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Design & Technology
Eduqas GCSE

Papers and boards: sources, origins, properties and footprint

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. Which type of wood pulp has long, undamaged fibres because the lignin has been dissolved away?

A Mechanical pulp

B Chemical pulp

C Recycled pulp

Q2. When making paper by hand, what is the mould and deckle?

A A mesh screen in a frame that is dipped into the pulp

B A pair of heated rollers that dry the sheet

C A blender that turns scrap paper into pulp

Q3. Which surface finish uses a clay coating to give a smooth surface that holds ink sharply?

A Uncoated

B Calendered

C Coated

Q4. Why does paper rotting in landfill add to climate change?

A It releases methane, a powerful greenhouse gas

B It absorbs carbon dioxide from the air

C It releases bleaching chemicals into rivers

Q5. What does the FSC logo on a paper product show?

A The paper can be recycled 5 to 7 times

B The producer has paid towards recycling

C The wood fibres come from responsibly managed forests

Q6. Why does newspaper turn yellow and brittle when it is left in sunlight?

A It has a clay coating

B It is made from mechanical pulp, so the lignin remains

C It has been calendered

Q7. An origami rabbit is folded from a single square of copier paper.

Q7a. Give one property of copier paper that makes it an appropriate choice of material for the origami rabbit. **(1 mark)**

Q7b. Explain one advantage of using recycled copier paper to manufacture the origami rabbit. **(2 marks)**

Q8. A hardback book has pages made from bonded paper.

Q8a. Explain one working property of bonded paper that makes it suitable for the pages of the hardback book. **(3 marks)**

Q8b. Explain two negative effects on the environment of producing bonded paper. **(4 marks)**

Q9. A children's pop-up book has a pop-up fish made from bonded paper. Explain one physical characteristic of bonded paper that makes it an appropriate material from which to make the pop-up fish. **(2 marks)**

Q10. A gift box has decorative side panels made from printed copier paper. Explain two working properties of copier paper that make it an appropriate choice of material for the decorative side panels. **(6 marks)**

Q11. This question is about sustainable papers and boards.

Q11a. A model of a windmill is made from boards that are sustainable. Explain two advantages of manufacturing the model windmill from boards that are sustainable. **(4 marks)**

Q11b. A fruit juice carton is made from one piece of card. Give one benefit to the manufacturer of making the carton from a single material. **(1 mark)**

Q11c. Seedling pots for growing plants are made from paper pulp. Give one reason why paper pulp is a good environmental choice. **(1 mark)**

Q12. Wood and wood pulp are materials used to manufacture greetings cards. Analyse the impact harvesting these materials has on our ecological footprint. **(5 marks)**

Q13. Discuss how designers can improve and extend the life of papers, boards and card products to lessen their impact on our environment. **(6 marks)**

Answers

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

Q7a.

Any one (1): flexibility; easy to bend; easily creased or holds its shape when folded; easy to fold (foldability); biodegradability. Do not accept “foldable” or “folded” on their own.

Q7b.

An advantage (1) and a linked justification (1). Do not accept “recycled” on its own. For example:

- Using recycled paper reduces the need to make new paper, so it is more sustainable and causes less environmental damage (1), as fewer trees need to be cut down for pulp and less energy is used (1)
- Recycling paper stops it being thrown away and going to landfill (1), which keeps landfill space for materials that cannot be recycled (1)

Q8a.

A working property (1) and two linked justifications (1) + (1). For example:

- It has a rough or textured surface (1), which gives more grip (1), so the pages are easier to turn and nicer to write on (1)
- It is opaque and not very reflective (1), so printed text is clear to read (1) and cannot be read through from the other side of the page (1)

Q8b.

Any two effects (1 each), each with a linked justification (1). For example:

- Bleached pulp can be hazardous to people, plants, animals, soil and air (1) because it contains harmful chemicals (1)
- Rivers can become polluted (1) if bleach or other chemicals leak into the water (1)

- More energy is used, possibly from finite resources (1), because bleaching needs extra processing and produces more emissions (1)
- It puts demand on natural resources and causes deforestation, affecting local communities (1), because bonded paper is made from virgin pulp (1)

Q9.

