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**DESIGN TECHNOLOGY
STANDARD LEVEL
PAPER 1**

Friday 9 November 2012 (afternoon)

45 minutes

INSTRUCTIONS TO CANDIDATES

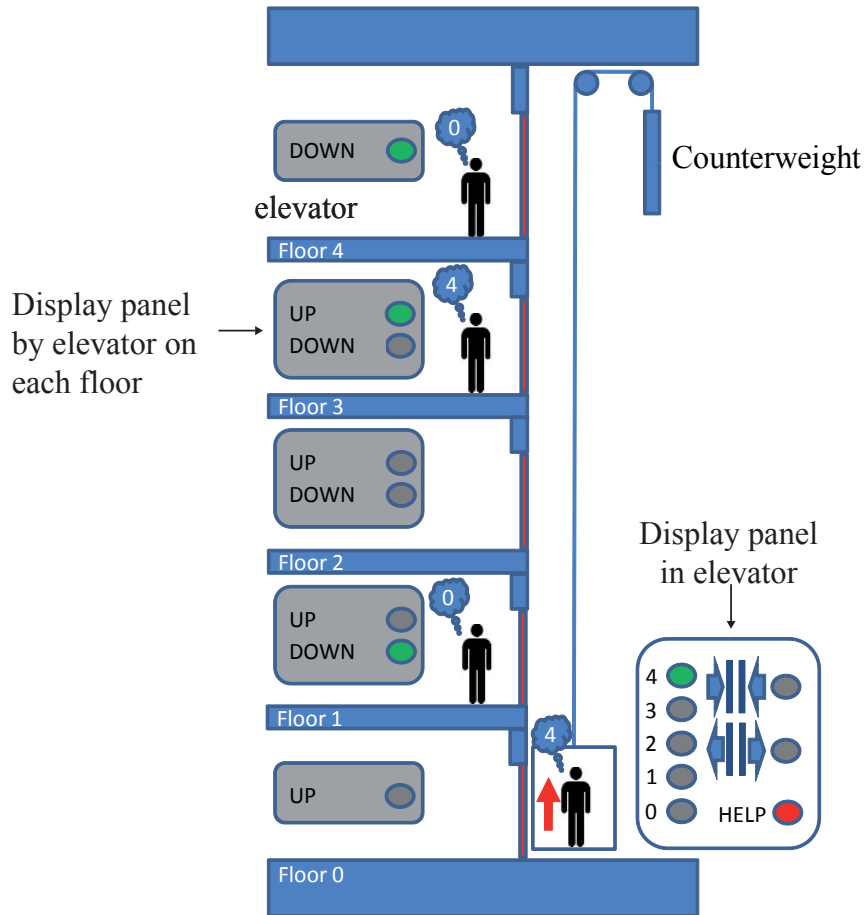
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- The maximum mark for this examination paper is *[30 marks]*.

1. Which stage of the IB design cycle results in the design brief?
 - A. Identifying or clarifying a need
 - B. Generating the ideas and solutions
 - C. Developing the chosen solution
 - D. Testing and evaluating the chosen solution

2. What is true of morphological synthesis but **not** attribute listing?
 - A. It is an ideas generating technique
 - B. It uses a matrix approach to combining ideas
 - C. It supports brainstorming
 - D. It uses analogies

3. **Figure 1** shows an elevator (lift) shaft in a busy office building with a number of people waiting to board. The elevator receives instructions via display panels on the wall next to the elevator on each floor (floorcall) or from the panel within the elevator (panelcall). If the elevator is travelling up the elevator shaft it continues upwards until it has serviced all the calls or it reaches the top of the elevator shaft. It then changes direction and travels down servicing calls as it goes down until there are no more calls or it reaches the bottom of the elevator shaft when it again changes direction.

Figure 1: An elevator shaft in a busy office building



[© International Baccalaureate Organization, 2013]

Which method would be most appropriate for the instructions on the elevator operation?

	Algorithm	Flowchart
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

4. **Figure 2** shows a scale model of a state-of-the-art business school to be built in a university in Sydney. It has been dubbed *The Treehouse* and was designed by world-renowned architect Frank Gehry.

