DTBase©

Design & Technology
Eduqas GCSE

Papers and boards: 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. On a net, how are fold lines usually shown?

A As solid lines

B As dashed lines

C As red shaded areas

Q2. Which is the safest way to cut card accurately with a craft knife?

A One heavy pass, cutting towards your body

B Freehand on the workbench

C Several light passes with a safety rule on a self-healing mat

Q3. What is scoring?

A Lightly cutting or pressing a line so the board folds cleanly

B Cutting right through the board

C Gluing two layers of board together

Q4. Which process presses pulp between a matching pair of shaped moulds to make egg boxes and drinks carriers?

A Vacuum forming

B Press forming

C Blow moulding

Q5. Which component is used to make pivot points in pop-ups and moving parts?

A Paper fasteners (split pins)

B Eyelets

C Velcro

Q6. Which joining method is temporary, needs no glue and lets a product be flat packed?

A PVA glue

B Hot glue

C Slots and tabs

Q7. The packaging for a lemon squeezer is made from a card net.

Q7a. The packaging is designed to include tabs. Explain why tabs are used in the construction of the packaging. **(2 marks)**

Q7b. State the name of the graphics equipment used to create a clean, sharp fold in the packaging nets. **(1 mark)**

Q8. A model of a pizza box is made using a development (net). Use words and sketches to show how a development or net can be marked out and made using hand tools. **(5 marks)**

Q9. A wedding guest book has a front cover made from 2 mm thick folding boxboard. A heart-shaped window is cut through the front cover. The top of the heart is formed by two curves of 20 mm radius and the bottom by two straight cuts. Use notes and sketches to show how the window in the front cover would be accurately cut out using hand tools. **(4 marks)**

Q10. The nets for a set of stackable paper cubes are produced using a 3 mm thick polymer stencil. Explain one advantage of using a stencil to produce the nets. **(3 marks)**

Q11. A set of disposable snap-off memory sticks is made from card. Using notes and sketches, describe how you would accurately manufacture multiple card prototypes of the memory sticks in a school setting. **(4 marks)**

Q12. A desk tidy has side panels made from 9 mm corrugated board, each 250 mm × 220 mm. A design printed on copier paper is glued onto each side panel. Use notes and sketches to show how the printed design would be glued onto one 9 mm corrugated board side panel. **(4 marks)**

Q13. The main body of a cardboard house is made from folding box board. To form the roof shape, a triangular piece of waste material is removed from each top corner of the side view. Give two different manufacturing methods that could be used to remove the waste material to form the roof shape. Explain one reason for using each manufacturing method. **(6 marks)**

Q14. Egg boxes can be made from moulded pulp. Analyse how the characteristics and properties of pulp make it suitable for moulding the egg box packaging. **(5 marks)**

Q15. In commercial design and manufacture, prototypes of card puzzles may be laser cut. Analyse the advantages and disadvantages of laser cutting card. **(5 marks)**

Answers

Q1. B
Q2. C
Q3. A
Q4. B
Q5. A
Q6. C

Q7a.

Up to 2 marks for a clear explanation, 1 mark for each correct point. For example:

- Tabs help assembly during manufacture, making the packaging easy to put together (2)
- Tabs let the packaging open and close (1), making it easier for the consumer (1)
- Tabs let the packaging be flat packed more effectively (1), helping the manufacturer with transport and distribution (1)

Q7b.

Creasing tool or bone folder (1). Only acceptable answers.

Q8.

Up to 5 marks for words and sketches showing a clear understanding of the stages. Maximum of 3 marks if only words or only sketches are given. For example:

- Draw the development accurately on card using a ruler, protractor and sharp pencil (1), with cut lines as solid lines and fold lines as dotted lines (1)
- Cut out the outline carefully using a safety rule, craft knife and cutting mat (1)
- Mark the fold lines with a creasing tool, or lightly score them with a craft knife (1)
- Fold the box carefully along the fold lines using a safety rule (1)
- Join the box together at the flaps using double-sided tape or glue (1)

Credit quality control checks, e.g. a creasing tool is more accurate than a craft knife, which could cut right through the corrugated card if too much pressure is used; a set square can check parts are at 90°.

Q9.

Cap at 3 marks if there are no sketches, or sketches with no notes. One mark for each:

- Place the front cover on a cutting mat (1)
- Locate and cut the two curved sections at the top of the heart with a compass cutter, or a wad punch and hammer (1)
- Cut along the straight lines with a craft knife (1)
- Use a safety rule to give a straight cut and keep the user safe (1)
- Cut into the corners to remove any remaining pieces (1)

Q10.

