DTBase©

Design & Technology
Eduqas GCSE

Timber: 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 defect is a split between the growth rings, caused by stresses in the growing tree or by felling?

A Knot

B Shake

C Cupping

Q2. Which hardwood is extremely light and is used for model aircraft?

A Balsa

B Beech

C Jelutong

Q3. Seasoning dries timber to a moisture content of around:

A 1 to 5%

B 12 to 20%

C 40 to 50%

Q4. Which manufactured board is made from wood chips bonded with resin and is often faced with melamine?

A Hardboard

B MDF

C Chipboard

Q5. Which softwood has few knots and is used for staircases, but tends to warp?

A Scots pine

B Western red cedar

C Parana pine

Q6. Which of these is an effect of deforestation?

A Soil erosion and flooding

B More carbon dioxide is absorbed

C More habitats for wildlife

Q7. The top layer of a chessboard is made from squares of reused hardwoods and softwoods.

Q7a. Give one example of a hardwood and one example of a softwood. **(2 marks)**

Q7b. Wood fibres can be compressed and glued together to make manufactured boards. Other than cost, describe one advantage of using manufactured boards. **(2 marks)**

Q8. A table is made from oak. The table top is 500 mm wide and is made from three separate boards glued together edge to edge. Looking at the end grain of the table top, the growth rings of each board curve the opposite way to the board next to it.

Q8a. Give two reasons why oak is a suitable hardwood from which to make the table. **(2 marks)**

Q8b. Give one reason why the table top is made from three boards rather than one board 500 mm wide. **(1 mark)**

Q8c. Explain why the boards have been arranged with the growth rings curving in alternate directions. **(2 marks)**

Q8d. The table top is fixed to the top rail by screws that pass through a brass plate. The holes for the screws in the brass plate are slotted. Explain why the holes for the screws are slotted. **(2 marks)**

Q9. A teaching aid for primary schools has number wheels that rotate. The teaching aid is made from beech. Explain two physical characteristics of beech that make it an ideal material from which to make the teaching aid. **(4 marks)**

Q10. A play fishing set for young children has a cylindrical fishing rod handle, 120 mm long, made from jelutong. Explain two characteristics of jelutong that make it an ideal material from which to make the fishing rod handle. **(4 marks)**

Q11. A wooden toy kit for young children is made from timber. Explain two reasons why the timber must be seasoned before it can be used to manufacture the toy kit. **(4 marks)**

Q12. A small box is made from hardwood. The hardwood base has been glued and screwed to the sides of the box. Explain what is likely to happen to the base of the box, over time, as a result of gluing and screwing it to the sides of the box. **(2 marks)**

Q13. Pine and oak are natural timbers used to manufacture a child's wooden toy. Analyse the impact that deforestation and converting natural timbers has on our ecological footprint. **(5 marks)**

Q14. A stool made from birch plywood is sold flat packed, and hundreds of thousands of these stools are sold every year. Undertake a Life Cycle Analysis of the stool, explaining the impact it has on the environment. **(5 marks)**

Answers

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

Q7a.

One mark for each:

- Hardwood: e.g. oak, mahogany, ash, beech, maple, ebony, walnut (1)
- Softwood: e.g. pine, cedar, larch, fir, redwood, spruce, yew (1)

Do not accept manufactured boards such as MDF, plywood, chipboard or fibreboard.

Q7b.

1 mark for an advantage, plus 1 mark for a description or example. For example:

- Boards can be made in a range of sizes for different uses (1), e.g. large sheets so a big panel does not need joining (1)
- Boards can be made in a range of thicknesses (1)
- There is no grain, so a smoother finish can be achieved (1)
- Little or no waste, as the boards are made from wood fibres and waste wood (1)
- They can be made weather resistant by using different types of glue (1)

Q8a.

Any two (1 mark each): hardwearing; attractive; finishes well; tough; durable; long lasting; resistant to scratches. Do not accept “easy to work with”. Do not accept “can be used outdoors” or “weather resistant”, as the table is used indoors.

Q8b.

One mark for: wider boards are not available, as hardwood boards are limited in width by the size of the tree; or a board 500 mm wide would be more expensive (1). Also accept a reference to stopping warping or cupping, but do not credit the same answer again in Q8c.

Q8c.

The boards are arranged with the end grain in alternate positions to give stability (1). Without this arrangement the whole table top would cup; it prevents splitting and stops the top deforming over time (1).

Q8d.

Solid wood moves (expands and shrinks) across the grain (1). The slots allow the screw to move as the wood expands or contracts, so the top does not split (1). Also award 1 mark for "makes it easier to line up the top with the rails".

Q9.

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

- Beech does not splinter easily because it is close grained (1), so it is a safe wood to use and will not injure the user (1)
- Beech is tough (1), so it can withstand knocks and being dropped without damage (1)
- Beech is hard (1), so it can be touched, rotated and turned without wearing away (1)
- Beech finishes well (1), giving a smooth surface that can be varnished or waxed and lasts longer (1)

Q10.

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

- Jelutong has an even grain and fine texture (1), so it turns and sands well to a fine finish and is unlikely to splinter, making it safe (1)
- Jelutong is lightweight (1), so the handle will not be too heavy for a young child to move (1)

- Jelutong takes a finish such as stain or varnish well (1), so the handle is easy to wipe clean during and after use (1)

Q11.

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

- Seasoning reduces the moisture content (1), which reduces the risk of the timber moving, cupping, warping, twisting or splitting, so it is more stable (1)
- Seasoning reduces fungal growth or attack (1), because the fungus needs moisture in the wood to grow (1)
- Timber absorbs moisture from the air (1), so its moisture content needs to be reduced to match the place where it will be used (1)

Q12.

The hardwood base could dry out and shrink (1). Because it is glued and screwed and cannot move, this would cause the base to split (1).

Q13. (5 marks)

Indicative content: cutting down trees and converting them into planks has a negative impact on our ecological footprint unless the wood comes from managed sources.

Negative impacts

- Hardwood trees such as oak take a very long time to grow compared to softwoods such as pine
- Trees absorb carbon dioxide and help prevent global warming, so cutting them down adds to climate change
- Converting tree trunks into planks uses energy and nearly always involves transport from the forest to the factory, causing air pollution and using non-renewable energy
- Deforestation has a negative impact on the environment and climate change

Positive impacts

- In managed forests, a new tree is planted when one is cut down
- Fast growing softwoods are mainly used, as they take less time to grow

- Waste wood is used to make manufactured boards

Band	Marks	Descriptor
3	4 to 5	A coherent answer with detailed, relevant knowledge and understanding of the ecological footprint of cutting down trees and converting them into timber. 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.

Q14. (5 marks)

Indicative content: a life cycle analysis looks at the environmental impact of a product from the growth or extraction of its raw materials to its use and disposal.

- Raw materials: trees are felled and converted into veneers for the plywood. This uses energy and cutting down trees affects the environment; managed forests sustain the supply and reduce the impact
- Transport: the raw materials are transported to the factory. At each stage, transport by lorry, ship or aircraft uses energy and has a large environmental impact
- Manufacture: factories may be close to the raw materials; global manufacturers may make the stools in several locations to cut transport
- Distribution: the stools are flat packed to save space and reduce transport costs, and are easier to take home; they are packaged ready for the shops
- Use: the stool is built by the customer; the type of finish should be considered, as some finishes are harmful to the environment
- Disposal: at the end of its life the stool can be recycled, e.g. the wood fibres made into MDF sheets for new products, reducing the environmental impact

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