Diploma Programme
Programme du diplôme
Programa del Diploma

Design technology
Higher level
Paper 1

Thursday 11 May 2017 (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]**.

2217 – 6201

1. A designer is developing the interior of a car and wants to ensure that the driver has sufficient range of movement to reach all the controls.

What type of data does the designer need?

A. Dynamic data

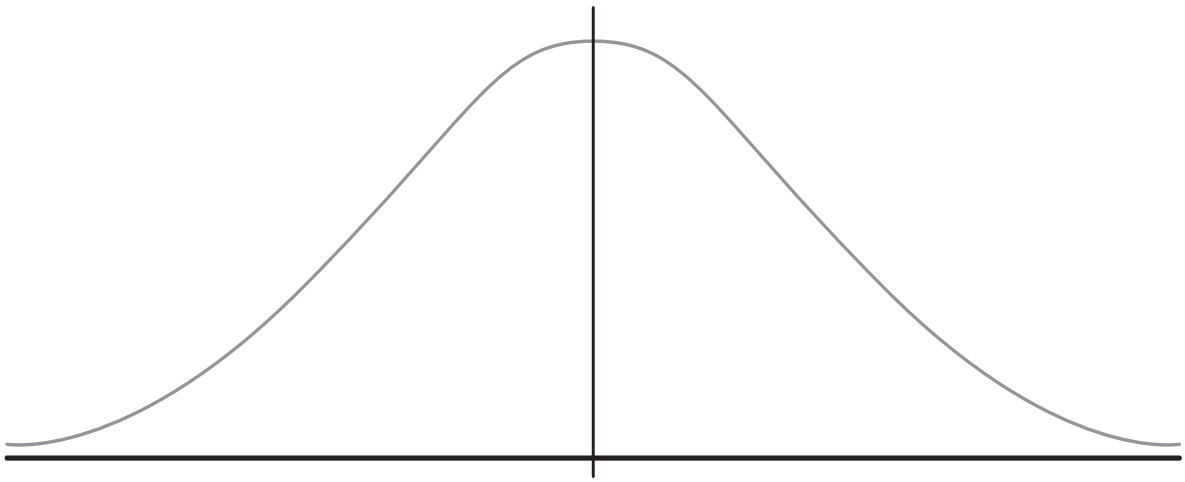
B. Static data

C. Primary data

D. Environmental data

2. **Figure 1** below is a bell shaped curve showing a normal distribution.

Figure 1: A bell shaped curve



[Source: Generic diagram]

Which strategy should the designer use for the mass-produced product?

