Diploma Programme
Programme du diplôme
Programa del Diploma

Design technology
Higher level
Paper 1

Friday 4 May 2018 (afternoon)

1 hour

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 **[40 marks]**.

2218 – 6201

21 pages

1. What describes the collection of data that does not already exist?

A. Ordinal data

B. Secondary data

C. Primary anthropometric data

D. Categorical data

2. What physiological factor are the designers attempting to address in the creation of the Wow-pen mouse shown in **Figure 1**?

Figure 1: A Wow-pen mouse

[Source: brollymedia/iStock]

A. Endurance

B. Biomechanics

C. Tolerance

D. Comfort and Fatigue

3. Which of the following is a non-renewable energy source?

A. Solar

B. Natural gas

C. Hydro

D. Biomass

4. When can timber be defined as renewable?

A. When a new tree is planted to replace used timber

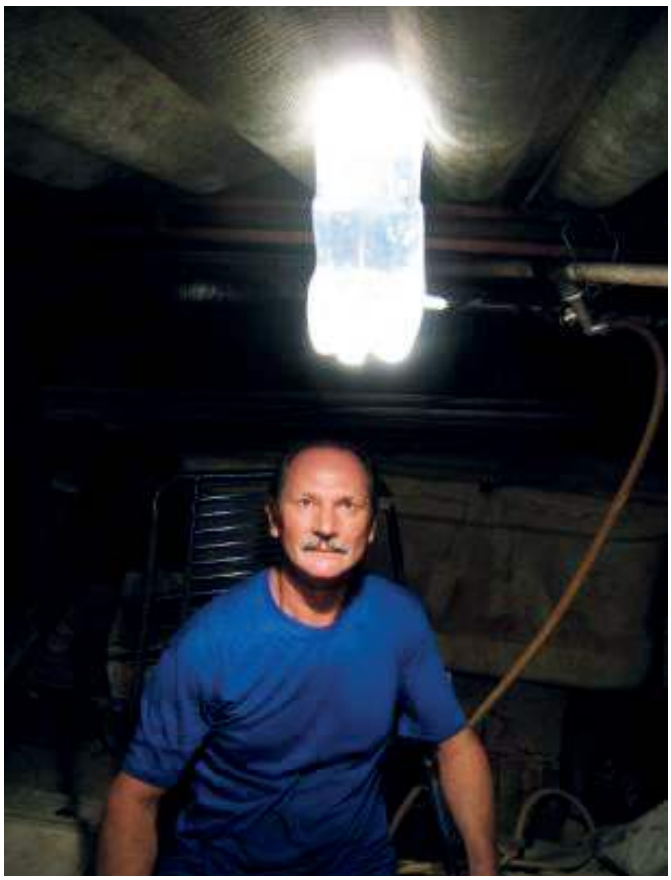
B. When it is re-engineered

C. When it is sourced from a rainforest

D. When it has been recycled

5. Alfredo Moser invented a lamp, see **Figure 2**, to provide lighting to homes without access to electricity, using nothing more than a plastic bottle, water and bleach.

Figure 2: The Moser lamp



[Source: Image by Gibby Zobel]

What waste mitigation strategy describes the use of the bottle in this invention?

A. Recondition

B. Recycle

C. Repair

D. Reuse

6. CoolBins Eyewear has grown to become a recognizable brand due to its products being made from sustainable sources, such as the wooden sunglasses shown in **Figure 3**. They improve on an existing product by considering environmental factors.

Figure 3: CoolBins Eyewear wooden sunglasses

What strategy is CoolBins Eyewear employing?

A. Eco-design

B. Sustainable design

C. Green design

D. User-centred design

7. The 1997 Kyoto Treaty saw governments set targets to reduce greenhouse gases.

What approach to green energy is this?

