88136205

International Baccalaureate®
Baccalauréat International
Bachillerato Internacional

DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 2

Candidate session number

0	0							

Monday 18 November 2013 (afternoon)

1 hour

Examination code

8	8	1	3	–	6	2	0	5

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 *[40 marks]*.

16 pages

SECTION A

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

1. **Figure 1** shows the Pegasus 25 sports shoe manufactured by Nike, a multinational company. Since 2009 Nike has adopted a corporate strategy to ensure that its products are more environmentally friendly. **Table 1** shows data published by Nike as a result of a life cycle analysis (LCA) of the product.

Figure 1: Pegasus 25 sports shoe

Figure 1 removed for copyright reasons

Table 1: data for Nike sports shoes

- 50 % reduction of waste material during manufacture
- 33 % of waste created during manufacture recyclable
- 1 mould can be used to create multiple shoe sizes
- change to the use of organic cotton grown without the use of pesticides or fertilizers
- Nike collects old shoes for recycling
- recycled shoes and scrap material from manufacturing used to create Nike “grind” rubber
- Nike “grind rubber” used for the soles of new shoes
- the airbag for the Pegasus shoe is made from 83 % post-industrial polyurethane
- the upper part of the shoe is made from 20–25 % pre and post consumer recycled plastic bottles and textile products
- reduction of gluing processes for each shoe from 20 to 17
- pattern efficiency in the design of the shoes focuses on maximizing the number of patterns cut from the material
- shoeboxes used to package the shoes use 30 % less wood pulp
- designers are provided with a materials analysis database which evaluates materials in relation to chemistry, energy impact, physical waste and water impact
- materials in the database are ranked so designers can choose environmentally friendly materials without compromising performance

(This question continues on the following page)

(Question 1 continued)

(a) (i) State **one** environmental benefit described in the data relating to the shoebox. *[1]*

. . . .
. . . .

(ii) State **one** reason why designers would want information relating to chemistry from the materials analysis database for life cycle analysis. *[1]*

. . . .
. . . .

(iii) List the **two** most relevant life cycle analysis stages which would be affected by the choice of materials for the shoe. *[2]*

. . . .
. . . .
. . . .
. . . .

(b) (i) Outline **one** likely change to the design of the shoe mould in order to make it suitable for manufacturing multiple shoe sizes. *[2]*

. . . .
. . . .
. . . .
. . . .

(This question continues on the following page)

(Question 1 continued)

(ii) Outline **one** benefit of having just one mould in relation to the corporate strategy. *[2]*

. . . .

. . . .

. . . .

. . . .

(c) (i) State which piece of data from **Table 1** relates to a policy of "take back". *[1]*

. . . .

. . . .

(ii) Explain how consumers' attitudes to green issues could have contributed to Nike's adaptation of their corporate strategy. *[3]*

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

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

. . . .
. . . .

(b) Discuss the conflict for the designer between moral and social responsibilities in relation to green design issues and wealth creation. *[3]*

. . . .
. . . .
. . . .
. . . .
. . . .
. . . .

3. (a) State **one** reason for adding scrap glass to new raw materials in the manufacture of glass. *[1]*

. . . .
. . . .

(b) Explain why glass is a suitable structural material for making bricks. *[3]*

. . . .
. . . .
. . . .
. . . .
. . . .
. . . .

SECTION B

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

4. **Figure 2** shows the Antelope Chair originally designed by Ernest Race for the 1951 Festival of Britain which was a major trade fair. The chair is designed with a metal frame (steel rod) and ball feet. The original design included a plywood seat but versions of the chair are also now available with a plastic seat (in a range of colours) instead of plywood. The chair is called "Antelope" due to the shape of the back and arms.

Figure 2: Ernest Race Antelope Chair

[Source: www.racefurniture.com. Used with permission.]

(This question continues on the following page)

(Question 4 continued)

(a) (i) State the ideas generating technique used to decide the name for the chair. *[1]*

. . . .

. . . .

