

**DESIGN TECHNOLOGY
 STANDARD LEVEL
 PAPER 2**

Monday 18 November 2002 (afternoon)

1 hour

Name

Number

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INSTRUCTIONS TO CANDIDATES

- Write your candidate name and 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 in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
- At the end of the examination, indicate the number of the Section B question answered in the box below.

QUESTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION A	ALL	/20	/20	/20
SECTION B	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	TOTAL /40	TOTAL /40	TOTAL /40

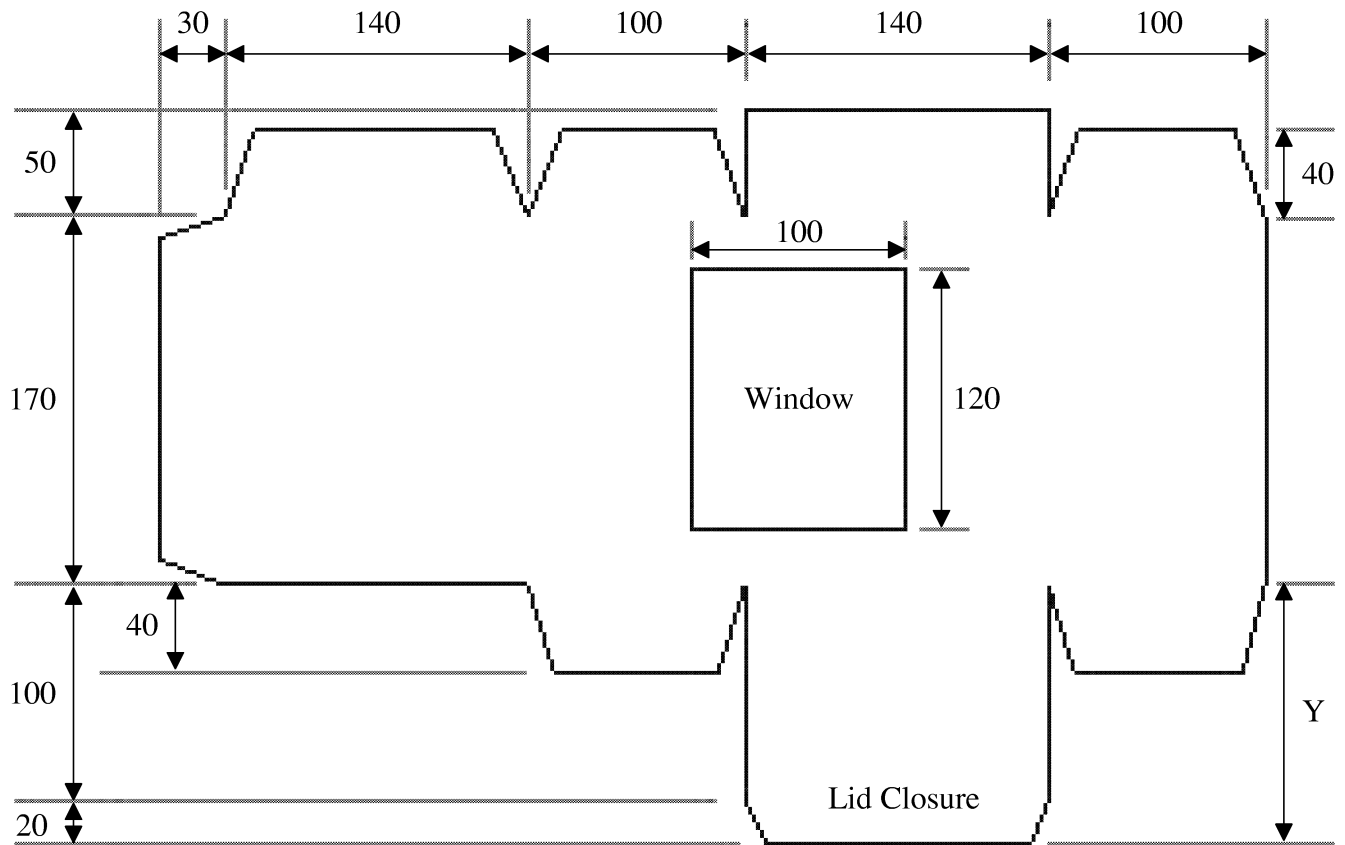
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SECTION A

Candidates must answer **all** questions in the spaces provided.

1. Food and drink packages are designed in a variety of 3D shapes. When cartons are manufactured they are cut from a flat piece of card. During the cutting process creases are put into the card where the folds have to be made.

Figure 1 shows the net of a regular cuboid, which is a shape often used for carton packaging.



