IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
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M07/4/DESTE/SP2/ENG/TZ0/XX

22076205

DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 2

Thursday 10 May 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.

0109

SECTION A

*Answer **all** the questions in the spaces provided.*

1. A graphic designer is developing a poster to make young children more aware of international road safety signs. She uses an iterative process to work with the client to agree the poster design, as shown in the algorithm (see **Figure 1**). **Figure 2** shows the final design for the poster as agreed with the client. The client wants the poster to be printed in landscape mode and for the height of the images on the poster to be 120 mm with 60 mm of white space vertically between each image and between the letters and the images. The letters are each 40 mm high. **Table 1** shows ISO standard paper sizes available for printing the poster. **Figure 3** shows the actual height of the signs and also includes an alternative design for the "Do not enter" sign shown at the top right of the poster in **Figure 2**.

Figure 1: Algorithm representing the design process

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Receive brief from client
Undertake research to generate ideas
Incorporate research into computer-aided design of initial design ideas
Until all aspects of the design are agreed and the design is signed off by the client
    Discuss design with client
    Incorporate client comments into freehand drawings
Discuss poster design with printer
Agree printing requirements with printer
Print proof
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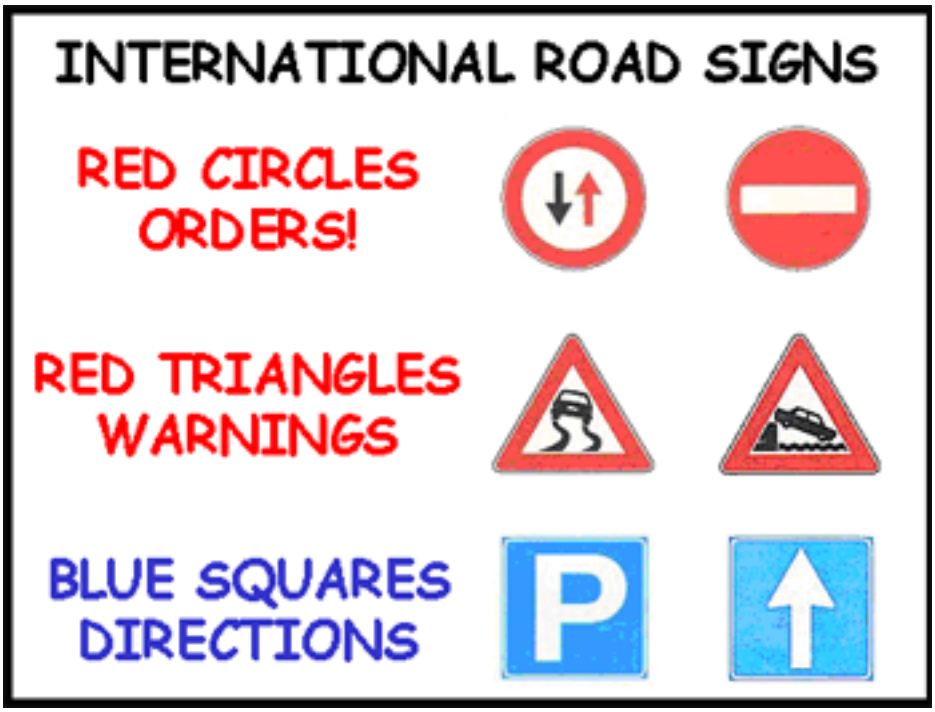
Figure 2: Final poster design agreed with client



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(Question 1 continued)

Table 1: ISO standard paper sizes (mm)		
A0	1189	841
A1	841	594
A2	594	420
A3	420	297
A4	297	210

Figure 3: Sign Dimensions

(a) (i) Calculate the scale at which the signs are drawn on the poster. *[2]*

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(ii) Identify the minimum ISO paper size on which the poster could be printed in landscape mode (see Figure 2). *[2]*

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(b) (i) State **one** advantage of using computer-aided design to develop ideas for the design with the client. *[1]*

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(ii) Explain why the poster designer uses an iterative process to agree the final design for the poster with the client. *[3]*

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(Question 1 continued)

(c) (i) State **one** disadvantage of the "Do not enter" sign in Figure 3 over the one included in Figure 2 for use in an international context. *[1]*