Figure 2: A model of Frank Gehry’s *The Treehouse*



[Source: www.abc.net.au/news/stories/2010/12/16/3094936.htm?section=entertainment]

What would be a suitable scale for the model of *The Treehouse*?

- A. 0.01
- B. 0.1
- C. 10
- D. 100

5. What characterizes a pioneering strategy?
- I. It is a low risk strategy for a company
 - II. It offers a company the potential for a large profit
 - III. The company needs good research and development capability
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III
-
6. At which stages of the product life cycle is marketing of the product **most** likely to take place?
- I. Early stage
 - II. Mature stage
 - III. Late stage
- A. I and II
- B. I and III
- C. II and III
- D. I, II and III
-
7. Which term describes the features of a particular type of product, *e.g.* a mobile phone, considered essential by the majority of manufacturers and purchasers?
- A. Incremental design
- B. Product family
- C. Robust design
- D. Dominant design

8. **Figure 3** shows an adjustable Panel Bin. **Figure 4** shows a non-adjustable bin.

Figure 3: The adjustable Panel Bin



Figure 4: Non-adjustable bin



[Source: www.yankodesign.com/2010/12/15/dustbin-of-many-sizes]

At which stage of the product life cycle does the Panel Bin offer the **most** advantage over the ordinary waste bin?

- A. Production
- B. Distribution
- C. Utilization
- D. Disposal

9. Which objectives for the design of green products are addressed by replacing the use of chlorofluorocarbon (CFC) refrigerant with an alternative refrigerant?
- I. Increasing efficiency in the use of materials, energy and other resources
 - II. Minimizing damage or pollution from the chosen materials
 - III. Taking full account of the effects of the end disposal of the product
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III

10. Which schemes reflect life cycle analysis of a product?

	Ecolabel	Energy label
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

11. What is described as a mixture of two or more substances with one substance acting as the matrix or glue?
- A. Atom
 - B. Molecule
 - C. Alloy
 - D. Composite

12. What is defined as the ability of a material to be drawn or extruded into a wire or other extended shape?
- A. Plasticity
 - B. Elasticity
 - C. Malleability
 - D. Ductility

13. What characterizes natural timber?

	Along the grain	Across the grain
A.	Low tensile strength	Low tensile strength
B.	Low tensile strength	High tensile strength
C.	High tensile strength	Low tensile strength
D.	High tensile strength	High tensile strength

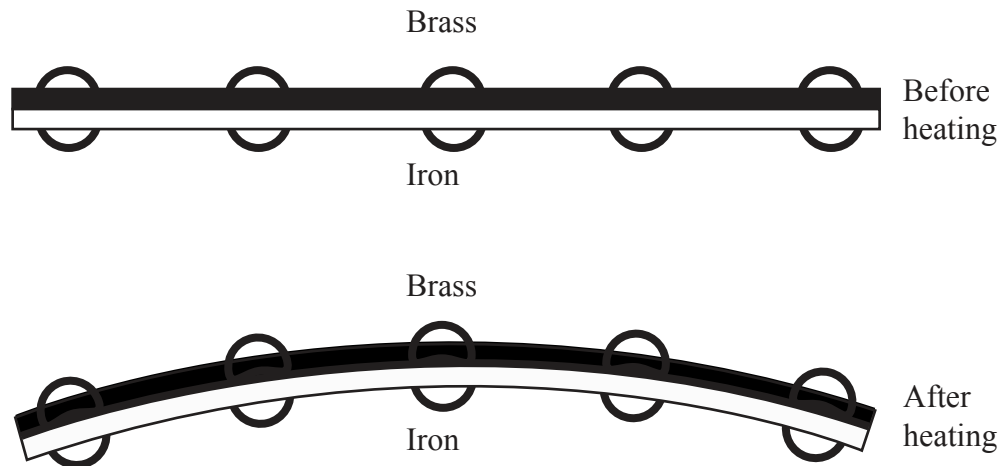
14. What characterizes the cooling of metals?

