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Design & Technology
Eduqas GCSE

Papers and boards: factors influencing selection

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 paper has a hard surface so mistakes are easy to remove, and is used for working drawings and overlays?

A Tracing paper

B Cartridge paper

C Copier paper

Q2. Which board is thick and rigid, cannot be folded, and is used for mounting artwork and architectural models?

A Folding boxboard

B Mounting board

C Corrugated board

Q3. Which of these is a disadvantage of corrugated board?

A Poor impact resistance

B Not suitable for high-quality printing

C It cannot be recycled

Q4. Which of these is a functional property of papers and boards?

A Colour

B Print quality

C Barrier properties

Q5. A batch of 100 printed boxes costs £77 to make before profit is added. What is the cost of one box?

A £7.70

B £0.077

C £0.77

Q6. Which action helps protect biodiversity and reduce deforestation?

A Giving workers the right to join a union

B Using FSC certified or recycled board

C Adding plastic windows to packaging

Q7. Papers, boards and card are available in many different types. Give one example of a paper and one example of a board. **(2 marks)**

Q8. The packaging for an electronic device is made from folding boxboard. The packaging is printed in several different colours. Explain two characteristics of folding boxboard that make it an ideal material from which to make the packaging. **(4 marks)**

Q9. A desk tidy is made from corrugated board. Each 9 mm corrugated board side panel has a printed design on copier paper glued onto it.

Q9a. Explain two reasons for using corrugated board for the desk tidy. **(4 marks)**

Q9b. Explain one physical characteristic of copier paper that makes it an ideal material on which to print the design. **(2 marks)**

Q10. Takeaway food boxes are made from foil-lined board. Manufacturing the boxes from foil-lined board is cost effective.

Q10a. Explain one other benefit of manufacturing the takeaway food boxes from foil-lined board. **(2 marks)**

Q10b. Explain one cost factor that will have been considered when selecting foil-lined board as the material from which to manufacture the takeaway food boxes. **(3 marks)**

Q11. The pages of a sketchbook are made from cartridge paper. Give two different properties of cartridge paper that make it an appropriate choice of material for the pages of the sketchbook. For each property, explain one advantage of using cartridge paper for the pages of the sketchbook. **(6 marks)**

Q12. A burger box is made from card because it can be recycled and printed on. State two other reasons why card is a good choice of material for manufacturers of food packaging. **(2 marks)**

Q13. A set of disposable memory sticks is made from card. For each memory stick, the electronic components cost £0.35 and the card costs £0.15. The assembly and manufacture costs a further £1.08 per memory stick.

Q13a. Calculate how much it would cost the manufacturer to make 60,000 memory sticks. Show all workings. **(1 mark)**

Q13b. The manufacturer sells each memory stick for £3.50. Calculate how much money the manufacturer would receive if they sold 80% of the 60,000 memory sticks. Show all workings. **(2 marks)**

Q13c. Calculate the profit the manufacturer would make from your answer to Q13b. Show all workings. **(2 marks)**

Q14. Analyse why a growing number of products use recycled boards and papers as an alternative to plastics and other materials. **(5 marks)**

Q15. Packaging made from card is manufactured in an economically developing country. Analyse how a designer can ensure the packaging is produced in an ethical and environmentally friendly way. **(5 marks)**

Answers

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

Q7.

One mark for each:

- Paper (1): e.g. bleed proof paper, cartridge paper, grid paper, layout paper, tracing paper, copier paper, sugar paper
- Board (1): e.g. corrugated card, duplex board, foil-lined board, foam core board, solid white board, virgin fibre board

Q8.

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

- Folding boxboard is very stiff and less likely to bend (1), so the packaging keeps its shape and protects the contents (1)
- Folding boxboard has bleached, pure white, smooth outer layers (1), so printed images have vivid, true colours (1)
- Folding boxboard can be scored and creased (1), so it can be formed into boxes without splitting when folded (1)

Q9a.

Two reasons (1 each), each with a linked justification (1). Do not accept "cheap" on its own. For example:

- It has stiffness and stability along the length of the corrugations (1), so it stays flat and does not warp (1)
- It is available in large sheets (1), so pieces do not need to be stuck together to make a side panel big enough (1)
- It is a plain brown colour that can be finished in many ways (1), so it can be customised in different styles and colours to appeal to more buyers (1)

- It is relatively cheap (1), which keeps the overall cost of the product down (1)
- It is readily available (1) and can be bought in large volumes for mass production (1)

Q9b.

