Diploma Programme
Programme du diplôme
Programa del Diploma

Design technology
Standard level
Paper 1

Wednesday 7 November 2018 (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]**.

8818 – 6202

1. **Figure 1** shows a woman on an exercise machine.

Figure 1: A woman on an exercise machine

[Source: Photo credit by KETTLER GmbH]

While the woman is using the exercise machine data is being collected. Which type of data is being collected?

A. Dynamic data

B. Static data

C. Structural data

D. Psychological data

2. What type of scale would be used to collect qualitative data on comfort?

A. Interval scale

B. Ratio scale

C. Ordinal scale

D. Nominal scale

3. What is the final stage of the human information processing system, which results in a physiological response?

A. Sensory process

B. Input

C. Central process

D. Motor process

4. What is the name given to a twisting force in terms of biomechanics?

A. Torque

B. Compression

C. Tension

D. Turning

5. Which of the following is considered a renewable energy source?

A. Nuclear

B. Coal

C. Oil

D. Hydro

6. What are the disadvantages of carrying out a life cycle analysis (LCA)?

I. Time consuming

II. Expensive

III. Legally binding

A. I and II

B. I and III

C. II and III

D. I, II and III

7. Which of the following systems for individual energy generation would have the least impact on the surrounding area?

A. Geo-thermal

B. Solar PV Systems

C. Wind turbines

D. Micro-hydro

8. Which of the following would be considered an end-of-pipe technology?

A. Installation and use of energy saving lightbulbs

B. Rain water harvesting

C. Waste water treatment plant

D. Installation of solar panels

9. The Adidas x Parley shoe is made from recycled fishing nets retrieved from the west coast of Africa, see **Figure 2.**

Figure 2: Adidas x Parley shoe

[Source: adidas x Parley]

This is known as a…

A. Mixed economy

B. Linear economy

C. Circular economy

D. Hybrid economy

10. Glass jars which originally contained food are often used to store small items such as crayons, pencils and erasers. This is an example of:

A. Reuse

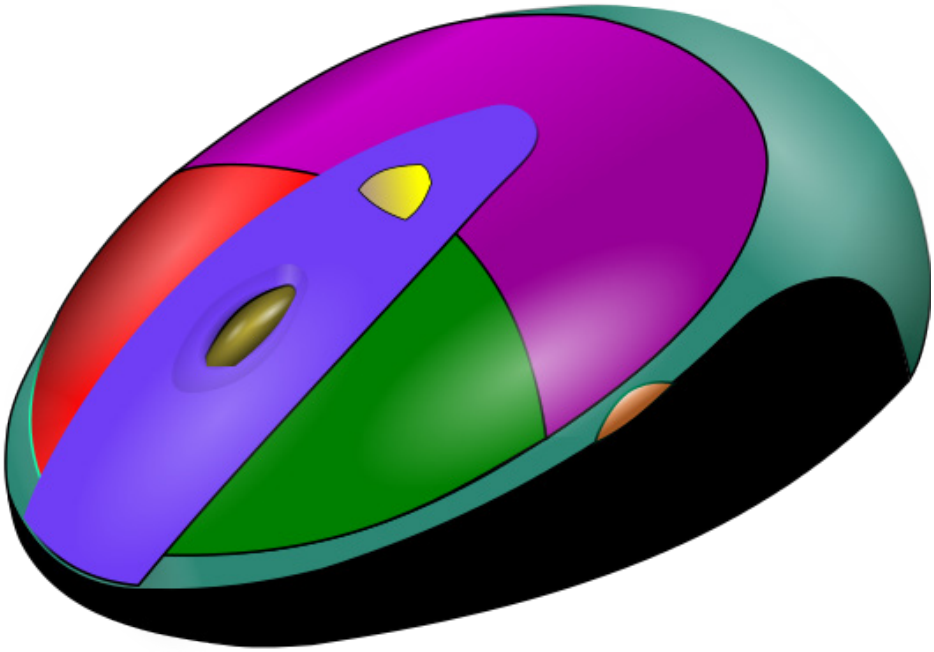
B. Recycling

C. Reduction

D. Reconditioning

11. **Figure 3** shows a photorealistic model of a computer mouse. The model gives no internal data for manufacture using computer-aided manufacturing (CAM).

Figure 3: A photorealistic model of a computer mouse



[Source: Image by Eduemoni www.wikipedia.com]

What type of model is shown in **Figure 3**?

A. Solid model

B. Graphic model

C. Surface model

D. Physical model

12. What type of prototype is designed to collect quantitative data to help inform development?

A. Mock up

B. Aesthetic model

C. Instrumented model

D. Scale model

13. What type of graphical model would likely be part of the instructions for flat pack furniture, usually shown in an exploded form?

A. Perspective drawings

B. Assembly drawings

C. Orthographic drawings

D. Scale drawings

14. **Figure 4** shows someone wearing cycling shorts. The shorts mould to the user's body and stretch with movement due to their elasticity.

Figure 4: Cycling shorts

State the type of textile used in these cycling shorts.

