

Design & Technology

AQA GCSE

Specialist techniques and processes

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 main aim of using specialist techniques and processes in prototype development?

- A** To make the prototype larger
- B** To add as many materials as possible
- C** To produce a high-quality outcome with accuracy

Q2. What is a *wastage* process?

- A** A method that adds material to a product
- B** A process that recycles leftover materials
- C** A technique that removes material to shape the product

Q3. Which of the following is an *addition* process?

- A** Cutting timber with a saw
- B** Welding two metal pieces together
- C** Filing an edge to smooth it

Q4. Which process involves changing the shape of a material without removing any of it?

- A** Deforming
- B** Wastage
- C** Cutting

Q5. Materials frequently have to be deformed and reformed. Choose one product from the table below.

		
Metal toy car	Birthday card	
		
Polymer toothbrush	Cotton skirt	Plywood chair

My chosen product is:

Q5a. Name a specific deforming or reforming process used in the manufacture of your chosen product. **(1 mark)**

Q5b. Explain why this process is used in the manufacture of your chosen product. **(2 marks)**

Q5c. What safety issues need to be considered when using the specific process given in your answer to Question 5b? **(2 marks)**

Q6. Describe how material can be formed when making a prototype. **(3 marks)**

Answers

Q1. C

Q2. C

Q3. B

Q4. A

Q5a.

Product	Process
Metal toy car	• Die casting • Gravity casting • Casting
Birthday card	• Creasing • Forming • Scoring • Embossing • Die cutter machine – as it can be used for creasing and perforation
Polymer toothbrush	• Injection moulding • Over moulding
Cotton skirt	• Pressing/Ironing • Folding • Pleating • Creasing (Do not accept gathering.)
Plywood chair	• Lamination • Steam bending • Bending • Former lamination • Vacuum bag lamination

Q5b.

Product	Process
Metal toy car	Casting • Create a one-piece form. • Create a fine detailed finish of car features.

	• A smooth finish which will accept a good paint finish.
Birthday card	Embossing • Create a relief pattern either raised or depressed to add texture and 3D qualities. Scoring • Make it easier to crease or fold at a precise point without tearing paper fibres. Creasing/Folding • So card can be bent/folded in a precise way at a precise point.
Polymer toothbrush	Injection moulding • An ergonomically shaped cavity in the required toothbrush shape. • Encapsulate bristles so they can't fall out when brushing. • Injection is quick and rapid for mass production Over moulding • Provide a 'soft touch' grip to make holding the toothbrush more comfortable.
Cotton skirt	Pressing/Ironing • To crease fabric and keep folds in place ready for pinning and stitching. Folding/pleating/creasing • To introduce a decorative series of features/improved aesthetics. • Create extra volume to skirt for added insulation.
Plywood chair	Laminating • Layers of wood (veneers or lamins) are bonded together under pressure in formers or a vacuum bag to create a unique profile once the adhesive has cured. Steam bending • Where veneers or lamins are first placed in a steam chamber so wood fibres are softened so wood can be deformed without splitting. Bending • Where veneers, lamins or small sections of wood are forced under pressure round a former.

Q5c.

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

Safety issue must be appropriate for process identified in 5a. or 5b. if that is where it has been identified in error.

- Reference to any Personal Protection Equipment (PPE), eg wearing goggles, protective gloves, (against heat).
- Safe use of equipment, eg securing if heavy against falling on feet etc, finger traps with clamps and fastening, risk of burning where heat is involved.
- Precautions taken when using heat/iron.

Q6.

Indicative content:

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Note: responses may consider deforming or reforming. Both processes involve a change in material shape without adding or removing material.

Timber based materials

- Timber strips can be steamed to make them more pliable and easier to bend.
- The timber fibres are softened and bent without tearing or rupture eg stair hand rails, musical instruments.
- Thin strips of timber can be laminated using a suitable adhesive using a former.
- Pressure is applied until the adhesive cures/set and a change in shape is made.

Metal based materials

- Bars and tubes can be bent found a former to change shape from a linear length.
- Metals can be heated (annealed) to make them easier to bend.
- Metals can be forged. Heating until red hot and shaped on an anvil.
- Metals can be formed using casting processes where the metal is heated until molten and poured into a cavity or mould to make 3d products.

- Metals can be pressed using extreme pressure eg car body panels.

Papers and boards

- Accurate folds can be produced using creasing bar on a paper or board first.
- Scoring can be used to cut fibres weakening a piece of paper or card making it easier.
- Perforations 'push' material apart (creating small holes) making it easier to tear and separate material eg tissue box lid.
- Scoring, creasing and perforations are all forming processes making it easier to perform a shape or direction change in a piece of paper or card.

Polymers

- Simple bends can be created by heating a piece of thermoplastic polymer in a straight line (using a line bender) where a bend is needed.
- 3D shapes can be created using vacuum forming over a former by heating a polymer sheet and creating a permanent form when it cools.
- Plug and yoke method can be used to form a shape in polymer sheet.
- Injection moulding of polymers to create profiles and 3D products.
- 3D printing to create a 3D prototype

Textiles

- Drape forming of felt based products like hats.
- Gathering – uses a sewing technique to increase the 'fullness' of a material or prototype eg curtains.
- Pleating – similar to gathering, but where textiles are folded and held by stitching along an edge. Accept other valid responses.