A. 1st – 99th percentile

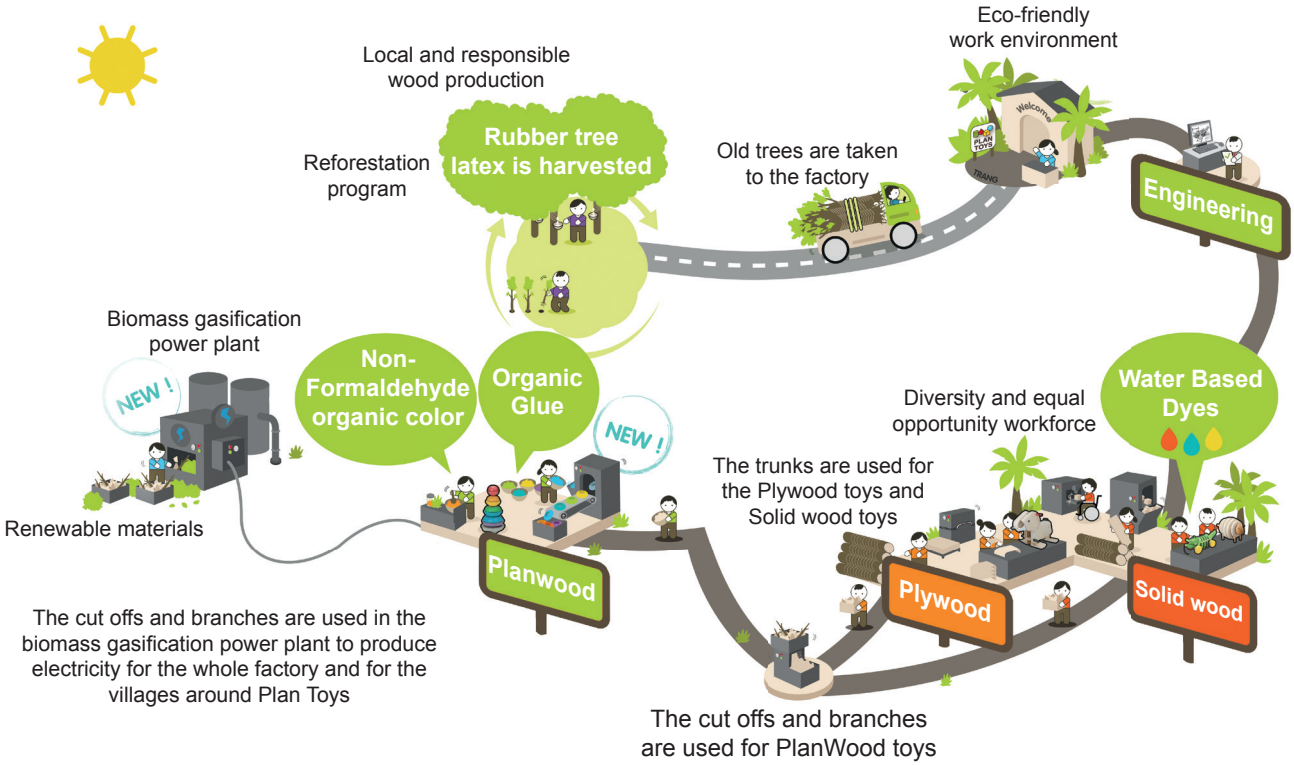
B. 95th percentile

C. 50th percentile

D. 5th – 95th percentile

3. Plan Toys is a company that markets itself on its environmental credentials. **Figure 2** below shows their production and distribution process. What best describes the company's sustainability strategy?

Figure 2: The production and distribution process for Plan Toys



[Source: www.playtravellife.com]

A. The use of renewable resources

B. The promotion of recycling

C. Undertaking dematerialization

D. The use of product recovery

4. What describes the quantity of material that is ready and available for production?

	Reserve	Resource
A.	No	No
B.	No	Yes
C.	Yes	No
D.	Yes	Yes

5. What is a definition of re-use

A. Changing waste material into a new product

B. Application of a product in the same or different context

C. The reconstruction or renewal of any part of a product

D. The return of a product to working order

6. What best describes end-of-pipe technology?

A. Capturing emissions immediately before release

B. Providing alternatives to fossil fuel usage

C. Improving the efficiency of production

D. Capturing emissions during production

7. What is a fundamental aspect of a “cradle to cradle” philosophy?

A. Reuse

B. Recycling

C. Repair

D. Reconditioning

8. What is the purpose of a conceptual model?

A. To provide a proof of concept of a new idea

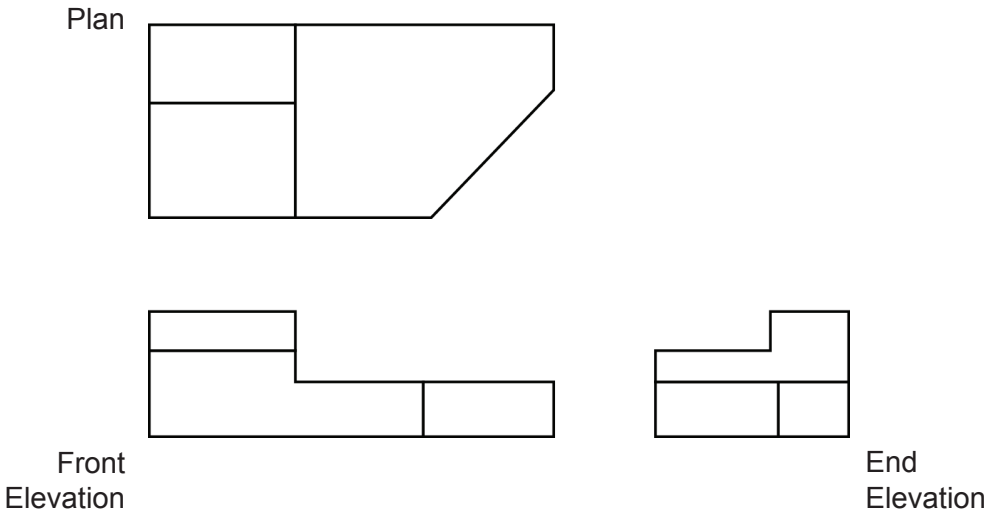
B. To demonstrate the sketching skills of the designer

C. To communicate new ideas that are unfamiliar

D. To present in detail how a new idea will work

9. **Figure 3** shows a technical drawing of a simple part.