A. Cotton

B. Silk

C. Lycra

D. Wool

15. A table leg, under normal load conditions, would be under which force?

A. Shear

B. Torsion

C. Compression

D. Tension

16. Which best describes the properties required of copper when being drawn into wire?

A. Plasticity

B. Ductility

C. Malleability

D. Elasticity

17. Which best describes the purpose of tempering?

A. To increase the hardness of a metal

B. To make a metal more malleable

C. To improve the toughness of a metal

D. To reduce the grain size of a metal

18. Which plastic is most widely used in the production of water bottles?

A. Polyvinylchloride (PVC)

B. High impact polystyrene (HIPS)

C. Polyethylene terephthalate (PET)

D. Acrylonitrile butadiene styrene (ABS)

19. What temporary joining technique is predominantly used in self-assembly products such as flat pack furniture?

A. Adhesives

B. Knock-down fittings

C. Nuts and bolts

D. Nails

20. **Figure 5** shows a farmer planting rice.

Figure 5: A farmer planting rice

[Source: Rice planting machine 2, katori-city, Japan (https://commons.wikimedia.org/wiki/File:Rice-planting-machine_2,katori-city,japan.JPG). Image by katorisi under copyright (https://creativecommons.org/licenses/by-sa/3.0/deed.en).]

Which production system is the farmer using?

A. Mechanized production

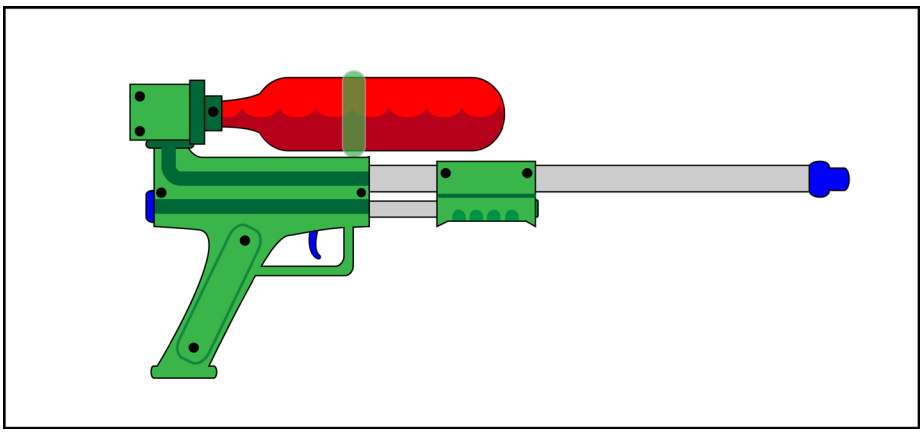
B. Specialized production

C. Automated production

D. Craft production

21. While working on a new type of refrigeration system, Lonnie Johnson connected a hose to his system to test a part when water shot out at high pressure. This gave him the start of the idea for the Super Soaker water gun, see **Figure 6**.

Figure 6: Water gun in a Super Soaker type design



[Source: © International Baccalaureate Organization 2018]

What strategy for innovation is this an example of?

A. Market pull

B. Analogy

C. Technology transfer

D. Chance

22. Which of the following must be present to enable inventions to become innovations?

I. Marketability

II. Financial support

III. User need

A. I and II

B. I and III

C. II and III

D. I, II and III

23. What is an advantage of being a lone inventor?

A. Products are more complex, using knowledge from many disciplines

B. Funding is easy to obtain

C. Full control over development

D. Easy to integrate into a team in later stages of development

24. Which of these statements describes psychological function?

I. It provokes an emotional reaction

II. It focuses on practicality

III. It focuses on desirability

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

25. The design of mobile phones has changed over time. **Figure 7** shows the evolution of mobile phones before the launch of the iPhone, while **Figure 8** shows the evolution of smartphones since the launch of the iPhone.

Figure 7: The evolution of mobile phones before the launch

Figure 8: The evolution of smartphones after the launch

[Sources: image adapted from Anders https://commons.wikimedia.org and © International Baccalaureate Organization 2018]

A design that contains those implicit features of a product that are recognized as essential by a majority of manufacturers and purchasers is known as…

A. Robust design

B. Dominant design

C. Emotional design

D. Form following function

26. Which of the following are considered criteria for a retro design?

I. The design uses the same materials as the original

II. The design uses the decoration of the original

III. The design uses the form of the original

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

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

The Centriphone is an original design by Nicolas Vuignier, a professional skier. The product enables users to attach their mobile phone into the device and take 360 degree dynamic video footage of themselves skiing. The Centriphone is attached to a cable with a handle on the end, which the skier swings around their head.

From simple foam-board models, through to plywood and a final 3D printed prototype, Vuignier went through several iterations of the Centriphone, see **Figure 9**.

Figure 9: Different iterations of the Centriphone

[Source: Images provided by Nicolas Vuignier]

Figure 10: A skier using the Centriphone

[Source: Images provided by Nicolas Vuignier]

27. **Figure 10** shows a skier spinning the Centriphone around their head. The cable can be seen, while the mobile phone is taking the shot.

Which of the following best describes the mechanical property required of the cable?

A. Ductility

B. Compressive strength

C. Hardness

D. Tensile strength

28. If Vuignier wanted to protect his invention globally from other people copying his idea, which intellectual property protection strategy would be most appropriate?

A. Copyright

B. Trademark

C. Registered trademark

D. Patent

29. Vuignier manufactured the Centriphone using rapid prototyping. The process uses a spool of plastic filament to create the product layer by layer.

Which of the following best describes this process?

A. Select laser sintering (SLS)

B. Fused deposition modelling (FDM)

C. Stereolithography

D. Laminated object manufacturing (LOM)

30. The Centriphone is made to order, and the latest iteration uses less material than previous versions by including holes in the main body.

Which waste mitigation strategy is this an example of?

A. Re-engineering

B. Radical solution

C. Dematerialization

D. Product recovery