



22126202

**DESIGN TECHNOLOGY
HIGHER LEVEL
PAPER 2**

Tuesday 8 May 2012 (afternoon)

1 hour 45 minutes

Candidate session number

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Examination code

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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 questions.
- Section B: answer one question.
- Write your answers in the boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is [60 marks].



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SECTION A

Answer **all** questions. Write your answers in the boxes provided.

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2. (a) State the primary energy source which powered the Industrial Revolution. [1]

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- (b) Explain **one** disadvantage of the continued development of biomass as a fuel source. [3]

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3. (a) Describe how the design of an I-shaped beam makes effective and economical use of materials. [2]

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- (b) Outline **one** benefit of using a LVL beam in the construction industry. [2]

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4. (a) Define *Young's modulus*. [1]

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- (b) Explain how knowledge of the *Young's modulus* of a material affects the selection of materials for a tennis racquet. [3]

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5. (a) List **two** moulding techniques used to manufacture plastic bottles. [2]

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(Question 5 continued)

(b) Outline the relevance of the draft angle in the creation of a mould for vacuum forming. [2]

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6. (a) Define *intelligent building*. [1]

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(b) Discuss grey water in relation to conservation of resources in a domestic building. [3]

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SECTION B

Answer **one** question. Write your answers in the boxes provided.

- 7. **Figure 4** shows the Viber Burst kinetic phone charger concept designed by Australian design student Josh Pell. The charger has various surface designs and could be worn as a piece of jewellery or stored in a handbag or pocket. The Viber Burst has been designed to store energy created by body movements and to have a very long life cycle compared to chemical battery technology, which loses capacity to recharge in a relatively short life cycle time. The Viber Burst is designed to be made from a thermoplastic material which is heat resistant and moisture resistant.

Figure 4: Viber Burst phone charger



[Please refer to the image at <http://www.cultofmac.com/12302/viber-burst-kinetic-phone-charger/>]

- (a) (i) Outline **one** ergonomic feature of the Viber Burst in relation to safety. [2]

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(Question 7 continued)

- (ii) Outline why the charger can be considered a combination of radical and incremental design. [2]

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- (b) (i) Outline **one** green design objective satisfied by the charger. [2]

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- (ii) Explain the most suitable manufacturing technique for the production of the plastic body of the charger. [3]

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9. **Figure 6** shows a traditional design of a wooden pencil manufactured by the German company Faber-Castell. Faber-Castell have manufactured wooden pencils since 1761. The softwood casing is bonded to the graphite lead with epoxy resin glue. Although wooden pencils are very cheap nowadays, they were extremely expensive in 1761. Since 1761 the company has expanded its range of pencils to include ones with integrated sharpeners and erasers, cosmetic pencils and mechanical pencils. **Figure 7** shows a solid silver mechanical pencil from the Faber-Castell range. The silver casing has a space for a name to be engraved on it. It is an internationally-agreed legal requirement that all solid silver products are hallmarked. A hallmark identifies the manufacturer, the date and place of manufacture, and the silver content.

Figure 6: Faber-Castell wooden pencil



[Used with permission from Faber-Castell]

Figure 7: Faber-Castell solid silver mechanical pencil



[Used with permission from Faber-Castell]

- (a) (i) Outline **one** way in which the silver pencil may be considered a green product. [2]

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(Question 9 continued)

- (ii) Outline **one** quality assurance feature of the silver pen. [2]

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- (b) (i) Outline **one** reason why wood was chosen as an appropriate material for the pencil in the eighteenth century. [2]

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- (ii) Explain **one** reason for the choice of glue for the wooden pencil. [3]

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Answers written on this page
will not be marked.



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