	Rapid cooling	Slow cooling
A.	Smaller grain size	Smaller grain size
B.	Smaller grain size	Larger grain size
C.	Larger grain size	Smaller grain size
D.	Larger grain size	Larger grain size

15. What is true of thermoplastics but **not** thermosets?
- A. Strong primary bonds
 - B. Weak bonds between adjacent polymer chains
 - C. Strong bonds between adjacent polymer chains
 - D. Rigid 3D structure
16. Why is scrap glass added to new raw materials in the manufacture of glass?
- A. It reduces the risk of accidents from broken glass
 - B. It reduces the volume of virgin raw materials required
 - C. It reduces the melting point
 - D. It reduces waste disposal to landfill
17. Which property of shape memory alloys allows them to spring back to their original shape by heating them?
- A. Malleability
 - B. Ductility
 - C. Elasticity
 - D. Pseudo-elasticity

18. **Figure 5** shows a bimetallic strip which comprises two dissimilar metals. A bimetallic strip bends when heated and can be used in a thermostat.

Figure 5: Bimetallic strip before and after heating



[Source: www.arthursclipart.org/physics/physics/page_01.htm]

Which physical property informs the selection of material for a bimetallic strip?

- A. Density
- B. Electrical conductivity
- C. Thermal conductivity
- D. Thermal expansivity

19. Which manufacturing technique would have been used to produce the basket shown in **Figure 6**?

Figure 6: A basket



[Source: From: http://en.wikipedia.org/wiki/File:Handmade_basket_kudzu.jpg. Created by Matt Tommey.]

- A. Stitching
 - B. Weaving
 - C. Moulding
 - D. Using fasteners
20. Which aspect of assembly-line production has a major negative impact on the workforce?
- A. Interchangeable parts
 - B. Job standardization
 - C. Pre-processing of materials
 - D. Quality control

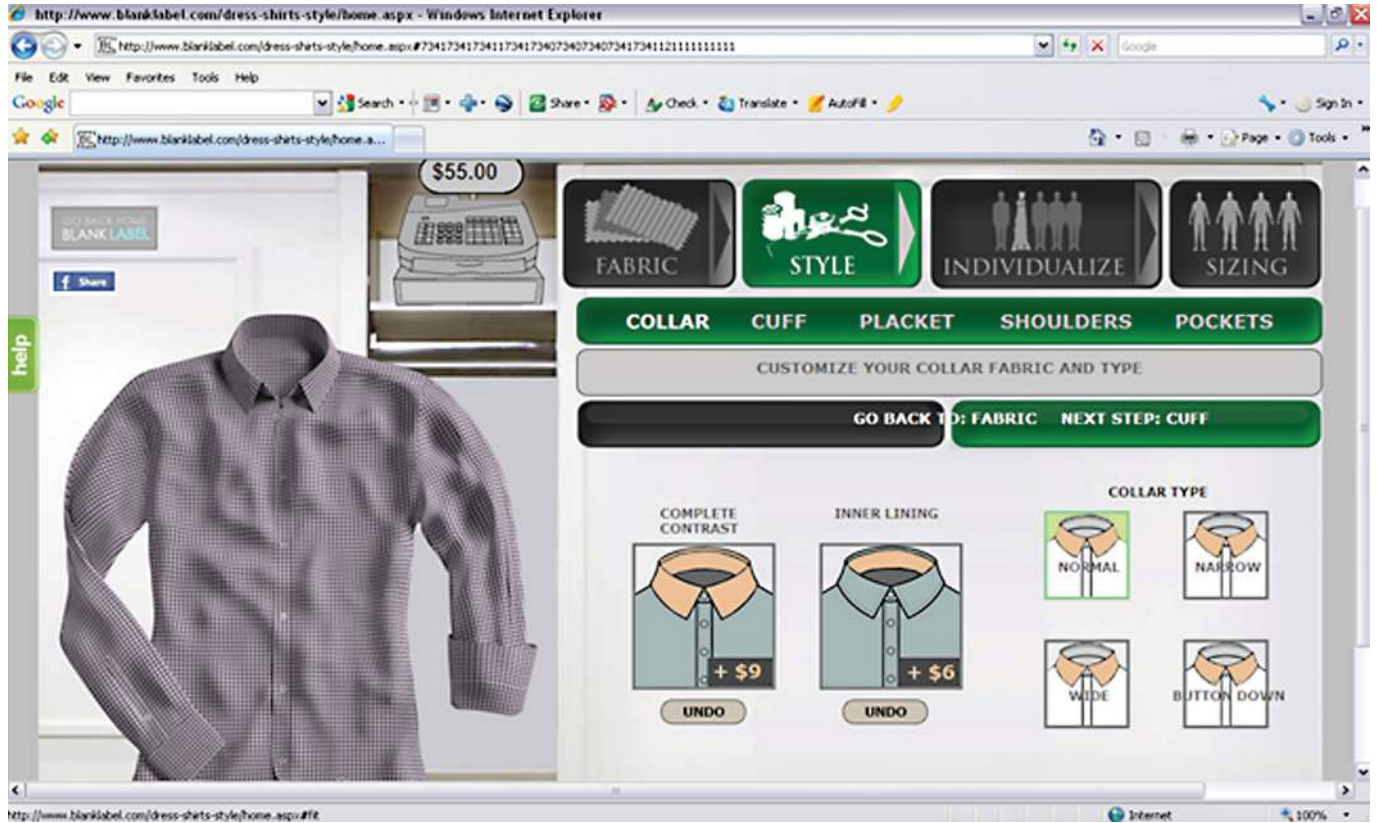
- 21.** What is true of the breakeven point?
- I. It specifies the number of products required to cover the total costs
 - II. It specifies the point at which a company will start to make a profit
 - III. It is determined by the manufacturer
- A. I and II
 - B. I and III
 - C. II and III
 - D. I, II and III
- 22.** What is an advantage of planned obsolescence for manufacturers?
- A. Materials must be carefully specified
 - B. Consumers have to replace products at regular intervals
 - C. Products are designed so they are repairable
 - D. Products must last at least as long as their guaranteed product life
- 23.** In which design context would the 50th percentile be used?
- A. The height of a door
 - B. Mass produced clothing
 - C. A safety helmet
 - D. The height of a kitchen work surface

