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Design technology
Standard level
Paper 1

15 May 2026

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

45 minutes

Instructions to students

- 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. RoWok is a robotic restaurant. The cooked food is dropped into a bowl and delivered through side windows, see **Figure 1**.

Figure 1: RoWok robotic restaurant



Which percentile range should be used for the side windows of the RoWok?

- A. 5th
 - B. 50th
 - C. 95th
 - D. 5th–95th
-
2. The main purpose of a speedometer is to show how fast a vehicle is going at any given moment, typically in miles per hour (mph) or kilometres per hour (km/h).

The measurement on a speedometer is an example of:

- A. Nominal Scale
- B. Ordinal Scale
- C. Interval Scale
- D. Ratio Scale

3. When designing a bottle cap for ease of opening, which anthropometric data is most important to consider?
- A. Hand width
 - B. Bottle diameter
 - C. Finger size
 - D. Arm length
4. Hasiru Dala Innovations' initiative aims to reduce plastic usage by promoting the refill of toiletries at a mobile station, see **Figure 2**.

Figure 2: Hasiru Dala Innovations' mobile van initiative



Which waste mitigation strategy is promoted by the Hasiru Dala Innovations' initiative mobile van?

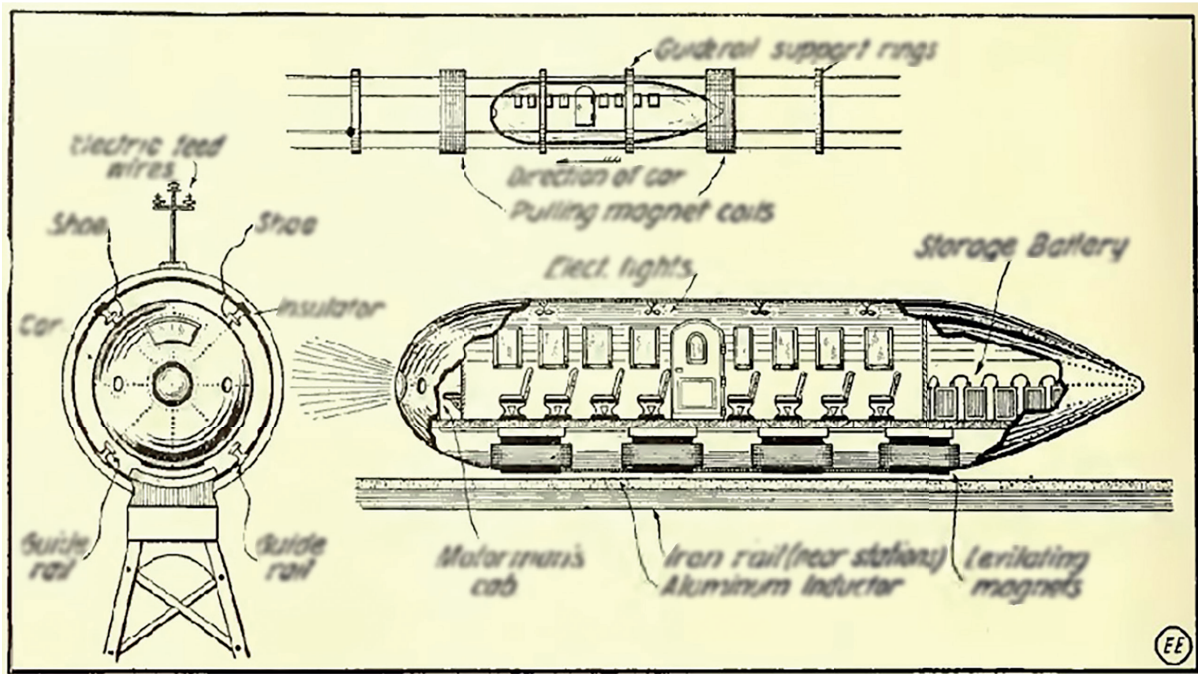
- A. Recycle
- B. Re-Engineer
- C. Reuse
- D. Recondition

5. What type of battery is commonly used in combustion engine cars?
- A. Li-Ion
 - B. Li-Po
 - C. Ni-Cd
 - D. Lead acid
6. Which of the following best defines reserves in the context of natural resources?
- A. Designated areas for the protection of wildlife and ecosystems
 - B. The known amount of a resource that can be economically and technically extracted
 - C. The measure of the total amount of a resource in a given area
 - D. The sustainable use of resources to meet current and future needs
7. Which of the following is a typical application for local combined heat and power (CHP) systems?
- A. A residential home
 - B. Electric vehicle charging stations
 - C. Solar power farms
 - D. Large-scale industrial facilities
8. Which of the following best describes the primary purpose of the precautionary principle?
- A. To prevent known and quantifiable harms from occurring
 - B. To promote economic development and technological innovation
 - C. To anticipate potential problems in relation to the environmental impact of the production, use and disposal of a product
 - D. To proceed with actions without the need to conduct an investigation of potential risks

9. What does the principle of "designing out waste" aim to achieve?
- A. Minimizing the use of recycled materials in product manufacturing
 - B. Eliminating waste generation throughout the product lifecycle
 - C. Maximizing the disposal of end of life products in landfills
 - D. Promoting single-use products to encourage a throwaway culture
10. The drawing in **Figure 3** presents the concept of a magnetic levitation carriage designed to achieve speeds of 500 miles per hour.