All dimensions in mm

Figure 1

- (a) State dimension Y.

[1]

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(This question continues on the following page)

(Question 1 continued)

The net shown is cut from a card strip on a 200 m roll, 510 mm wide. (See below).

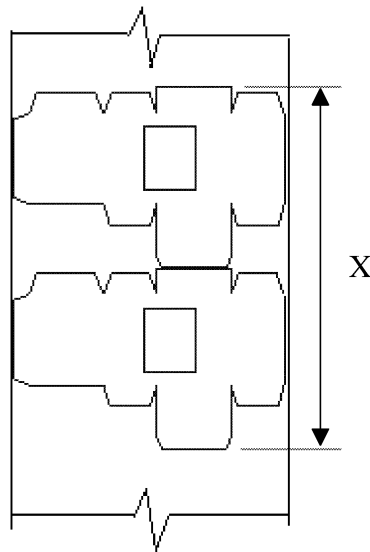
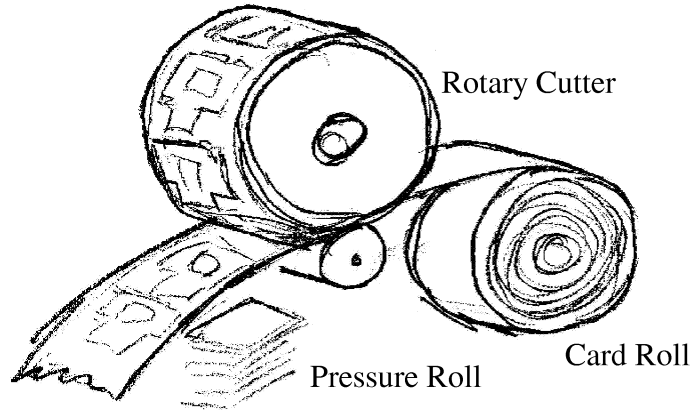


Figure 2

(b) (i) Calculate the distance X. [2]

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(ii) Calculate the number of cartons which can be cut from the roll using the arrangement shown in Figure 2. [3]

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(This question continues on the following page)

(Question 1 continued)

- (c) (i) State the minimum number of creases that need to be made to allow the carton to be folded into shape. [1]

- (ii) Draw a 3D view of the assembled package. [3]

2. A plank of wood measuring 150 mm × 1200 mm × 12 mm is to be used as a shelf to support books. The plank will be supported by metal brackets fixed to the wall.

Tests have shown that wood is strong and tough enough to support the books.

- (a) State **one** other mechanical property which must be considered in this design context. [1]

- (b) The plank is to be cut by hand and abraded to give a smooth finish. State the manufacturing process these techniques represent. [1]

3. Explain what is meant by “novel properties” with reference to new materials. [3]

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4. List **two** ways in which energy considerations can influence the design of a product. [2]

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5. An engineer lives near an airport and has complained about the excess of noise from aircraft flying over his house. He has decided to build a device to monitor the noise level of the aircraft.

(a) Draw the symbol for a component which can be used as the input device. [1]

(b) State the major component of the processing device. [1]

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(c) Draw the symbol for a component which can be used as the output device. [1]

SECTION B

Answer **one** question. Up to three additional marks are available for the construction of your answer. Write your answers in a continuation answer booklet. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.



Figure 3

6. (a) Outline **two** advantages of using the graphic symbol in Figure 3 rather than words for communication in an international airport. [4]
- (b) The symbols are most often made in plastic materials. State **four** advantages of using plastics for making these signs. [4]
- (c) The designer of a new building to be used as a bank needs to ensure that customers in wheelchairs can use the bank unassisted. [9]
- Explain the design considerations the designer needs to take into account.
7. A company produces plant seedlings to supply garden centres.
- The seedlings are grown in large glass houses and are maintained by an automatic watering system. The design of the system ensures that the moisture content of the soil is constantly monitored.
- However, because seedlings can be damaged if watered in bright sunlight, watering only takes place at night.
- (a) Draw a processing block diagram to describe the electronic control system to maintain the moisture content of the soil. [5]
- (b) Draw a circuit diagram to provide an analogue signal from changing light levels. [3]
- (c) Discuss the effectiveness of the automatic watering system for conserving resources and energy. [9]

8. (a) (i) Outline the difference between mechanisation and automation in a production system. [2]
- (ii) Outline how CAD can contribute to a mechanised system. [2]
- (b) Describe **two** effects of automating a production process on the workforce. [4]
- (c) A manufacturing company is changing its production system from mechanisation to automation.
- Explain the effect of this change on the following fixed and variable costs – capital costs, labour costs, design costs, overheads. [9]
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