

# Design & Technology

## AQA A-Level

# Paper and board forming processes

### Materials required for questions

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- Pencil
- Rubber
- Calculator

### Instructions

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- 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

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- 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 die cutting in paper packaging?

- A** Adding decorative colours
- B** Cutting precise shapes using a metal die
- C** Increasing material thickness

**Q2.** Which process uses a high-powered beam to create intricate designs in paper?

- A** Creasing
- B** Bending
- C** Laser cutting

**Q3.** Why is creasing applied to paper or board before folding?

- A** To weaken the fibres for easier bending
- B** To add waterproof coatings
- C** To enhance print quality

**Q4.** What is a key advantage of laser cutting over traditional die cutting?

- A** Lower initial setup costs for small batches
- B** Faster production of large quantities
- C** No need for skilled operators

**Q5. Describe the process of die cutting (6 marks)**

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**Q6. Describe the process of laser cutting cardboard (6 marks)**

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## Answers

**Q1.** B

**Q2.** C

**Q3.** A

**Q4.** A

**Q5.**

Die production

- A thin steel cutter blade is folded and shaped into the desired profile or shape.
- Creasing rules and perforations can be incorporated into the die depending on the required output.
- These blades are mounted into a substrate board/cylinder which maintains the shape and alignment of the die.

Mounting die in machine

- The die is mounted into a pressing machine that may be manual or hydraulic.
- The die can either be flat or cylindrical.

Feed card into machine

- Card blanks are fed into the press either in batches or continuously.

Card secured in place

- The substrate to be cut is located in the machine, often using locator guides to ensure the correct alignment.

Pressure applied to card

- The die is forced through the material and the waste material and die cut pattern is removed.

Pressure removed and card ejected

- A soft rubber support surrounds the die. This is compressed when the die is used and ejects the cut material when the force is removed.

**Q6.**

**Design Creation**

- A CAD (Computer-Aided Design) file is created with the desired shapes or patterns to be cut or engraved on the cardboard.

**Machine Setup**

- The laser cutter is set up by loading the cardboard material onto the cutting bed and adjusting focus, speed, and power settings suitable for cardboard (a low-density material).

**File Preparation**

- The design file is imported into the laser cutter software, where cut lines (usually in red) and engrave lines (in black or other colours) are defined.

**Focusing the Laser**

- The laser is focused precisely to ensure a clean cut. This usually involves setting the correct distance between the laser head and the surface of the cardboard.

**Cutting/Engraving**

- The machine uses a high-powered laser beam to either vaporise the material (cutting) or burn the surface (engraving) according to the design path.

**Finishing and Safety Check**

- After cutting, the parts are removed. The operator checks for burn marks, ensures the cut is clean, and disposes of waste safely. Proper ventilation is also important due to smoke produced.