriate factor. Award up to a maximum of two additional marks for an appropriate explanation.

Question	Answer	Marks	Guidance
3(c)	**Explain <u>two</u> disadvantages of a product extension strategy that adds more features to a product.** Any **two** disadvantages from: • Adding more features could make it a more expensive product [1] as more material/processing could be needed [1] • Adding more features could add complexity [1] and be more difficult to use [1] • Adding more features could increase the risk of things going wrong [1] during manufacture or result in additional function failure [1] • The consumer could dislike the change because the product is different to the original [1] which could result in a loss of sales [1] Accept all valid responses.	**4**	Award up to a maximum of two marks for each relevant disadvantage.

Question	Answer	Marks	Guidance
4(a)	**Explain the purpose of a prototype when manufacturing products.** Exemplar answers: • A prototype is the first example of something [1], such as a vehicle from which all later vehicles are manufactured [1] • A working prototype is a working model made to test the function and feel of a design [1] and identify production needs before manufacturing begins [1] • A prototype represents all or nearly all the functionality of the final product [1] and is used to check fitness for purpose before the product is manufactured in quantity [1] • A prototype helps to identify faults [1] and enable changes/improvements to be made before the product is manufactured in quantity [1] Accept all valid responses.	**2**	

Question	Answer	Marks	Guidance
4(b)	**Explain <u>one</u> feature of concurrent engineering.** Exemplar answers: • Simultaneous development of components [1] reduces lead time to market [1] • Speedier production [1] generates increase in products produced [1] • It increases productivity [1] by stopping mistakes in their manufacturing cell [1] Accept all valid responses.	**2**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>4(c)</td><td>

Discuss the economic and social impact of the use of automated production systems in the manufacture of products.

Marking grid for AO4d Analysis of wider issues in design and technology

Candidates should be able to:
- Analyse wider issues in design and technology (including cultural, economic, environmental and social factors). (AO4d)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 3</td><td>Analysis of more than two wider issues with relevant and detailed information

• Detailed discussion of more than two wider issues in design and technology. (AO4d)
• The analysis is well supported with relevant and detailed information. (AO4d)</td><td>5–6</td></tr>
<tr><td>Level 2</td><td>Analysis of at least two wider issues with relevant information

• Discussion of at least two wider issues in design and technology. (AO4d)
• The analysis is supported with relevant information. (AO4d)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>Description of at least one wider issue with limited relevant information

• Description of at least one wider issue in design and technology. (AO4d)
• The description is supported with limited relevant information. (AO4d)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>• No creditable response.</td><td>0</td></tr>
</table>

</td><td>6</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
4(c)	Use the marking grid for AO4d Analysis of wider issues in design and technology to mark candidates' responses to this question. Responses may include some of the following ideas, but all valid material must be credited. • Automated production systems are expensive to set up but potentially cheaper to run in the long term. This could result in the manufacturer been able to offer the product more cheaply in the long term • For the workforce, there would be an impact on skills needed. There may be fewer available qualified workers. Workers may require specialist training. This could have an impact on the cost of manufacturing the product as higher skilled workers would expect higher salaries, and there would be a cost to provide the training. The higher manufacturing costs could result in the manufacturer having to increase the prices of their products to finance the additional cost in the short term, which could in turn reduce the sales of the product • Automated production requires fewer workers. Some may be low waged but the remainder are likely to be highly skilled • Automation may also have an impact on the types of roles required in the workforce with a reduction in the number of existing roles and a need for new roles. This could lead to redundancies in the existing workforce and new workers moving to the local area • Automation requires skilled technicians/IT specialists to set up equipment and maintain it. The manufacturer may have to recruit new workers in this skill area • Redundancies to replace manual labour with automated systems can have an adverse effect on employment prospects in the local area leading to larger numbers of people being unemployed/looking for work • If the manufacturer is not able to attract highly skilled workers to the local area, they may have to relocate to another area where there are more skilled workers available. Or it could be that the manufacturer cannot afford to pay the high wages demanded from the highly skilled workforce, and has to consider relocating to another area/country where the salaries of highly skilled workers are lower		Credit any appropriate economic or social issue. Marks can be awarded for more than one wider economic or social issue as long as they are distinct from each other.