A. Radical innovation

B. Media pressure

C. International legislation

D. System level solution

8. Which of the following are design objectives for green products?

A. People, planet, profit

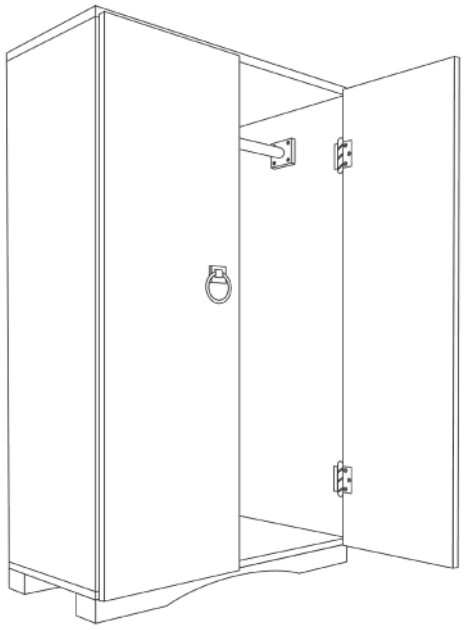
B. Reuse, recycle, repair

C. Materials, energy, pollution

D. Production, distribution, utilization

9. Many furniture manufacturers provide graphical models to help customers assemble their products, see **Figure 4**.

Figure 4: An example of a graphical model



[Source: Image designed by Mike Oliver]

What perspective style is used in the image?

A. Linear perspective

B. Two-point perspective

C. One-point perspective

D. Three-point perspective

10. James Dyson reportedly made over 5000 prototypes before he was happy with the design of his vacuum cleaner, see **Figure 5**.

Figure 5: A Dyson vacuum cleaner

[Source: The image of the Dyson prototype reproduced at page 6 is reproduced with the permission of Dyson Technology Limited]

What could be a disadvantage of a detailed working prototype?

A. Looks different to the final product

B. Encourages inaccurate feedback

C. Does not give an accurate idea of the final product

D. Expensive to produce

11. Conceptual models provide a way of communicating, testing and developing early ideas.

Who are the main beneficiaries of a conceptual model?

I. Client

II. Designer

III. End user

A. I and II

B. I and III

C. II and III

D. I, II and III

12. The joints along railway tracks have noticeable gaps. This is not a design flaw as these gaps serve a purpose, see **Figure 6**.

Figure 6: The gaps along railway tracks

[Source: https://commons.wikimedia.org/wiki/File:Track_joint.jpg]

What purpose do the gaps along railway tracks serve?

A. Easy access for maintenance

B. Allow for thermal expansion

C. Ease of transportation

D. To adjust the distance between the wooden sleepers

13. Man-made timbers can be convenient for industrial use.

Which of the following man-made timbers is created from thin layers glued together?

A. Chipboard

B. MDF

C. Particle board

D. Plywood

14. Glass can be processed in many ways to achieve different properties.

Which of the following processes describe tempering?

A. Heat treating

B. Laminating

C. Moulding

D. Etching

15. Modern sportswear often advertises its technical capabilities, such as wicking properties, see **Figure 7**.

Figure 7: Modern sportswear

[Source: Todor Tsvetkov / iStockphoto]

What material is best suited for this application?

A. Silk

B. Cotton

C. Polyester

D. Wool

16. Which of the following is most suited to the manufacture of a high value niche product?

A. Continuous flow

B. One-off

C. Mass production

D. Batch manufacture

17. **Figure 8** shows a child's garden slide.

Figure 8: A child's garden slide

[Source: JoenStock]

What would be the predominant manufacturing process for this item?

A. Blow moulding

B. Injection moulding

C. Rotational moulding

D. Compression moulding

18. Which of the following is a recognized strategy to achieve Design for Manufacture (DfM)?

A. Developing products in multifunctional teams

B. Contracting external concept design

C. Research for capturing user needs

D. Undertaking Life cycle analysis (LCA)

19. Which of the following are true of robotic production?

I. Increases productivity

II. Increases accuracy and reliability

III. Improves health and safety of workforce

A. I and II

B. I and III

C. II and III

D. I, II and III

20. Gillette has been operating since 1901 and has consistently stayed ahead of its competition through advancements in its shaving products, see **Figure 9**.