An advantage (1) and two linked justifications (1) + (1). For example:

- The stencil is traced or drawn around (1), so the nets will always be the same (1), so the cubes fit and stack together as designed (1)
- The stencil can be moved over the paper (1) to make the best use of the material (lay planning) (1), reducing waste (1)
- It removes the need to measure and mark out each net (1), reducing the time and complexity of marking out (1), so errors are less likely (1)

Q11.

Answers should show how a jig or template is used and the order of the processes. Not all stages are needed. For example:

- Make the jig or template using CAM
- Prepare the correct tools: cutting mat, knife, safety rule
- Place the jig on top of the card
- Quality control check: is the template in the correct place?
- Cut around the jig
- Final checks once cut

Marks	Descriptor
4	Clear understanding of the stages needed, with clear sketches and detailed notes.
3	Some understanding of the stages; good sketching and notes but may be missing a stage.
2	Limited understanding; basic sketches with notes that lack detail. Maximum of 2 marks for clear sketching with no notes.
1	Little understanding; sketches with very limited detail.
0	Nothing worthy of credit.

Q12.

Cap at 3 marks if there are no sketches, or sketches with no notes. One mark for each:

- Clean the surface of the corrugated board so it is smooth (1)
- Apply glue to the surface of the corrugated board or the paper (1)
- Carefully align the printed design with the side panel and place it in contact (1)
- Apply pressure evenly so there are no ripples, bubbles or creases (1)
- Leave the panel for time for the glue to dry (1)

Q13.

Two methods (1 each), each with two linked justifications (1) + (1). For example:

- Cutting (1): scissors or a craft knife can be used to cut along the lines (1), so the triangular sections are removed as whole pieces (1)
- CAM, CNC machining, laser cutting or plotter cutting (1): the design is produced in CAD (1), then a cutter or laser beam follows it to cut out the whole shape (1)
- Die cutting (1): the cardboard is placed between a die and a cutting board (1), which cuts out the design in one go when pressure is applied (1)

Q14. (5 marks)

Indicative content. Moulded pulp is made from water and recycled paper, formed using moulds and wet pressing.

- It can easily be formed around 3D and complex shapes, giving more packaging options than flat sheet materials, which are limited to simple shapes made from nets
- It gives excellent cushioning, so it protects the eggs well
- A range of thicknesses can be made; thick-walled pulp is stronger and gives more protection
- It is mostly water and recycled paper, so it can be argued to be more environmentally friendly
- It has a good strength-to-weight ratio, so the packaging is light
- However, its textured, curved surface is harder to print on than flat sheet materials
- However, it is absorbent, so if an egg breaks it soaks into the packaging and leaks

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the characteristics of moulded pulp. Relevant examples and a well-developed, logical chain of reasoning, sustained throughout.
2	2 to 3	Some coherence, with partial knowledge and understanding. Mostly relevant examples and a logical chain of reasoning that may not be sustained throughout.
1	1	Basic knowledge and understanding. Limited relevant examples or logical chain of reasoning.
0	0	Incorrect or irrelevant answers.

Q15. (5 marks)

Answers must include both advantages and disadvantages to access the full 5 marks.

Advantages

- Most card, of any thickness, can be laser cut, giving flexibility
- Card can be cut to any shape, however intricate
- High precision (about ±0.1 mm), so puzzle pieces will fit together; clean, accurate cut lines

- Needs little manpower; safe, as it will not cut with the lid open
- Repeat cuts are possible, and the design can be modified and prototyped again quickly

Disadvantages

- The size of card is limited by the size of the laser bed
- Staining from the bed plate can mark the card
- A ventilation system is needed to remove fumes, and its filters need replacing
- Expensive to buy, install, service and repair; training is needed
- Settings differ for each card type and thickness; wrong settings can damage the card or set it on fire, causing waste

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the advantages and disadvantages of laser cutting card. Relevant examples and a well-developed, logical chain of reasoning, sustained throughout.
2	2 to 3	Some coherence, with partial knowledge and understanding. Mostly relevant examples and a logical chain of reasoning that may not be sustained throughout.
1	1	Basic knowledge and understanding. Limited relevant examples or logical chain of reasoning.
0	0	Incorrect or irrelevant answers.