

OCR A-Level

Material Suitability in Product Development (7.2e)

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. A designer chooses 1.5mm thick sheet steel over 3mm thick steel for a product enclosure primarily to reduce material cost. What other property is **most likely** being sacrificed?

- A Corrosion resistance
- B Electrical conductivity
- C Structural rigidity

Q2. For a high-volume consumer product like a plastic toy, which factor often becomes the **primary constraint** in material selection?

- A Availability in a wide range of colours
- B Suitability for high-speed injection moulding
- C Ultimate tensile strength

Q3. Which combination is **most critical** when selecting a material for a load-bearing bracket in a budget-conscious project?

- A High aesthetic finish and unique colour
- B Adequate strength at the lowest cost per unit volume
- C Ease of hand fabrication

Q4. The decision to use **standard stock sizes** of materials (e.g., 8' x 4' sheets, 6m lengths) is mainly driven by:

- A Improving the material's mechanical properties
- B Reducing waste and cost compared to custom sizes
- C Enhancing the product's user experience

Answers

Q1. C

Q2. B

Q3. B

Q4. B

Q5.

- Aluminium has a lower density than steel, making the chair lighter.
- Aluminium has better corrosion resistance for outdoor use.
- Aluminium tubing uses less material than solid rod for similar strength, reducing material cost.
- Aluminium is easier to cut and join than steel, lowering manufacturing time/cost.

Q6.

- Form chosen: Clay in liquid slip form (for slip casting).
- Influence on design: Allows for complex, hollow, and thin-walled shapes that would be difficult to hand-throw or carve.
- Influence on manufacturing: Requires a plaster mould to absorb moisture from the slip, setting the shape – suitable for batch production of identical items.
- Connection between design & process: The design must account for mould line placement, draft angles, and shrinkage of clay during drying/firing.

(1 mark for correct form, 1 for design influence, 1 for manufacturing influence, 1 for clear link between design and process.)

Q7.

- Thermal insulation: PP has lower thermal conductivity than stainless steel → better at keeping drinks cold/hot.
- Durability: Stainless steel is much more scratch and dent-resistant; PP can scratch and degrade with UV exposure.
- Weight: PP is significantly lighter than stainless steel → better for portable use.
- Recyclability: Both are recyclable, but stainless steel is easier to recycle infinitely without loss of quality.
- Manufacturing cost: PP is cheaper to injection mould at high volume; stainless steel requires more costly forming/welding/finishing.

(Scoring: 1 mark for accurate comparison per factor + 1 mark for reasoned judgement linked to bottle application per factor. Max 3 factors × 2 marks = 6 marks.)