Figure 3: A technical drawing of a simple part



[Source: © International Baccalaureate Organization 2017]

What is the drawing style in **Figure 3**?

A. Orthographic projection

B. One-point perspective

C. Exploded view

D. Isometric

10. During the development of an electronic product, a designer builds a model that gathers data relating to button presses.

What type of model has been created?

A. An aesthetic model

B. A mock-up

C. An instrumented model

D. A conceptual model

11. The glass face of a watch shown in **Figure 4** needs to be hard-wearing and scratch resistant.

Figure 4: A watch with a glass face

[Source: https://commons.wikimedia.org/wiki/File:Swatch_Irony_Charcoal_Suit.jpg, by BastienM]

What best describes a material with such properties?

A. Low stiffness

B. High hardness

C. Low tensile strength

D. High compressive strength

12. A mechanical arm that can make precise motions at high speed belongs to which generation of robots?

A. First generation

B. Second generation

C. Third generation

D. Fourth generation

13. What is an advantage of man-made timber over natural timber?

A. High tensile strength with resistance to damp environments

B. A renewable source of material

C. The creation of large sheets of consistent quality

D. Can be recycled more easily

14. Which of the following considers materials, production, assembly and disassembly?

A. Mass production

B. Design for manufacture (DfM)

C. Assembly line production

D. Computer numeric control (CNC)

15. Which of the following are characteristics of polyester?

I. High elasticity

II. High durability

III. High absorbency

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

16. What is potentially the major ethical impact of an increase in the use of automation?

A. Decreased wages

B. Increased leisure time

C. Increased unemployment

D. Decreased manufacturing costs

17. Which of the following processes can be applied to a composite material?

I. Pultrusion

II. Moulding

III. Weaving

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

18. The Apple Watch, see **Figure 5** below, is a product that works with a system to provide its functions. It offers new technology for a watch and is part of a new organisational chain between the watch, an iPhone and the iTunes software.

Figure 5: The Apple Watch

Please go to: https://ssl.apple.com/v/watch/g/images/shared/og_guided_tours.jpg?201511200804

What type of innovation is best described by the Apple Watch system?

A. Configurational

B. Architectural

C. Modular

D. Technology transfer

19. Which individual is more likely to finance the development of a product?

A. An inventor

B. A product champion

C. An entrepreneur

D. A designer

20. The pager shown in **Figure 6** below was a telecommunications device for receiving messages developed in the 1980s. Such devices are rarely used today due to the prevalence of ownership of mobile/cell phones.

Figure 6: A telecommunications device for receiving messages

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

Which of the following best describes the fate of the pager?

A. Technological obsolescence

B. Planned obsolescence

C. Functional obsolescence

D. Style obsolescence

21. Pixar's decision to animate the Anglepoise lamp, shown in **Figure 7** below, is an indicator of the lamp's classic design status.

Figure 7: The Anglepoise lamp

Removed for copyright reasons

Which of the following is an indicator of classic design status?

I. No longer produced

II. Timeless appeal

III. Widely imitated

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

22. **Figure 8** below is a photo of Cité Radieuse by Le Corbusier, who described his buildings as machines for living.

Figure 8: The Cité Radieuse by Le Corbusier

Please go to: https://upload.wikimedia.org/wikipedia/fr/1/1e/Marseille_la_terrasse_de_la_cit%C3%A9e_radieuse.jpg

What design principle best describes Le Corbusier's approach?

A. Form follows function

B. Retro styling

C. Psychological function

D. Dominant design

23. Why is considering affordances important in testing usability?

A. They show why an object should be used

B. They demonstrate when an object should be used

C. They indicate how an object might be used

D. They show where an object could be used

24. In which stages of the user-centred design process of a new product would members of the potential user community have been involved?

