



**DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 2**

Thursday 11 November 2010 (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

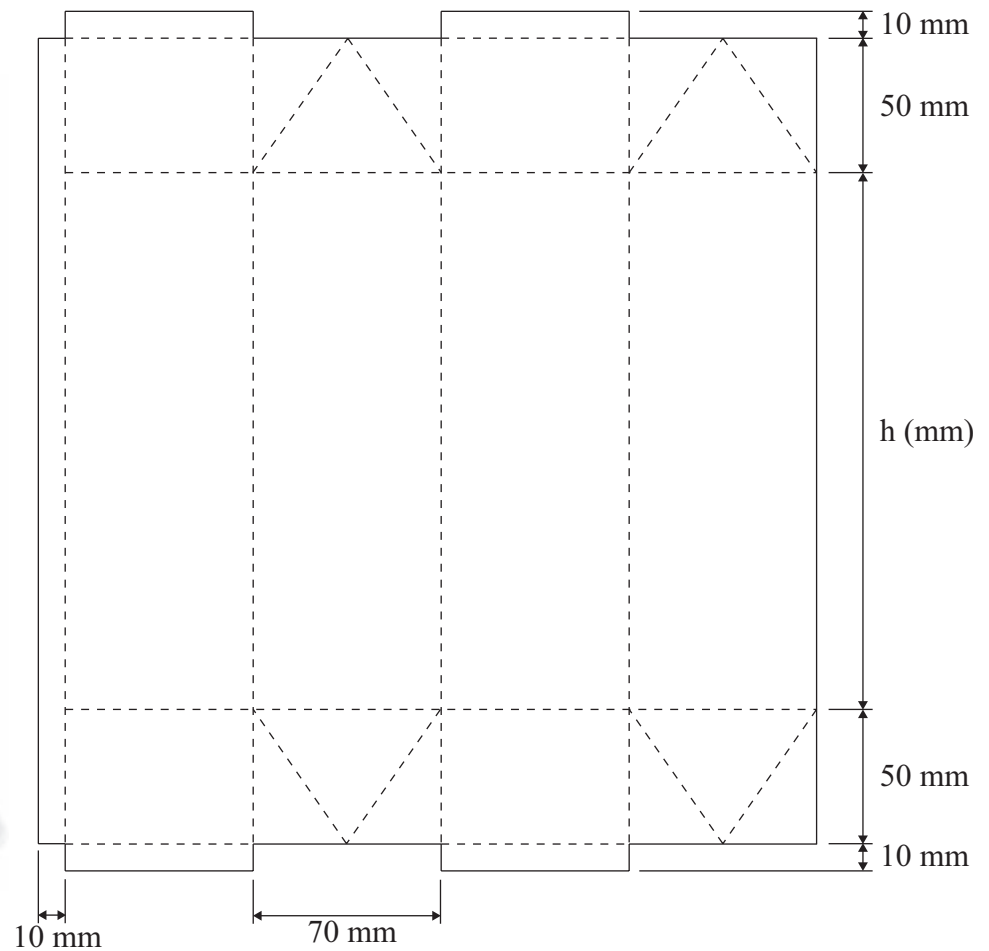
Answer *all* the questions in the spaces provided.

- Gable-top square-section cartons (see **Figure 1**) are widely used for packaging a range of liquid foods, such as milk, soup and fruit juice. The cartons are often made from a wax-coated cardboard net (see **Figure 2**). Dimension h varies for different volume cartons (see **Table 1**). Gable-top cartons are often difficult to open without spilling the contents. The design of some gable-top cartons is modified by the addition of a plastic spout to make them easier to open, close and pour (see **Figure 3**).

Figure 1: Gable-top carton



Figure 2: Net for a gable-top carton



[Source: www.markpascua.com/wp-content/milk-carton.jpg]

Table 1: Dimension h for cartons of different volumes **Figure 3: Plastic spout on gable-top carton**

Volume (mls)	Dimension h (mm)
300	60
500	100
1000	200



[Adapted from: http://en.wikipedia.org/wiki/File:Gable_Top.jpg
Image by R L Sheehan.]