(ii) Outline **one** advantage of using fasteners to join the seat to the frame. *[2]*

. . . .

. . . .

. . . .

. . . .

(iii) Outline **one** possible disadvantage for the user of using fasteners to join the seat to the frame. *[2]*

. . . .

. . . .

. . . .

. . . .

(This question continues on the following page)

(Question 4 continued)

(b) (i) State the percentile used to decide the height of the seat from the floor. *[1]*

. . . .

. . . .

(ii) Discuss the design of the frame of the chair in relation to comfort. *[3]*

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

(This question continues on the following page)

(Question 4 continued)

(c) (i) Outline **one** reason for designing the chair with ball feet. *[2]*

. . . .

(ii) Suggest **three** reasons for the continued popularity of the design of the Antelope chair over the past 60 years. *[9]*

. . . .

5. **Figure 3** shows the Pro-Sports backpack which is available in one size (20 litres) and is 100% waterproof. The backpack is designed with no zips and seams are electronically fused (welded) together. The back pack has reflective strips down each side and floats if dropped in water.

Figure 3: Pro-sports backpack

[Source: www.over-board.co.uk. Used with permission.]

(a) (i) State **one** reason for designing the backpack so it floats. *[1]*

. . . .

. . . .

(ii) Outline **one** reason for including reflective strips in the design of the backpack. *[2]*

. . . .

. . . .

. . . .

. . . .

(This question continues on the following page)

(Question 5 continued)

(iii) Outline the importance of density in the design of the backpack. *[2]*

. . . .
. . . .
. . . .
. . . .

(b) (i) State **one** advantage to the user of parts of the backpack joined by fusing. *[1]*

. . . .
. . . .

(ii) Explain how the structure and bonding of a thermoplastic allows for the technique of fusing. *[3]*

. . . .
. . . .
. . . .
. . . .
. . . .
. . . .

(This question continues on the following page)

(Question 5 continued)

(c) (i) Outline **one** reason for designing the backpack with no zips. *[2]*

. . . .
. . . .
. . . .
. . . .

(ii) Suggest **three** reasons for producing the backpack in one size. *[9]*

. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .

6. **Figure 4** shows the Umbrolly vending machine invented by Charles Ejogo who had the idea after being caught out in the rain one day and not having a brolly (umbrella) with him. Ejogo worked in a bank before founding his own company to develop and market the product. **Figure 5** shows the Umbrolly machine wall-mounted outside a train station and **Figure 6** shows a typical brolly (umbrella) sold in the vending machine.

Figure 4: Umbrolly vending machine

[Source: www.smallbiztrends.com]

Figure 5 : Umbrolly machine wall-mounted

[Source: http://www.journaldunet.com/economie/distribution/les-dix/distributeurs-automatiques/1.shtml]

Figure 6 : Brolly from the Umbrolly machine

[Source: http://www.adartimports.com/products/umbrellas/]

(This question continues on the following page)

(Question 6 continued)

(a) (i) State **one** evaluation strategy that Charles Ejogo would have used to evaluate the potential market for the Umbrolly. *[1]*

. . . .
. . . .

(ii) Outline **one** reason for ensuring that the price of a brolly from the vending machine is low in relation to value for the consumer. *[2]*

. . . .
. . . .
. . . .
. . . .

(iii) Describe how constructive discontent was the primary generator of the idea for the Umbrolly. *[2]*

. . . .
. . . .
. . . .
. . . .

(This question continues on the following page)

(Question 6 continued)

(b) (i) Identify **one** reason why innovators such as Ejogo may have difficulty in obtaining financial support. *[1]*

. . . .

. . . .

(ii) Discuss Ejogo as an example of an inventor/entrepreneur. *[3]*

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

(This question continues on the following page)

(Question 6 continued)

(c) (i) Outline the impact of research and development costs on the final cost of the Umbrolly. *[2]*

. . . .
. . . .
. . . .
. . . .

(ii) Discuss **three** cost implications which will need to be taken into account when establishing a network of Umbrolly machines. *[9]*

. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .
. . . .