24. What is true of quality assurance but **not** quality control?
- A. It ensures that a product meets a defined set of criteria
 - B. The inspection process adds value to the product
 - C. It involves inspection of the product
 - D. It aims to reduce the number of defective products to zero
25. What is the major advantage of user trials?
- A. They are cost-effective
 - B. They don't require a prototype
 - C. They provide user feedback
 - D. They are time-consuming
26. What is a disadvantage of a field trial compared to a laboratory-based evaluation?
- A. It is time-consuming
 - B. It can identify maintenance issues
 - C. It can investigate the impact of weathering on product life
 - D. It tests performance under real conditions

Questions 27–30 relate to the following case study. Please read the case study carefully and answer the questions.

Blank Label is a company which allows customers a limited range of options for designing their own shirts (see **Figure 7**). The shirts are designed online and produced in China. Blank Label’s slogan is “Designed by you, stitched by us”. As the customer chooses different options the image of the shirt changes.

Figure 7: Blank Label’s website which allows customers to design their own shirt



[Source: www.blanklabel.com. ©BlankLabel.com. Used with permission]

27. What is the benefit of including the image of the shirt on the website to the consumer?
- A. To help the consumer design the shirt
 - B. To see the size
 - C. To visualise the wearing of the shirt
 - D. To check the quality of the shirt

- 28.** What is the major advantage of mass customization for the manufacturer?
- A. The manufacturer develops a direct relationship with the customer
 - B. It reduces risk for the manufacturer
 - C. The customer's requirements dominate
 - D. The customer is involved in the design process
- 29.** Which cost related to the production of the shirt is a fixed cost?
- A. Website design
 - B. Materials
 - C. Labour
 - D. Distribution
- 30.** Why does the customized system offer a limited range of choices to customers for designing their shirts?
- A. Fashion
 - B. Planned obsolescence
 - C. Financial viability
 - D. Limited consumer demand
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