Figure 9: An example of a Gillette product

[Source: © Gillette and Proctor and Procter & Gamble]

What type of innovation is utilized by Gillette?

A. Modular

B. Radical

C. Incremental

D. Technology transfer

21. Rogers is well known for characterizing aspects of innovation.

What is the term given to product improvements over previous generations?

A. Compatibility

B. Relative advantage

C. Trial-ability

D. Complexity

22. Modern products are often very complex, containing digital and physical elements.

What approach do many companies employ to deal with this complexity?

A. Focus on a core technology

B. Employ a product champion

C. Multidisciplinary approach

D. Monodisciplinary approach

23. The Jerrycan, see **Figure 10**, was developed in Germany in the 1930s for military use. It became a much sought-after item because it was engineered to a much higher standard than the competition and contained many innovative features, including indentations in the walls that allowed for expansion and increased strength, and a handle design that allowed it to be carried by one or two people. Its iconic status is demonstrated by continued availability of and the use of the term “Jerrycan” in reference to all fuel containers.

Figure 10: The Jerrycan

[Source: https://commons.wikimedia.org/wiki/File:Jerrycan.JPG]

What term best describes the Jerrycan?

A. Imitative design

B. Dominant design

C. Obsolescent design

D. Aesthetic design

24. **Figure 11** below shows the 2015 Leica X digital camera.

Figure 11: The Leica X digital camera

[Source: With permission from Leica Camera]

Which best describes the designer's approach?

A. Retro-styling

B. Psychological function

C. Compromise

D. Innovation

25. Triple bottom line sustainability does not only focus on the profitability of an organization or product, but also the environmental and social benefit it can bring.

Which of the following refers to triple bottom line sustainability?

A. Economic, political, social

B. Environmental, political, social

C. Economic, environmental, political

D. Economic, environmental, social

26. What are generally considered to be examples of sustainable consumption?

I. Taking an alternative route to avoid road tolls

II. Not buying more food than needed

III. Turning taps off when brushing teeth

A. I and II

B. I and III

C. II and III

D. I, II and II

27. Which architectural considerations are responding to sustainable design?

I. The use of bamboo flooring

II. Heating the house by coal

III. Collecting and using rainwater

A. I and II only

B. II and III only

C. I and III only

D. I, II and III

28. What is the corporate strategy where leadership determines the overall goals and individual employees to assist in developing the mechanisms and ideas to meet these goals?

