



**DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 2**

Wednesday 14 November 2007 (afternoon)

1 hour

Candidate session number

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INSTRUCTIONS TO CANDIDATES

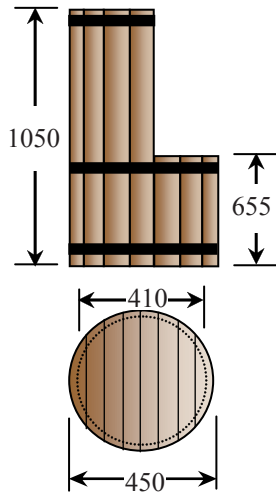
- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all of Section A in the spaces provided.
- Section B: answer one question from Section B. Write your answers on answer sheets. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.
- At the end of the examination, indicate the numbers of the questions answered in the candidate box on your cover sheet and indicate the number of sheets used in the appropriate box on your cover sheet.

SECTION A

Answer *all* the questions in the spaces provided.

- The garden furniture shown in **Figure 1** has been made from a softwood that has not been chemically treated. The manufacturer suggests that the timber should not be placed directly on the ground until it has been treated. The furniture is supplied “unfinished” from the manufacturer so that the customer can apply one or more surface treatments. Cushions may be made and added to the customers’ individual taste. **Table 1** provides information for the furniture.

Figure 1: The barrel garden furniture



[Source: http://www.kirami.fi/pictures/ryhma3_big.jp]

The chair manufacturer suggests that customers construct cushions by sewing together three pieces of material. The width of the side panel and the seams to be used are shown in **Figure 2**.

Figure 2: The paper pattern used for making the side of one cushion

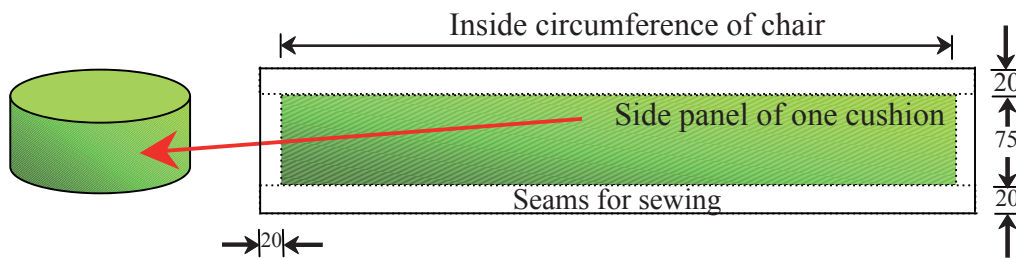


Table 1: Data concerning the barrel furniture

Dimensions of furniture (mm)	
Outside diameter of table top	700 mm
Thickness of all planks	20 mm
Dimension of one plank for chair (Full length)	1050×83×20 (mm)
Circumference of a circle	πD or $2\pi r$ (Where D = Diameter of circle and r = radius of circle)
Height of table	860 mm

(This question continues on the following page)

(Question 1 continued)

(a) (i) State **one** advantage of using softwood for the garden furniture. [1]

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(ii) Outline **one** disadvantage of the garden furniture in Figure 1 for storing away in winter. [2]

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(b) (i) Calculate the distance allowed for thigh room between the chair (without a cushion) and the bottom of the table top. [2]

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(ii) Calculate the length of fabric required to make the side panel for one of the cushions. [2]

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(c) (i) State **one** reason why the manufacturer of the furniture sells the product without the timber having had a surface finish applied. [1]

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(ii) State **one** disadvantage related to safety of leaving the garden furniture untreated. [1]

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(This question continues on the following page)

(Question 1 continued)

- (d) Discuss the suitability of the garden furniture in Figure 1 for use by a family with young children. [3]

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- 2. (a) Define *clean technology*. [1]

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- (b) Explain **one** reason why some manufacturing companies have adopted a pro-active approach to their environmental policies. [3]

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- 3. (a) State the angle of the horizontal plane to the vertical plane in an isometric drawing. [1]

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- (b) Explain the function of an exploded isometric drawing. [3]

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SECTION B

Answer **one** question. Write your answers on the answer sheets provided. Write your session number on each answer sheet, and attach them to this examination paper and your cover sheet using the tag provided.

4. **Figures 3 and 4** show photographs of the Millennium Bridge in Newcastle, UK. It is the world's first rotating bridge and is the first opening bridge to be built across the River Tyne for more than 100 years. When closed, small boats can sail under the bridge but for larger boats the whole structure rotates at an angle of 40 degrees creating a gateway arch with a 25 m height clearance. Each opening or closing of the bridge takes approximately four minutes. There is a weekly timetable showing when the bridge will open.

Figure 3: The Newcastle opening bridge



Figure 4: A view of the bridge by night



[Source: <http://www.bmpa.org.uk/images/2002newcastle.htm>. Photograph reproduced courtesy of Andrew Clymo]

- (a) (i) State **one** advantage of the weekly timetable of bridge openings for large boats. [1]
- (ii) Outline **one** aesthetic consideration of the design of the bridge on the built environment. [2]
- (b) Explain why the suspension cables of the bridge need to be made from a ductile material. [3]
- (c) (i) List **two** uses of physical models of the bridge during the public consultation phase of its design. [2]
- (ii) Explain the contribution of research and development to the design cycle of the Newcastle Millennium Bridge. [3]
- (d) Discuss the conflict between form and function faced by the designer of the Newcastle Millennium Bridge. [9]

5. **Figure 5** shows a laptop computer. Components in the laptop such as microchips and batteries contain a wide range of materials.

Figure 5: A laptop computer



[Source: www.alienware.co.uk. Reproduced with the permission of Alienware Limited.]

- (a) (i) Define *product cycle*. [1]
- (ii) Outline **one** reason why the laptop computer can be considered as being in the early stage of its product life cycle. [2]
- (iii) Outline **one** way that planned obsolescence can be designed into the laptop computer to the possible benefit of the manufacturer. [2]
- (b) Describe how adaptation has been used to generate ideas in the development of the laptop computer. [2]
- (c) Outline **two** ergonomic considerations related to the design of the laptop screen. [4]
- (d) Discuss **three** environmental issues related to the disposal of laptop computers. [9]

6. **Figure 6** shows a new design for an electric steam-iron. The white part of the iron (the body) is produced from a thermoset plastic, while the green part (the water tank) is produced from a thermoplastic.

Figure 6: The new steam-iron



[Source <http://www.istockphoto.com/file> (adapted)]

- (a) (i) Define *user trial*. [1]
- (ii) Outline **one** advantage in using a user trial in the development of the electric steam-iron. [2]
- (iii) Describe **one** reason why the water tank of the steam-iron in Figure 6 is transparent. [2]
- (b) (i) List **two** properties of thermoplastic which make it suitable for injection moulding the water tank of the steam-iron in Figure 6. [2]
- (ii) Outline **one** reason why the body of the iron is produced from a thermoset plastic. [2]
- (c) Outline why the steam iron in Figure 6 would be batch produced. [2]
- (d) Discuss how the strategies of reuse, recycle and repair could be applied to the design of the electric steam-iron in Figure 6. [9]
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