(This question continues on the following page)



(Question 1 continued)

(a) (i) State the height h of a one litre carton. [1]

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(ii) State the purpose of the dashed lines on the net. [1]

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(iii) Identify the minimum length and breadth of card from which the net for a one litre carton could be cut. [2]

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(b) (i) Identify why the modification of the design of the carton to add the plastic spout is an example of constructive discontent. [2]

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(ii) Outline **one** market segment that might find the carton difficult to open. [2]

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(c) (i) State why the cardboard is wax coated. [1]

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(ii) Explain **one** implication of the plastic spout of the carton for the ease of recycling of the carton. [3]

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- 2. The matrix shown in **Figure 4** has four cells A, B, C and D and indicates the relationship between product and market which underpin different corporate strategies.

Figure 4: Matrix relating products and markets for four corporate strategies

		PRODUCT	
		Existing product	New product
MARKET	Existing market	A	B
	New market	C	D

- (a) State which cell of the matrix (A, B, C or D) represents the corporate strategy “Product Development”. [1]

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- (b) For a named product, outline how a company might undertake product development. [3]

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- 3. (a) State **one** limitation of a literature search for evaluating a product’s performance. [1]

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- (b) Discuss the contribution of the Internet to the evaluation of value for money by consumers. [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. **Figure 5** shows a mobile phone with a standard keypad. **Figure 6** shows a second phone with a QWERTY keypad with an individual key for each letter. Both phones have a full range of features, e.g. high resolution screen, internet connectivity, email and camera.

Figure 5: Mobile phone with standard keypad

Figure 6: Mobile phone with QWERTY keypad



[Figures 5 & 6 copyright Nokia 2010. Used with permission.]

- (a) (i) Identify **one** market segment for which the mobile phone with a QWERTY keypad would be the preferred option. [2]
- (ii) Explain **one** benefit of quality assurance to mobile phone customers. [3]
- (b) (i) Outline **one** way in which planned obsolescence influences the design specification of mobile phones. [2]
- (ii) Outline **one** design for disassembly strategy which would be appropriate for the mobile phone. [2]
- (c) (i) Outline **one** reason why the product cycle for mobile phones has shortened. [2]
- (ii) Explain how the terms “fixed costs”, “variable costs” and “break-even point” relate to mobile phone production. [9]



5. **Figure 7** and **Figure 8** show the OMK chair designed by Rodney Kinsman in the 1970s. They were designed to be low cost and multi-purpose to appeal to a wide market. The chair has a perforated steel seat and back on a tubular steel frame produced in a range of fashion colours. It can be easily stacked or clipped into rows. The design has been very successful and is still available commercially.

Figure 7: Kinsman OMK stack chairs



Used with the permission of OMK Associates.

Figure 8: The chairs can be easily stacked



Used with the permission of OMK Associates.

- (a) (i) Outline **one** way in which aesthetic considerations have contributed to the design of the OMK chair. [2]
- (ii) Explain the conflict that Rodney Kinsman would have faced when attempting to balance form and function in the design of the OMK chair. [3]
- (b) (i) Outline **one** advantage of using steel to produce the seats and backs of the OMK chair. [2]
- (ii) Identify **one** benefit of the perforations (holes) in the seat and back of the OMK chair. [2]
- (c) (i) Identify how the tubular steel for the frame of the OMK chair would be produced. [2]
- (ii) Explain how consumers would evaluate the OMK chair before purchase, during initial use and in long-term use. [9]

6. Shopping trolleys (see **Figure 9** and **Figure 10**) were originally designed in Oklahoma by store owner, Sylvan N Goldman. They were developed to encourage shoppers to purchase more in his store. The trolleys are effectively large stainless steel wire baskets mounted on a chassis. The original design has evolved into a product family. Shopping trolleys have now become a global product.

Figure 9: Range of shopping trolleys



[Source: http://commons.wikimedia.org/wiki/Category:Shopping_carts. Images by Stilfehler.]

Figure 10: Shopping trolleys



[Source: <http://en.wikipedia.org/wiki/File:Einkaufswagen-2.jpg>. Image by de:benutzer:aeggy.]

- (a) (i) Outline **one** way in which robust design contributes to the development of a product family. [2]
- (ii) Explain **one** benefit to a manufacturer of developing a product family. [3]
- (b) (i) List **two** benefits of using stainless steel wire to make the baskets for the shopping trolleys. [2]
- (ii) Outline **one** reason why ductility is an important property of the material for the manufacture of the basket for the shopping trolley. [2]
- (c) (i) Outline **one** reason why a wire grid is a better design solution than a solid metal sheet for the basket for the shopping trolley. [2]
- (ii) Discuss **three** ways in which robust design meets the principles of green design. [9]