A physical characteristic (1) and a linked justification (1). Do not accept answers about absorbency. For example:

- Copier paper has a smooth texture (1), so the printed image is flat and even, not distorted or blurred (1)
- Copier paper is opaque (1), so the brown colour of the corrugated board underneath does not show through (1)

Q10a.

A benefit (1) and a linked justification (1). Do not accept answers about recycling. For example:

- The foil lining insulates (1), so hot food stays hot for longer and cold food stays cool (1)
- The foil lining makes the box waterproof (1), so liquids, sauces and grease will not leak out or soak in (1)

Q10b.

A cost factor (1) and two linked justifications (1) + (1). For example:

- The source or grade of the pulp affects the cost (1): recycled pulp is cheaper (1), but impurities in it could contaminate the food (1)
- The availability of aluminium foil (1) means prices may vary (1), which could result in higher costs (1)
- Supply and demand for recycled paper pulp varies (1) because it is also used for other papers and boards (1), which could result in higher costs (1)

Q11.

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

- Cartridge paper is opaque (1), so images cannot be seen through the paper (1), as ink, paint and markers will not bleed through from one side to the other (1)
- Cartridge paper has a smooth surface finish (1), so it accepts most types of media well (1), allowing high quality artwork to be produced (1)
- It is a pure white colour (1), so true colours can be shown (1), making artwork more realistic and better for scanning (1)

Q12.

Any two (1 mark each): it can be cut, scored and folded easily; it comes from a sustainable source, which gives the manufacturer a good name; it is lightweight, so easy to carry; it is available in a wide range of colours; it is biodegradable, so less harmful if thrown away; it resists liquids or soaks up grease, so the contents do not leak. Do not accept “recycled” or “printed on” (given in the question), or “food safe”, “non-toxic”, “cheap”, “lightweight”, “strong” or “rigid” without a reason.

Q13a.

£0.35 + £0.15 + £1.08 = £1.58 per memory stick; £1.58 × 60,000 = £94,800 (1).

Q13b.

80% of 60,000 = 48,000 memory sticks sold (1). 48,000 × £3.50 = £168,000 (1).

Q13c.

Cost of the 48,000 memory sticks sold: £1.58 × 48,000 = £75,840 (1). Profit: £168,000 − £75,840 = £92,160 (1). Credit any appropriate approach to calculating the profit.

Q14. (5 marks)

Indicative content:

- Consumers and manufacturers are aware that traditional materials, particularly plastics, harm the environment

- Growing consumer awareness has created demand for alternatives that deal with the waste modern society produces
- Designers are looking for more sustainable ways to design products; the 6Rs may be mentioned
- Current environmental issues can be referenced
- Manufacturers promote the ethical approach of their companies to increase sales

Band	Marks	Descriptor
3	4 to 5	A clear understanding of the environmental need for more sustainable products in place of traditional materials. May mention the 6Rs and current environmental issues, along with consumer demand for more environmentally friendly products.
2	2 to 3	Some understanding of the call for more sustainable materials and how consumers want to be greener. Some mention of general sustainability issues and consumer demand, with less detail than band 3.
1	1	Little understanding of what drives the desire to be more sustainable and how manufacturers have responded. Refers to one of the issues in band 2 or 3.
0	0	Incorrect or irrelevant answers.

Q15. (5 marks)

To reach band 3, answers must cover both ethical and environmental considerations.

Environmental considerations

- Use recycled cardboard
- Use printing inks and glues from natural origins or that are non-toxic
- Simplify the packaging design to reduce manufacturing processes
- Dispose of waste correctly and safely
- Use factories powered by renewable energy such as solar power
- Nest nets efficiently to minimise wasted material
- Use local factories and process raw materials in the same country, reducing transport and pollution
- Consider the fuel used to transport materials and packaging
- Make sure all parts of the packaging are recyclable and that it is well made so it protects the product
- Carry out a life cycle analysis; design with a circular economy approach

Ethical considerations

- Respect local culture and practices
- Protect the health and well-being of employees
- Fair pay, acceptable hours with breaks, and well ventilated, healthy workplaces
- Contracts that give workers a regular income
- No child labour or exploitation of workers; ethically sourced raw materials

However:

- Natural inks and fair wages increase the selling price of the packaging
- Packaging may be thrown away straight away and not recycled
- Consumers often buy products without thinking about the ethics of the packaging

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of how a designer can ensure the packaging is produced in an ethical and environmentally friendly way. 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.