Figure 3: The magnetic levitation carriage

Image labels are for example use only



What type of drawing is this?

- A. Isometric
- B. One-point perspective
- C. Two-point perspective
- D. Orthographic projection

11. What is the primary goal of physical modelling?
- A. Demonstrating the conceptual design
 - B. Visualizing the Ideas
 - C. Testing the specifications of a product against user requirements
 - D. Conceptualizing the user requirements
12. Which of the following is most suitable for determining finite element analysis (FEA)?
- A. Optimizing the geometry of an aircraft model
 - B. Determining the strength of a steel structure
 - C. Calculating the displacement in a vertical steel bar
 - D. Testing a medical device is safe to be implanted in human beings
13. Which of the following statements correctly describes a key capability of surface and solid CAD modelling?

	Surface Modelling	Solid Modelling
A.	Does not have mass properties	Has defined mass properties
B.	Can define volume and mass	Cannot define volume and mass
C.	Supports complex curves and freeform shapes	Limited to simple geometric shapes
D.	Generally used for structural and mechanical designs	Primarily used for aesthetic and visual designs

14. Balsa wood is harvested from deciduous trees and is a popular material choice for building small models and prototypes, see **Figure 4**.

Figure 4: Airplane model made of balsa wood



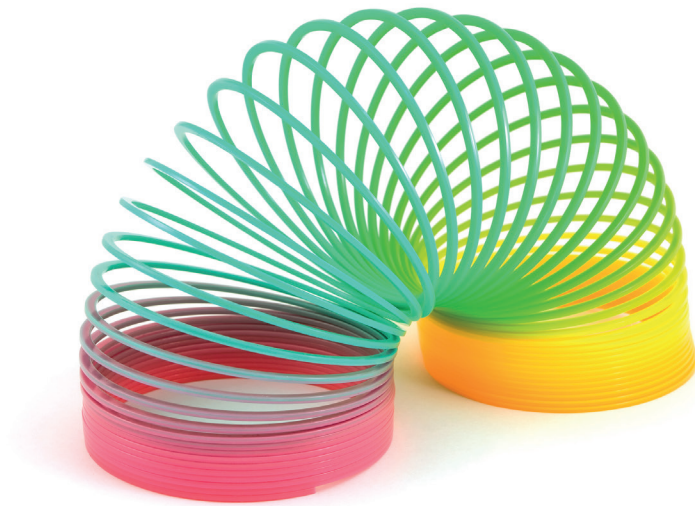
Which characteristic of balsa wood makes it suitable for modelling purposes?

- I. It is derived from softwood
 - II. It has low density
 - III. It is lightweight
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III
15. Which smart material exhibits a change in viscosity in response to an applied electric field?
- A. Piezoelectricity
 - B. Thermoelectricity
 - C. Photochromicity
 - D. Electro-rheostatic

- 16.** Which property of metals allows for effective recycling and disposal methods to enable softening and reuse?
- A. Electrical conductivity
 - B. Malleability
 - C. Ductility
 - D. Melting point
- 17.** Which statement about glass recycling is most accurate?
- A. Recycled glass can only be used to create the same type of glass
 - B. The colour of recycled glass is not important, and all colours can be mixed together
 - C. Recycling glass requires significantly less energy compared to producing newly processed glass
 - D. Broken glass shards are too dangerous to handle and cannot be effectively recycled
- 18.** What is the most common application of laminated veneer lumber (LVL)?
- A. Flooring
 - B. Structures and beams
 - C. Furniture
 - D. Decorative mouldings
- 19.** Which textile fibre-based material is unsuitable for lace making?
- A. Cotton thread
 - B. Silk yarn
 - C. Jute rope
 - D. Nylon string

20. Which of the following statements about lamination is most accurate?
- A. Lamination always requires high pressure and heat
 - B. Lamination can be done with adhesives
 - C. Lamination weakens the individual materials being joined
 - D. Lamination is used for decoration purpose only
21. In 1943, naval engineer Richard T. James accidentally knocked a spring off a shelf, and it began to "walk" across the floor. This led him to create the Slinky (**Figure 5**).

Figure 5: The Slinky



Which innovation strategy best describes this innovation?

