

OCR A-Level

Optimising Materials and Production Processes (7.3c)

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. What is the primary purpose of using an economical lay plan in the cutting of sheet materials?

- A** To minimize material waste and reduce overall production costs
- B** To create aesthetically pleasing patterns on the finished product
- C** To make the manufacturing process more complex and time-consuming

Q2. Cost effective production for viability means that a product must be manufactured:

- A** Using the most expensive materials to ensure high quality
- B** At a cost that allows it to be sold profitably while meeting market demand
- C** Entirely by hand to guarantee craftsmanship

Q3. Which of the following is a direct result of optimizing production processes?

- A** Increased material waste and longer assembly times
- B** Higher unit costs and reduced profit margins
- C** Reduced labour hours and lower energy consumption per unit

Q4. Working to a budget in manufacturing requires designers to:

- A** Ignore material costs and focus only on product functionality
- B** Select processes and materials that keep production within financial constraints
- C** Use only automated systems regardless of initial capital cost

Answers

Q1. A

Q2. B

Q3. C

Q4. B

Q5.

Indicative content:

The guidance provided is illustrative and not exhaustive. Credit any worthy points made in support of the band descriptors above.

Nesting of shapes and parts/lay planning

- A process for planning and working out the best way to maximise the effective use of material and minimising waste as much as possible.
- By placing similar shapes and parts next to each other to minimise waste.
- Strategic way of planning material use and minimising waste.
- Looking for patterns in nesting eg inverting shapes being cut out if they are triangular to save material by placing parts as close together as possible.
- Tessellation is a process by which parts are placed together in interlocking and repeating patterns to minimise waste.
- Consideration of standard forms and sizes of available material to ensure materials are sourced in the most cost-efficient form to minimise waste.

Cutting techniques

- Allow for the width of saw cuts eg 2mm with a dovetail saw to ensure the process of cutting does not accidentally reduce the size of material being cut out.
- Failure to consider material removed by saw cuts will make shapes/parts being cut out possible too small (out of tolerance) and having to be rejected ie material wasted.
- Seam allowance to allow for an effective joint to be formed along the edges of fabric materials to be joined.
- Use of different coloured lines for cut and score/crease lines in paper and boards to ensure fold flaps and glue flaps are created to ensure effective assembly.

- Use of red line for cut and black lines for engrave/raster lines on a laser cutter to avoid errors in pre-cut checks.

Accept other responses.

Q6.

An outline covering any 6 of the following points:

- Set-up costs (1)
- Material costs (1)
- Labour costs (1)
- Transportation costs (1)
- Training and development costs (1)
- Manufacturing costs (1)
- Overhead costs / facilities costs (1)
- Sales and marketing costs /market research (1)
- Production capacity (1)
- Market trends (1)
- Break even output (1)
- Product retail price / affordability (1)
- Quality (1)
- Market demand / expected production output (1)
- Storage costs (1)
- Packaging costs (1)
- Energy costs (1)
- Inflation impacting on costs (1)
- Profit forecasts and requirements (1)
- Government policies (1)
- Long term aims and objectives (1)
- Contingencies / allowance for unexpected events (1)