

OCR A-Level

**Optimum Use of
Materials and
Components (3.3a)**

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

Good luck!

Q1. Why might a designer choose plywood over solid hardwood when producing furniture for mass manufacture?

- A** Plywood has a higher aesthetic value than hardwood
- B** Plywood offers stability at a lower cost and reduced material waste
- C** Plywood requires more complex processing and tooling

Q2. Which design decision most effectively reduces the financial impact of high-cost materials such as aluminium?

- A** Increasing the thickness of all components
- B** Optimising geometry to maintain strength with minimal material use
- C** Specifying only bespoke components

Q3. Why do custom fasteners and bespoke electronic components significantly increase production costs?

- A** They reduce assembly time
- B** They are produced in limited quantities and lack standardisation
- C** They improve supply chain flexibility

Q4. A designer aligns their component dimensions with standard sheet size availability. What is the primary benefit?

- A** Enhanced product aesthetics
- B** Reduced offcuts and improved material yield
- C** Increased need for secondary machining

Q5. The image below shows a swing seat.



Discuss the sustainability issues that would need to be considered in the design and manufacture of the swing seat. Refer to specific examples from the swing seat in your answer. **(6 marks)**

Answers

Q1. B

Q2. B

Q3. B

Q4. B

Q5.

The designer of the swing seat needs an awareness of sustainability issues relating to industrial manufacture.

Indicate content:

Materials:

- Source of material. Candidates could discuss the use of sustainability sources timber from FSC approved forests, or the use of locally sourced materials. They could consider the impact of using more suitable outdoor timbers that are less sustainable to produce a product that is more hardwearing or naturally weatherproof.
- End of life: The use of natural materials and ease of disassembly and separation of parts means could be considered to ensure users could dispose of the products.

Manufacturing

- Efficiency: Candidates could discuss the efficiency of production lines and use of Design for manufacture principles to maximise sustainability.
- Transport and packaging. Ability to be transported without damage with minimal packaging and waste material.

Design

- Reducing material, optimising design. Candidates could discuss the advantage of making the design from separate parts that could extend the useful life, as parts could be replaced or updated when needed/ wanted.
- Replacement parts/ ease of repair. The use of standardised parts could be considered to ensure that the life of the product will exceed the life of the company. Enabling users to fix or replace parts locally.
- Any other suitable response.