- A. Act of insight
- B. Analogy
- C. Adaptation
- D. Chance

- 22.** Many chefs create unique and delicious dishes, but some choose not to formally protect their recipes through intellectual property (IP).

Which of the following reasons is most likely a factor in this decision?

- A. Recipes are not eligible for intellectual property (IP)
 - B. The cost and time involved are high
 - C. The recipe relies heavily on readily available ingredients
 - D. There is no definite category for recipes
- 23.** Which of the following statements best describes the concept of product generations?
- A. Each product generation offers entirely new features and functionalities
 - B. Product generations mostly offer minor architectural changes and slight improvements
 - C. Product generation offers a series of improvements built upon the original product concept
 - D. Each product generation targets different target markets

24. Michael Thonet's Cafe Chair is a revolutionary icon of design and functionality, see **Figure 6**. Introduced in 1859, it was the first mass-produced bentwood chair.

Figure 6: Michael Thonet's Cafe Chair



Which of the following can be a psychological function of the Cafe Chair?

- A. Durability and strength
- B. Lightweight
- C. Comfort and relaxation
- D. Versatile design

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25. Which of the following is a characteristic of a classic design?
- A. Emphasis on technological innovations
 - B. Utilization of precious materials
 - C. Timeless with enduring aesthetic appeal
 - D. Innovative and experimental designs
26. A designer creates a pair of shoes with high, thin stiletto heels (**Figure 7**) that are difficult to walk in.

Figure 7: Pair of high heel stiletto shoes



This is an example of:

- A. Perfect balance between form and function
- B. Prioritizing form over function
- C. A design that excels in both form and function
- D. A poorly designed product with no satisfying qualities

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

The FUSED Kodo is a 3D printed shoe, made as one piece, see **Figure 8**. They can be ordered in all white, all black, or as a mixed pair with each shoe a different colour. The left upper features a coral pattern, while the right shoe has a scales pattern, a reference to water and fire.

The FUSED Kodo is made to order. The shoes are 3D printed in one piece and feature a large shoestring (shoelace) that wraps around the shoe and between the outsole pods. The outsole pods are filled with shock-absorbing lattice structures. The shoes are designed to fit the individual customer's feet.

FUSED shoes are made out of a single material – thermoplastic elastomer (TPE) – and can be returned to the company at disposal for them to make new shoes out of the old ones.

Figure 8: FUSED Kodo 3D printed footwear



27. The FUSED Kodo shoe is made to order. It is designed and developed using computer aided design software. As the base model of the shoe is adapted to the required size, the design of the shoes can be easily adjusted to allow for customization and personal fit.

Why do FUSED design the Kodo shoes to match the user's feet?

- A. To ensure maximum comfort for the user when using the shoes
- B. To reduce the risk of foot injuries during athletic activities
- C. To reduce the environmental impact during the initial production phase
- D. To create a highly fashionable product users will pay more for

- 28.** The FUSED Kodo meets the requirements of take-back legislation, which means they “take back” the shoes at the end of their life.

Which of the following waste mitigation strategies applies to the FUSED Kodo shoes?

- A. Recondition
 - B. Re-engineer
 - C. Repair
 - D. Recycle
- 29.** Which properties of thermoplastic elastomer (TPE) makes it ideal for a 3D printing process?
- A. High toughness
 - B. Softens when heated above 210 °C
 - C. High durability
 - D. Resistance to cutting
- 30.** Which of the following aspects of a design specification would need to address the use of 3D printing as a manufacturing process for the shoes?
- I. Price constraints
 - II. Manufacturing requirements
 - III. Materials requirements
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II, and III
-

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References:

- Figure 1:** With permission from Appetronix.
- Figure 2:** With permission from Hasiru Dala Innovations Private Limited.
- Figure 3:** [Future Electric Railway] 1917. [image online] Available at: <https://www.maglevboard.net/en/about/in-memori-370-boris-petrovich-weinberg> [Accessed 17 July 2025]. Source adapted.
- Figure 4:** capecodphoto, 2010. *Plane in flight – stock photo*. [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/plane-in-flight-royalty-free-image/157694480?adppopup=true> [Accessed 24 September 2025]. Source adapted.
- Figure 5:** Lucielang, 2012. *Slinky toy over white – stock photo* [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/slinky-toy-over-white-royalty-free-image/150683973> [Accessed 30 May 2025]. Source adapted.
- Figure 6:** With permission from Thonet GmbH.
- Figure 7:** Mykhaylo, 2021. *Elegant High Heels – stock photo* [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/elegant-high-heels-royalty-free-image/1293927606?phrase=pair%2Bof%2Bstiletto%2Bhigh%2Bheels> [Accessed 28 July 2025]. Source adapted.
- Figure 8:** With permission from FUSED footwear (www.fusedfootwear.com).