Question	Answer	Marks	Guidance
4(c)	• Implementing automated processes can eliminate the most time-consuming, repetitive tasks, freeing up the workers' time for more important/creative tasks. Additionally, computers and machines tend to be more accurate in their work, unless a technical error disrupts workflow		

Question	Answer	Marks	Guidance
5(a)	**Describe <u>one</u> service sector in the design and manufacturing industry.** Exemplar answers: • Extraction of raw materials [1] to provide materials for use for building, etc. [1] • Design and development services [1] to improve/develop provisions [1] • Manufacturing [1], e.g. consumer products [1] • Education/training [1], e.g. school and college provision [1] • Repair/maintenance [1] to ensure safe and efficient use of equipment and resources [1] • Marketing [1] to inform target markets [1] Accept all valid responses.	**2**	Award one mark for an appropriate service sector. Award one additional mark for an appropriate description of the named service sector.
5(b)	**Explain <u>one</u> type of software program that is used in the development of products.** Exemplar answers: • CAD 3D modelling/simulation software [1] which allows virtual modelling and designing of a product, reducing lead times [1] • Desktop publishing software such as Microsoft Publisher [1] to create designs for publishing in digital formats, such as online newspapers, magazines or blogs [1] • Collaboration software programs such as Miro [1] which allow for collaborative working for designers based in different locations [1] Accept all valid responses.	**2**	Award one mark for an appropriate type of software used in the development of products. Award one additional mark for a relevant explanation of the type of software.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5(c)</td><td>
Discuss the advantages of using digital communication methods in the design of products.

Marking grid for AO4d Analysis of wider issues in design and technology

Candidates should be able to:
• Analyse wider issues in design and technology (including cultural, economic, environmental, and social factors). (AO4d)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 3</td><td>Analysis of more than two wider issues with relevant and detailed information

• Detailed discussion of more than two wider issues in design and technology. (AO4d)
• The analysis is well supported with relevant and detailed information. (AO4d)</td><td>5–6</td></tr>
<tr><td>Level 2</td><td>Analysis of at least two wider issues with relevant information

• Discussion of at least two wider issues in design and technology. (AO4d)
• The analysis is supported with relevant information. (AO4d)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>Description of at least one wider issue with limited relevant information

• Description of at least one wider issue in design and technology. (AO4d)
• The description is supported with limited relevant information. (AO4d)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>• No creditable response.</td><td>0</td></tr>
</table>
</td><td>6</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
5(c)	Use the marking grid for AO4d Analysis of wider issues in design and technology to mark candidates' responses to this question. Responses may include some of the following ideas, but all valid material must be credited. • Digital communication methods allow for more remote communication. You can reach a more diverse range of designers/collaborators in different locations and across different companies • There is less need for a physical design studio/collaborating in the same space. This can allow design companies to save on office rental and travel costs • Design companies may be able to attract a wider range of designers, not only the ones who live locally, as they can collaborate with them through the use of collaboration software packages and software such as Microsoft Teams and Miro • Designers may prefer not to go into a physical office to work as they can save on travel cost and time • Digital communication methods have other advantages such as speed of amendment/accuracy/replicability/quality of design output allowing design companies to work in a more efficient way in the long term		Credit any appropriate advantage of using digital communication methods. Marks can be awarded for more than one advantage as long as they are distinct from each other.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(a)</td><td>
Use sketches and notes to produce <u>two</u> different innovative ideas for a product that would enable exercise at home.

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:
• Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and easily understood. (AO2b)</td><td>2</td></tr>
<tr><td>Level 1</td><td>Partial communication. (AO2b)</td><td>1</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>
</td><td>12</td><td>For each innovative idea, award two marks using the marking grid for AO2b Communication using sketches and notes, and four marks using the marking grid for AO3c Generate conceptual ideas, up to a maximum of six marks.

The two ideas must be different from each other.</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(a)</td><td>

Marking grid for AO3c Generate conceptual ideas

Candidates should be able to:
- Generate conceptual ideas and evaluate them using an iterative design process, leading to the creation of a design proposal. (AO3c)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 3</td><td>• Generates one complete valid conceptual idea. The conceptual idea is fully supported. (AO3c)
• Clear reference to design specification. (AO3c)</td><td>4</td></tr>
<tr><td>Level 2</td><td>• Generates one complete conceptual idea. The conceptual idea has some supporting information. (AO3c)
• Some reference to design specification. (AO3c)</td><td>2–3</td></tr>
<tr><td>Level 1</td><td>• Generates one partially complete conceptual idea. The conceptual idea has limited supporting information. (AO3c)
• Limited or no reference to design specification. (AO3c)</td><td>1</td></tr>
<tr><td>Level 0</td><td>• No creditable response.</td><td>0</td></tr>
</table>

The design ideas may include some of the following ideas, but all valid material must be credited.

- Use simple spring resistance to exercise arms and/or legs, weights could also be used to give resistance
- Allow sitting and/or standing position
- Include variable resistance methods
- Include recording/measurement possibilities
- Attach to room fitments, e.g. door openings

</td><td></td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
6(b)	**Evaluate your <u>two</u> ideas to select a final proposal for a product that could be used for exercise at home.** • A clear justification of the choice with an explanation • Clear comparisons should be made • Evaluations should consider the specification points given in the question • Sketches and notes may be used to support evaluations Candidates can answer this question in a variety of ways. Accept all valid responses.	**3**	Award one mark for the decision with justification. Award one mark for the comparison of the two design ideas. Award one mark for the evaluation. Accept an answer which includes sketches and annotations as necessary.