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(ii) Explain why international standards for the shape and colour of road signs have been developed. *[3]*

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2. (a) Define *green design*. *[1]*

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(b) Discuss why some manufacturing companies have adopted pro-active approaches to their environmental policies. *[3]*

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3. (a) Define *planned obsolescence*. *[1]*

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(b) Explain how eco-labelling would help a consumer to anticipate potential problems relating to the disposal of a refrigerator when it becomes obsolete. *[3]*

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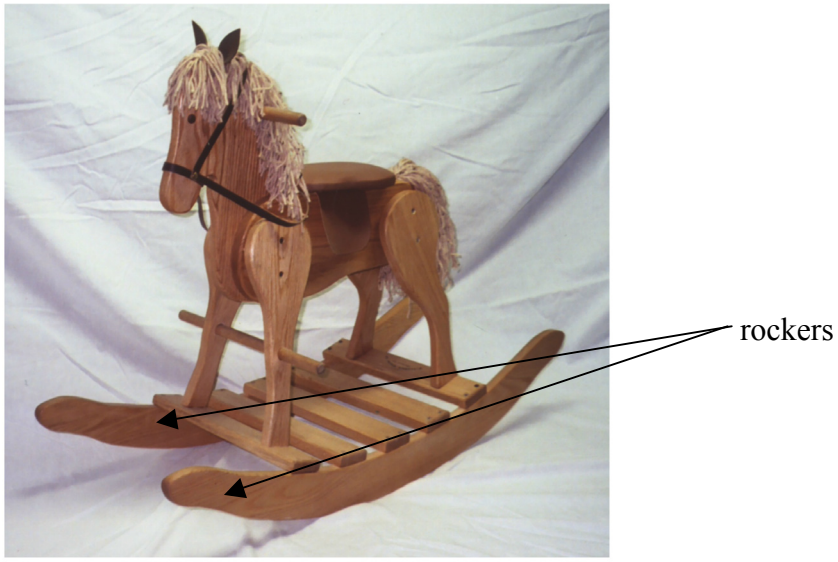
SECTION B

*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 4** shows a child's rocking horse that has been designed and handmade by a craftsperson. The rockers (the parts in contact with the floor) have been cut from two single pieces of timber. The designer used freehand drawings to communicate ideas about potential modifications to the design of the rocking horse to customize it to a client's specific requirements.

Figure 4: A child's rocking horse



[Source: Wisconsin Wagon Company (Janesville); www.wisconsinwagon.com]

(a) (i) State **one** feature of the rocking horse shown in Figure 4 that makes it suitable for craft production. *[1]*

(ii) List **two** advantages of using freehand drawings to communicate ideas about potential modifications to the design of the rocking horse for individual clients. *[2]*

(iii) Outline **one** criterion which would be used to evaluate the rocking horse to ensure that it is safe to use. *[2]*

(b) (i) List **two** mechanical properties that make wood a suitable material for the rocking horse. *[2]*

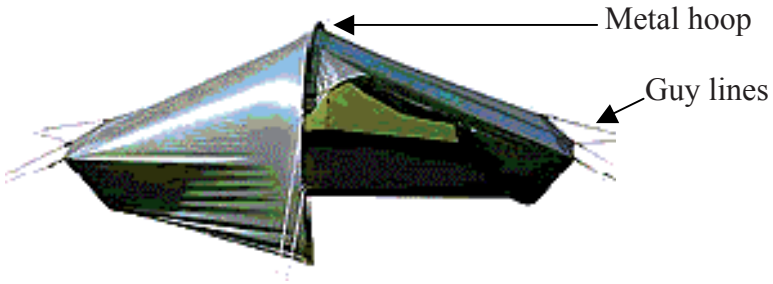
(ii) Outline **one** advantage of using laminated timber rather than single pieces of timber for the production of the rockers. *[2]*

(c) (i) Outline **one** way in which craft production could be considered as a clean technology. *[2]*

(ii) Explain how **three** different manufacturing processes contribute to the production of the rocking horse. *[9]*

5. **Figure 5** shows a tent designed for use by hikers. It was designed following a brainstorming activity with a group of experienced hikers. The tent is made from a lightweight fabric. It is held up by a metal hoop and held down by guy lines.

