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# Design & Technology
# Eduqas GCSE

# Timber: 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 timber would be chosen for a garden bench because of its strength, durability and attractive grain?

**A** Oak

**B** Balsa

**C** MDF

**Q2**. Which of these is an aesthetic property of timber?

**A** Durability

**B** Grain pattern and figure

**C** Stability

**Q3**. Why is beech chosen for wooden spoons?

**A** It is naturally resistant to rot

**B** It is extremely light

**C** It is hard, tough, close grained and food safe

**Q4**. Which type of timber is usually the cheapest per area?

**A** Hardwoods

**B** Softwoods

**C** Manufactured boards

**Q5**. If a designer uses an endangered tropical hardwood at all, how should it be used?

**A** Only as a thin veneer

**B** As thick solid boards

**C** For hidden structural parts

**Q6**. A pine bookshelf takes 1.5 hours to make. The labour rate is £12 per hour. What is the labour cost?

**A** £13.50

**B** £18.00

**C** £12.00

**Q7**. A toy creature for young children is made from sustainable timber. Different natural timbers are used for different parts of the creature.

**Q7a.** Explain two advantages of manufacturing the toy creature from sustainable timber. **(4 marks)**

**Q7b.** Explain one reason for using different natural timbers for different parts of the toy creature. **(2 marks)**

**Q8**. A desk tidy is made from 15 mm MDF. The side panels are veneered with beech and have slots cut in them for adjustable shelves.

**Q8a.** Explain two reasons for using MDF for the desk tidy. **(4 marks)**

**Q8b.** Explain one physical characteristic of beech that makes it an ideal material to use for the veneer. **(2 marks)**

**Q9**. Modern furniture products are often made from manufactured boards. Analyse the benefits of using manufactured boards instead of natural solid woods when manufacturing furniture products. **(5 marks)**

**Q10**. A jewellery box is made in the form of a bear. The main body is made from ash and the eyes and nose are made from mahogany. Explain one issue associated with the ecological footprint of using mahogany for the jewellery box. **(3 marks)**

**Q11**. A stool is made from birch plywood. To manufacture one stool, the plywood costs £1.10, the assembly costs £3.05 and the fittings cost £0.20.

**Q11a.** Calculate how much a batch order of 50,000 stools would cost the manufacturer to make. Show all workings. **(1 mark)**

**Q11b.** The manufacturer sells the stool for £9.00. Calculate how much money the manufacturer would receive if they sold 80% of the 50,000 stools. Show all workings. **(2 marks)**

**Q11c.** Calculate the profit the manufacturer would make from your answer to Q11b. Show all workings. **(2 marks)**

**Q12**. Veneers are thin slices of quality wood glued onto a cheaper board.

**Q12a.** A lampshade is made from 4 mm thick veneered plywood. Give two advantages of using veneered plywood rather than solid wood for the lampshade. **(2 marks)**

**Q12b.** Many manufactured boards used to make furniture have veneered surfaces. State one benefit and one drawback of using veneers to cover the surfaces of manufactured boards used to make furniture. **(2 marks)**

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

**Answers**

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

**Q7a.**

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

- Timber stocks will not run out (1), because as trees are cut down new ones are planted, maintaining natural habitats (1)
- The product can be marked with the FSC logo (1), which might increase sales, widen its appeal and let consumers make informed choices (1)
- Certification comes with the timber (1), which shows consumers that the source of the timber is being protected from deforestation (1)

**Q7b.**

A reason (1) and a linked justification (1). Do not accept an opinion about appearance on its own. For example:

- Different timbers have different colours, grains and textures (1), so they can be used to show different parts or features of the creature (1)
- Small scraps can be used up for the small parts such as ears, nose and face (1), reducing waste and making efficient use of the material available (1)

**Q8a.**

Two reasons (1 mark each), each with a linked justification (1 mark each). Do not credit “cheap” or “lightweight” on their own. For example:

- MDF does not warp, cup or twist (1), so it will stay flat and in shape (1)
- MDF is available in large sheets (1), so pieces do not need to be joined to make a panel big enough for the side panel (1)
- MDF has a smooth, flat surface that can be finished in many ways, e.g. veneered (1), so it can be customised to increase its appeal (1)

- MDF is relatively cheap (1), so it keeps the overall cost of the product down (1)
- MDF is easily machined (1), so the slots for the shelves can be cut, e.g. on a router (1)
- MDF is readily available (1), so it can be bought in large volumes (1)
- MDF has no grain (1), so it does not splinter (1)

**Q8b.**

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

- Beech is a pink or pale colour (1), so it will complement most desks and offices (1)
- Beech has a distinctive grain pattern (1), which gives a pleasant appearance (1)
- Beech is close or fine grained (1), so it does not split or splinter easily (1)

**Q9. (5 marks)**

Indicative content, benefits of manufactured boards:

- Available in larger sheets
- Less likely to twist and warp out of shape
- Cheaper to buy, so products can be made at a lower cost
- More eco-friendly, as less solid wood is used to make them
- They can be sealed so that finishes can be added
- Available with smooth faces and no grain, which makes them easier to paint to a good finish
- Available with textured or painted finishes

| Band | Marks | Descriptor |
|---|---|---|
| 3 | 4 to 5 | A coherent answer with detailed, relevant knowledge and understanding of the benefits of using manufactured boards over natural solid woods. 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. |

**Q10.**

An issue (1), plus two linked justifications (1) + (1). For example:

- The demand for mahogany results in trees being cut down (1), causing a loss of natural habitats (1), so animals and birds have to move elsewhere or fall in number, with a potential loss of species (1)
- Logging mahogany causes deforestation (1), leaving the land exposed to the rain (1), which can cause flooding and loss of nutrients from the soil (1)
- Mahogany is sourced from tropical rainforests (1), so it has to be transported a long way to the factories (1), causing pollution from burning fuels (1)

**Q11a.**

(£3.05 + £1.10 + £0.20) × 50,000 = £217,500 (1).

**Q11b.**

80% of 50,000 = 50,000 ÷ 100 × 80 = 40,000 stools (1). 40,000 × £9.00 = £360,000 (1).

**Q11c.**

Profit = total selling price − manufacturing costs = £360,000 − £217,500 (1) = £142,500 (1).

**Q12a.**

Any two (1 mark each): cheaper; more stable; less likely to split; allows a thinner wood-based material to be used; lightweight. Do not accept “easier to work, cut or shape”.

**Q12b.**

- Benefit (1): cheaper than solid wood; has the appearance of solid wood; attractive
- Drawback (1): damages easily; not easily repaired; less durable

**Q13. (6 marks)**

| Band | Marks | Descriptor |
|---|---|---|
| 3 | 5 to 6 | A coherent answer with detailed, relevant knowledge and understanding of how designers can extend the life of wood-based products to lessen the impact on our 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. |

Indicative content:

- Manufactured boards are by-products of converting natural timber from trees
- Laminating or adding specialist layers or finishes, e.g. Formica on kitchen worktops
- Wooden products and manufactured boards can be recycled into new manufactured boards
- Improve the quality of finish, strength and construction so products last longer
- Design products that can be repaired, so parts can be replaced to extend their life

- Use woods that are sustainable and from managed sources and responsible suppliers
- Make products from recycled or upcycled wood
- Use suitable finishes that extend the life of products and keep their appearance
- Make raw materials locally, reducing transport costs and $CO_2$ emissions; use greener energy in manufacture
- Educate people about the harm of sending wood to landfill and encourage the 6Rs
- Although natural woods biodegrade, the glues used can contaminate land, and this waste could be used as a raw material again