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(c)</td><td>
Use sketches and notes to develop your chosen idea to show details of functions, materials, construction and finishes.

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:
• Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and detailed sketches and notes. (AO2b)</td><td>2</td></tr>
<tr><td>Level 1</td><td>Simple sketches with some notes included. (AO2b)</td><td>1</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

<u>Functions</u>
Award up to a maximum of three marks:
• Award one mark for one key function described.
• Award two marks for two key functions described.
• Award three marks for more than two functions described.

<u>Materials</u>
Award up to a maximum of two marks:
• Award one mark for naming one or more relevant material.
• Award one mark for the justification of use of the material.

<u>Construction</u>
Award up to a maximum of two marks:
• Award one mark for some detail of construction/assembly.
• Award two marks for clear detail of construction/assembly.

<u>Finishes</u>
Award one mark for an appropriate finish.
</td><td>10</td><td>Award up to a maximum of two marks using the marking grid for AO2b Communication using sketches and notes.</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(d)</td><td>
Using a method of your own choice, draw the complete design solution. Include key details and dimensions.

Marking grid for AO2b Communication using sketches and notes

Candidates should be able to:
• Communicate knowledge and understanding using sketches, notes and a range of graphical techniques, including conventions and specialist vocabulary. (AO2b)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>Clear and detailed sketches with most key dimensions included. (AO2b)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>Simple sketches with some dimensions included. (AO2b)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Marking grid for AO3d Finalise a design proposal

Candidates should be able to:
• Refine and develop procedures to finalise a design proposal, recognising the constraints of time, cost and resources, and plan for making. (AO3d)

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>Level 2</td><td>The design proposal is realistic and includes most design/product details. (AO3d)</td><td>3–4</td></tr>
<tr><td>Level 1</td><td>The design proposal includes some design/product details. (AO3d)</td><td>1–2</td></tr>
<tr><td>Level 0</td><td>No creditable response.</td><td>0</td></tr>
</table>

Appropriate drawings could be dimensioned orthographically or isometrically.
</td><td>8</td><td>Award up to a maximum of four marks using the marking grid for AO2b Communication using sketches and notes, and up to a maximum of four marks using the marking grid for AO3d Finalise a design proposal.</td></tr>
</table>

Question	Answer	Marks	Guidance
6(d)	Candidates may use component drawings with an assembled product sketch. Pictorial/perspective sketches should include all details and dimensions. Annotation may be used to describe key features.		

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(e)</td><td>
Write a detailed <u>manufacturing</u> specification for your chosen idea. Your answer should include at least <u>four</u> different manufacturing specification points.

Award marks based on the following criteria.

<table>
<tr><th>Level</th><th>Description</th><th>Marks</th></tr>
<tr><td>5</td><td>Four or more detailed manufacturing specification points covered and clearly described.</td><td>5</td></tr>
<tr><td>4</td><td>Three points covered and clearly described.</td><td>4</td></tr>
<tr><td>3</td><td>Two points covered and clearly described.</td><td>3</td></tr>
<tr><td>2</td><td>One point covered and clearly described.</td><td>2</td></tr>
<tr><td>1</td><td>One point covered but not clearly described.</td><td>1</td></tr>
<tr><td>0</td><td>No creditable response.</td><td>0</td></tr>
</table>

The manufacturing specification could include the following, but all valid material must be credited:

<u>Specific materials used:</u>
• Ø20 stainless steel tube and birch plywood for the main structure

<u>Bought in components/parts:</u>
• 12 M6 × 30 nuts, bolts and washers, 12 M6 × 15 set screws

<u>Construction/assembly details:</u>
• Three stainless steel tube components bent and welded. To be assembled with M6 × 30 nuts, bolts and washers' components. Two birch plywood boards to be assembled with M6 × 15 set screws

<u>Finish to be applied:</u>
• Polished stainless steel tube, matt polyurethane varnish for birch plywood
</td><td>5</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
6(e)	Allowable tolerance: • ± 0.25 mm for M6 attachment holes		
6(f)	**Describe one quality control check that could be used on your final manufactured product.** Any **one** from: • Visual check [1], checking for welding faults, accidental damage, proportional flaws [1] • Dimensional accuracy checks [1] mainly for assembly features, using digital tools, gauges [1] • Random sample checks [1] and general functional check on large batches [1] • Camera/computer checks [1] of weight, overall dimensions quickly checked [1] Accept all valid responses.	**2**	Award one mark for an appropriate quality control check. Award one additional mark for the description.