A physical characteristic (1) and a linked justification (1). For example:

- Bonded paper is a heavier, denser, thicker paper (1), so it is stiffer and can support its own weight when the fish stands up (1)
- Bonded paper has a fine surface texture (1), so the printed fish will have a high quality finish with vivid colours (1)

Q10.

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

- Copier paper is bright white (1), which gives high quality printing (1), so vivid colours can be shown (1)
- Copier paper has a smooth surface (1), so it takes the ink well (1) and stops the ink bleeding (1)
- Copier paper is opaque (1), so colours or designs underneath are unlikely to show through (1), meaning the printed image is clear to see (1)

Q11a.

Two advantages (1 each), each with a linked justification (1). For example:

- Fewer trees need to be cut down, reducing deforestation (1), because sustainable board can be made from waste pulp or wood fibre (1)
- Less energy is needed to process the board than when using virgin pulp (1), which lowers its carbon footprint and emissions (1)
- The pulp is likely to come from a well-managed forest (1) where trees are replaced in an ethical way (1)

Q11b.

Any one (1): only one material needs to be bought from a supplier; waste is limited; waste is easy to dispose of or recycle; it saves time joining materials

during manufacture; it cuts the processes and resources needed to join different materials. Do not accept “cheaper” unless explained.

Q11c.

Any one (1): paper pulp is made from trees, which are renewable; it biodegrades or rots after use if thrown away; it will not cause pollution when disposed of; paper pulp is often made from recycled paper or card.

Q12. (5 marks)

Indicative content. Harvesting wood mostly has a negative impact on our ecological footprint, but modern approaches can make it positive.

Negative

- Unregulated harvesting causes huge damage to sensitive ecosystems
- Machines used for harvesting cause emissions in the local area
- Forests are destroyed, so animals lose their habitats and some species become endangered as food chains are disrupted
- Trees take in carbon dioxide as they grow, so removing them without replanting means less carbon is captured
- Removing large numbers of trees increases the risk of flooding
- Harvesting is poorly regulated around mating seasons and nest sites, even in some developed countries
- Trees take a long time to grow to maturity
- Bleaching wood pulp can lead to chemical spills

Positive

- FSC sites are now the most common source of timber for products sold in many parts of the world
- Consumer awareness has grown, leading to changes in regulation and attitudes
- Former industrial sites are being used to grow trees for packaging, giving green spaces in cities
- Organisations such as the FSC are planting more trees than are cut down
- Credit references to climate agreements or packaging regulations that say materials must come from a renewable source

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the ecological footprint of harvesting wood and wood 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.

Q13. (6 marks)

Indicative content. Ways to improve and extend the life of paper, board and card products:

- Design fewer single use products
- Improve the quality of raw materials and manufacture so products last longer
- Put recycling information on the product to encourage people to recycle it
- Use marketing and social media so that sustainable products become fashionable
- Design and make products from a single material rather than mixed materials that cannot be separated for recycling
- Use materials that are not processed in ways that damage ecosystems, and natural dyes
- Use finishes that extend the life of products and keep them looking good
- Manufacture locally to cut transport and CO_2 emissions; use greener energy
- Buy raw materials from Fairtrade suppliers
- Educate people about the harm of throwing products away, using the 6Rs

However:

- Multi-material boards such as foil-lined board are hard to recycle
- Not everywhere has recycling bins, so paper and card ends up in normal bins

- Sustainable materials and better quality products cost more, and many people can only afford cheap products
- Consumers often see packaging as something to throw away
- Changing manufacturing systems to be more environmentally friendly has high set-up costs

Band	Marks	Descriptor
3	5 to 6	A coherent answer with detailed, relevant knowledge and understanding of how designers can extend the life of paper, board and card products to lessen their impact on the environment. Relevant examples and well-developed, substantiated judgements in a logically structured response.
2	3 to 4	Some coherence, with partial knowledge and understanding. Mostly relevant examples and partly substantiated judgements in a generally well structured response.
1	1 to 2	Basic knowledge and understanding. Limited relevant examples or judgements, with little structure.
0	0	Incorrect or irrelevant answers.