I. Concept

II. Implementation

III. Research

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

25. What could be part of a user-centred design strategy?

I. Marketing

II. Observation

III. Questionnaires

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

26. Many countries have introduced legislation to take back electronic products at their end-of-life. Why do governments enforce such legislation?

I. To reduce the amount of waste going to landfill

II. To encourage the recovery of non-renewable resources

III. To create a market for used electronics

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

27. Designers often need to be aware of differing consumer attitudes to sustainability. Which group enthusiastically adopts environmentally friendly practices?

A. Eco-warriors

B. Eco-champions

C. Eco-phobes

D. Eco-fans

28. What evaluates a product's harmful impact on the environment?

A. Green design

B. Sustainable design

C. Life cycle analysis

D. Triple bottom line

29. What are the three elements of triple bottom line?

A. Economic, environmental, social

B. People, planet, social

C. Income, employment, growth

D. Capital, resources, investment

30. McDonald's is a global brand that has invested heavily in creating a recognisable identity (see **Figure 9**). However in 2014 the global sales decreased by 15 % to US$6500m.

Figure 9: McDonald's logo

Please go to: https://en.wikipedia.org/wiki/McDonald%27s#/media/File:McDonald%27s_Golden_Arches.svg

[Source: www.unbrandeddesigns.com]

Which factors could have contributed to the decline of the McDonald's brand in 2014?

I. The brand is associated with the quality of service customers receive

II. Updating the brand identity is a major cost

III. Increased competition in the fast food marketplace

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

31. A toy retailer sells many of its toys with prices such as $3.99, $5.99, $9.99 or $19.99. What pricing strategy is the retailer using?

A. Cost-plus / mark-up

B. Demand

C. Premium

D. Psychological

32. Apple has just released an updated iPhone. This is a new product aimed at an existing market. What corporate strategy is this an example of?

A. Market penetration

B. Product development

C. Market development

D. Product diversification

33. Which of the following is a disadvantage of just in case (JIC) production?

A. The availability of a buffer of goods

B. The ability to respond to demand

C. Having to hold inventory

D. Greater supply chain flexibility

34. Which waste is reduced by moving from just in case (JIC) to just in time (JIT) production?

A. Waiting

B. Defects

C. Overproduction

D. Transporting

35. Which of the following is an example of how design can be included in computer integrated manufacturing (CIM)?

A. Functions are simulated in the virtual environment before prototypes are made

B. Components are ordered and traced by the computer system

C. Production is tracked by computerised inventory control

D. Retrieval and storage of parts is organised by the system

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

Search GPS from Rip Curl, is a GPS watch for surfing that communicates with an app* for analysing performance and sharing experiences with fellow surfers. The watch, see **Figure 10** below, comes in a variety of colours and is worn during surfing. It records data such as the number of waves surfed, the surfer's location and the time in the water.

As this is the first smart sports watch developed specifically for surfers, the designers have involved members of the surfing community in the development of the product. All functions of the watch are controlled via three large buttons.

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* app: application software, typically small, specialized programs downloaded onto mobile devices; apps can also run on the internet, on a computer, or on a cell/mobile phone or other electronic device

Figure 10: The Search GPS from Rip Curl

[Source: www.product-reviews.net]

36. Why have the designers limited interaction with the watch to three large buttons?

A. So that the watch can be used by a wide range of people

B. The environment of usage can affect the user's ability to interact

C. To overcome limitations in the designer's anthropometric data

D. To reduce component parts for recycling

37. What plastic processing method is most appropriate for creating the body and strap of the watch?

A. Blow moulding

B. Rotational moulding

C. Injection moulding

D. Vacuum forming

38. Rip curl claim this is the first smart watch for surfers. Which type of innovation best describes the product?

A. Sustaining innovation

B. Disruptive innovation

C. Process innovation

D. Architectural innovation

39. What advantages did engaging with the surfing community bring to the development of the Search GPS watch?

I. Reducing market research costs

II. Reducing market risk

III. Understanding user needs

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

40. Which of the following is true about unit costs for the manufacturer of the Search GPS watch?

A. They are based on only the fixed costs for an organisation

B. They are the average costs of the organisation to produce a product

C. They are the break-even cost divided by the quantity produced at break-even point

D. They are the costs required to produce, store and distribute one unit