A. Top down

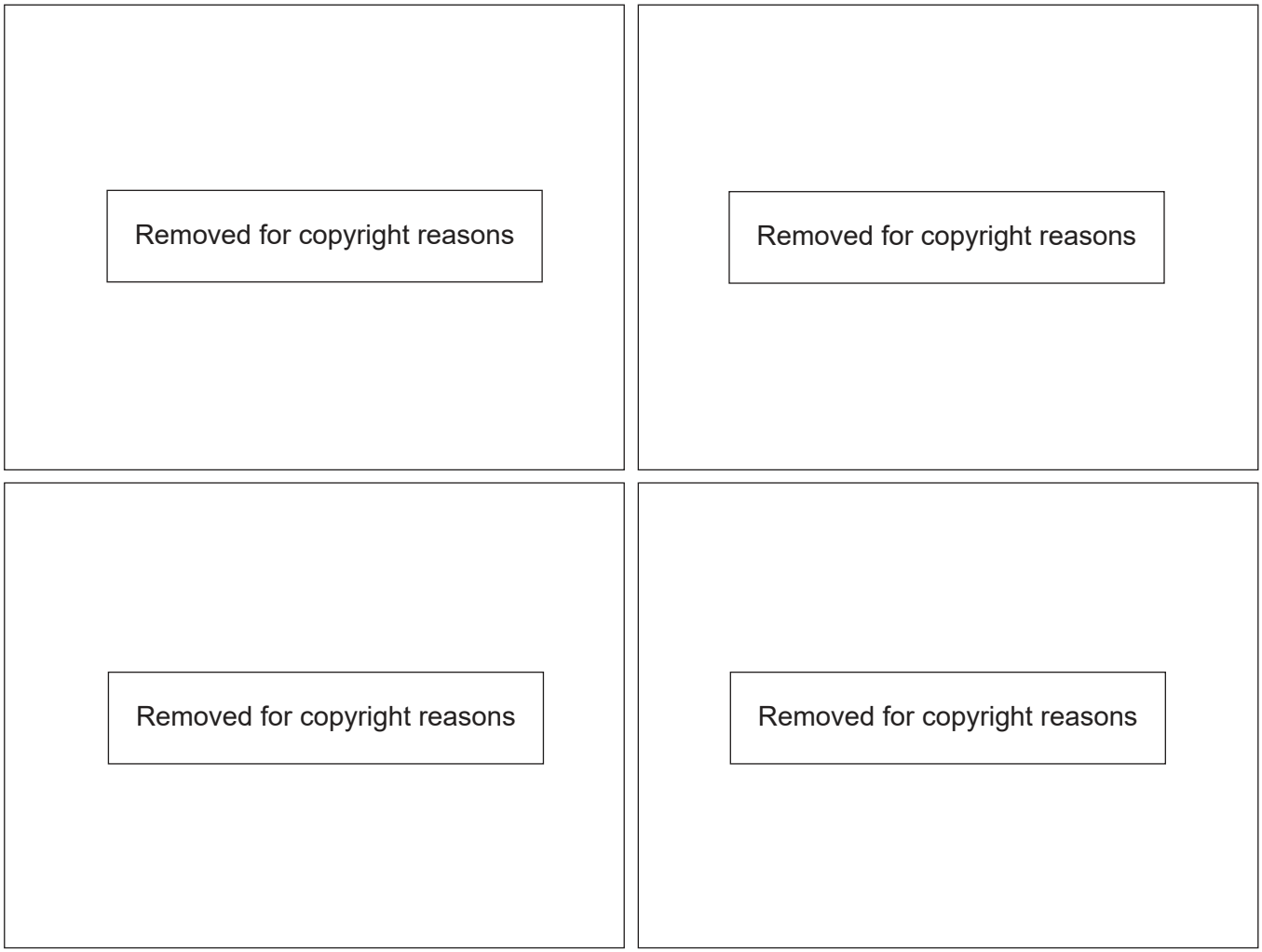
B. Bottom up

C. Delayering

D. Product stewardship

29. **Figure 12** below shows the evolution of the iPhone from the first generation iPhone to the tenth generation iPhone 7.

Figure 12: The evolution of the iPhone



How has each model of the iPhone best exemplified a product family?

I. Through branding consistency

II. Through shared aesthetic characteristics

III. Through technological improvements

A. I and II only

B. II and III only

C. I and III only

D. I, II and III

30. Product and Promotion are two factors of the four Ps involved in “Marketing mix”.

What are the other two Ps?

A. Price and profit

B. Place and profit

C. Place and price

D. People and profit

31. A trademark can be:

I. A letter or word

II. A sound

III. A picture

A. I and II

B. II and III

C. I and III

D. I, II and III

32. Which consideration best relates to the waste produced by inappropriate processing?

A. Are we producing exactly what is required?

B. Where and how can we reduce our stock?

C. How can I avoid moving parts from one place to another?

D. Can operations be eliminated from my work?

33. The ideal situation in a just in time (JIT) environment is piece per process, which equates to one piece ordered, one piece processed and one piece shipped. All inventory held over and above this quantity is regarded as waste.

However, this is not always possible or practical. Which of the following allows the inventory to be minimised as far as possible?