Figure 5: Lightweight tent for hikers



[Source: www.fieldandtrek.com/product-Hilleberg-Akto-Tent-32779.htm]

(a) (i) Define *brainstorming.* *[1]*

(ii) Outline **one** way in which brainstorming with the group of experienced hikers could contribute to the incremental design of the tent. *[2]*

(iii) List **two** ways in which mathematical modelling might be used in the design of the tent. *[2]*

(b) (i) Outline **one** mechanical property that is relevant to the selection of material for the metal hoop used to support the tent. *[2]*

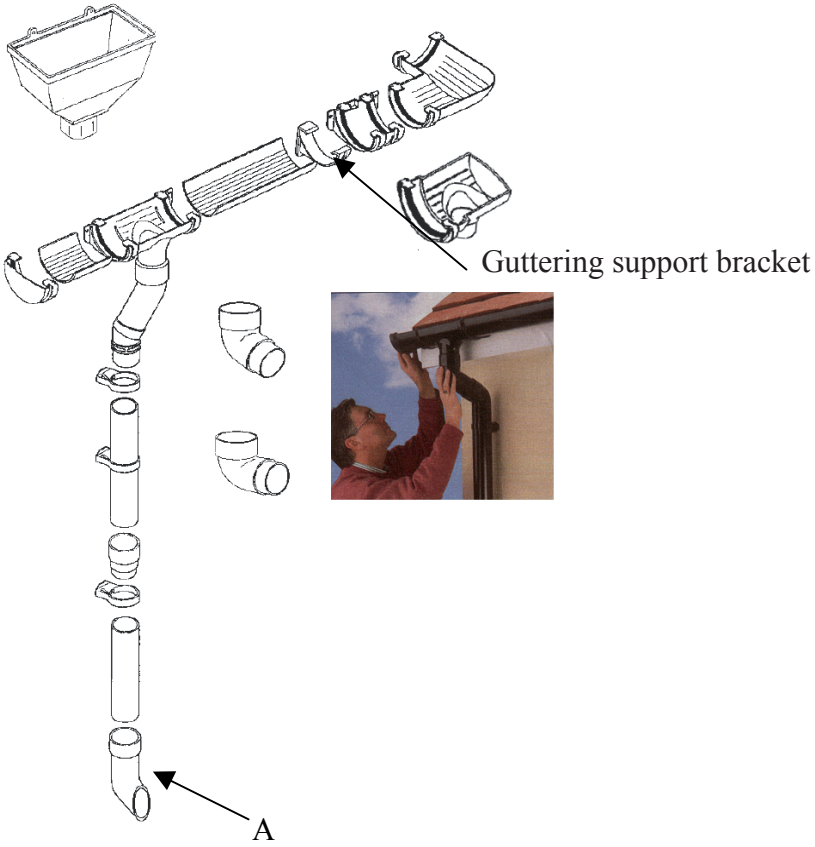
(ii) Outline **one** mechanical property that is relevant to the selection of material for the guy lines used to hold down the tent. *[2]*

(c) (i) Outline **one** advantage of using CAD/CAM in the production of the tent. *[2]*

(ii) Explain how **three** different manufacturing processes, other than CAM, contribute to the production of the tent. *[9]*

6. Figure 6 shows the components of a modular system that can be used to produce a guttering system for a house. The components are manufactured from a thermoplastic.

Figure 6: Thermoplastic components in a modular guttering system



[Source: http://www.wilkes.co.uk]

(a) (i) List **two** advantages of using an exploded isometric drawing to communicate aspects of the guttering system to potential customers. *[2]*

(ii) Explain how fixed costs contribute to the final cost of the components for the guttering system. *[3]*

(b) (i) Outline **one** mechanical property that determines the spacing of the guttering support brackets in the guttering system. *[2]*

(ii) Outline why the component labelled A in Figure 6 cannot be manufactured using extrusion. *[2]*

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(Question 6 continued)

(c) (i) Outline **one** way in which using thermoplastic for the guttering system meets the design objectives of green products. *[2]*

(ii) Explain how **three** different manufacturing processes contribute to the production of the components for the modular guttering system. *[9]*