A. Carry parts that are expensive

B. Carry parts that are likely to become obsolete

C. Carry parts critical to manufacture

D. Carry parts that another local company can also sell

34. Which of the following is a culture of continuous improvement?

A. Kaizen

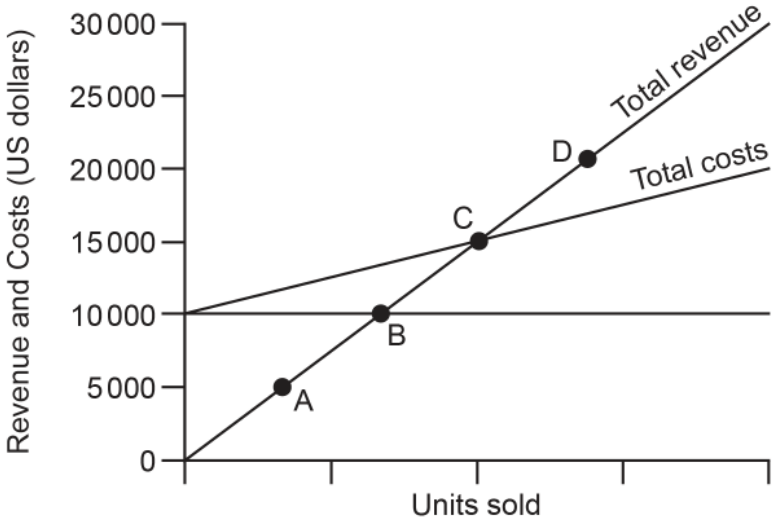
B. Quality control

C. Statistical process control

D. Value stream mapping

35. **Figure 13** shows a graph of costs/revenue against sales.

Figure 13: Break-even graph



[Source: © International Baccalaureate Organization 2018]

Which of the following points represents the break-even point on the graph?

A. A

B. B

C. C

D. D

Questions 36 – 40 relate to the following case study. Please read the case study carefully and answer the questions.

When the Italian manufacturer Alessi commissioned the architect Michael Graves to design a new kettle, the company stipulated two requirements. They wanted a hob kettle that would come to the boil quickly, and that looked American. Graves realised that a fast boil could be achieved by making the kettle the right shape, with a broad base that tapered towards the top, see **Figure 14**, but making it look American was more of a challenge. In the end, he looked back to the childhood summers he spent on a farm in Indiana for inspiration. He remembered waking to the sound of boiling water and the rooster crowing, so he gave the kettle a whistle in the form of a coloured bird that screeched when steam from the boiling water rushed up the spout, see **Figure 15**. This witty reference to the past was typical of the Postmodern movement in design and architecture of the 1970s and 1980s.

Developed in 1985, Graves' Alessi kettle with a bird whistle remains an iconic design with one of its successes being that it meets all four aspects or criteria of the four-pleasure framework.

Figure 14: The Alessi kettle

Figure 15: The bird whistle on the Alessi kettle

[Sources: © Alessi]

36. Which of the following pleasures does this definition refer to: a pleasure that can be derived from the cognitive demands of using a product or service and the emotional reactions engendered through the experience of using it.

A. Socio-pleasure

B. Physio-pleasure

C. Psycho-pleasure

D. Ideo-pleasure

37. What was the growth strategy that the Alessi company utilized in commissioning Michael Graves' new kettle design?

A. Market penetration

B. Market development

C. Product development

D. Product diversification

38. Graves used his childhood memories as an inspiration for the kettle.

What design strategy did he use?

A. Iterative

B. Emotion

C. Inclusive

D. Participatory

39. The whistling of the kettle may not be accessible for people with hearing impairments.

What principle could a designer use to overcome this limitation?

A. Reflective

B. Participatory

C. Ergonomic

D. Inclusive

40. What has dictated the design of the kettle?

A. The practical function

B. The psychological function

C. Neither the practical or psychological function

D. Both the practical and psychological function