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**Design technology**  
**Higher level and standard level**  
**Paper 2**

16 May 2025

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

Candidate session number

1 hour 30 minutes

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**Instructions to candidates**

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: answer all questions.
- Section B: answer one question.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[50 marks]**.



### Section A

Answer **all** questions. Answers must be written within the answer boxes provided.

- 1. Nokia have created a range of retro-inspired cell (mobile) phones based on their original models released between 2000 and 2010. Known fondly as “the brick”, the robust cell (mobile) phones were equipped with features such as built-in classic apps, like the game Snake and an FM radio.

The new models shown in **Figure 1** and **Figure 4** feature music playback buttons, front-facing speakers, Bluetooth® 5.0, and USB-C charging. The Nokia phones, traditionally known for their much simpler user interface and long standby battery life, now feature advanced upgraded accessibility features. Nokia says the limited features make these phones easier to use and help provide a “digital detox” from social media as they do not have a touchscreen.

**Figure 1:**  
**The 3310 Nokia, 2024**



**Figure 2:**  
**The 3310 Nokia, 2000**



**Figure 3: Robotic manufacture of cell (mobile) phones**



(This question continues on the following page)



(Question 1 continued)

**Figure 4: Nokia’s 2024 range of retro-inspired cell (mobile) phones**



**Figure 5: Environmental profile of Nokia 6310, 2024 (shown in Figure 4)**



The 2024 revival of the Nokia 3310 classic design cell (mobile) phone shown in **Figure 1** imitates the past interactive and functional design of the Nokia 3310 from the year 2000 shown in **Figure 2**.

The more recent version of the phone is intended to appeal to the needs of current and next generations, and those who remember the original model.

**(This question continues on the following page)**



**(Question 1 continued)**

(a) (i) Plastics are generally categorized as:

Thermoplastic (thermosoftening)	Thermosetting
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Identify the appropriate category for Acrylonitrile Butadiene Styrene (ABS) plastic. [1]

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(ii) List **two** reasons why culture is an important classic design characteristic of the Nokia cell (mobile) phones shown in **Figure 1**, **Figure 2** and **Figure 4**. [2]

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(b) (i) List **two** advantages of using robotic systems in cell (mobile) phone production, see **Figure 3**. [2]

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(ii) Outline the scale of production used for producing Nokia cell (mobile) phones. [2]

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**(This question continues on the following page)**



**(Question 1 continued)**

- (c) (i) Outline **one** rapid prototyping technique that could be used to develop the complex internal and external components of the Nokia cell (mobile) phones with high accuracy. [2]

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- (ii) Explain how Nokia uses market segments to establish the target market for various product ranges. [3]

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**(This question continues on the following page)**



**(Question 1 continued)**

- (d) (i) State which type of intellectual property (IP) applies to the 3310 Nokia, 2024 cell (mobile) phone, see **Figure 1**.

[1]

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- (ii) Outline why the Nokia cell (mobile) phones are considered in the maturity phase of the product life cycle.

[2]

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**(This question continues on the following page)**



**(Question 1 continued)**

- (e) (i) Outline why process innovation forces companies such as Nokia to develop new cell (mobile) phones to continuously improve the method of manufacturing. [2]

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- (ii) Explain why Nokia considers Rogers' characteristic of complexity as an important aspect in the commercial success of its products. [3]

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2. **Figure 6** shows a glass cooking pot made from borosilicate glass with handles on both sides, and **Figure 7** shows a traditional aluminium metal pot with a handle.

**Figure 6: Borosilicate glass cooking pot**



**Figure 7: Aluminium metal cooking pot**



- (a) Outline **one** advantage of using borosilicate glass for the cooking pot (**Figure 6**) compared to the traditional aluminium metal pot (**Figure 7**).

[2]

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- (b) Outline **one** disadvantage of the aluminium cooking pot handle at the end of its product life.

[2]

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- 3. Teeny Chompers creates wooden teethers for babies which are made from a type of hardwood and small batch-produced.

As the baby bites on the wooden teether, pressure is applied to the sore gum relieving discomfort from new growing teeth (**Figure 8**).

The wooden teether does not contain any chemicals or toxic substances.

**Figure 8: Baby using teether**



[Source: Nemer-T / iStock]

Describe the manufacturing process Teeny Chompers uses to create the hardwood teether from a block of wood.

[3]

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- 4. Explain why manufacturing products using hardwood limits renewability.

[3]

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### Section B

Answer **one** question. Answers must be written within the answer boxes provided.

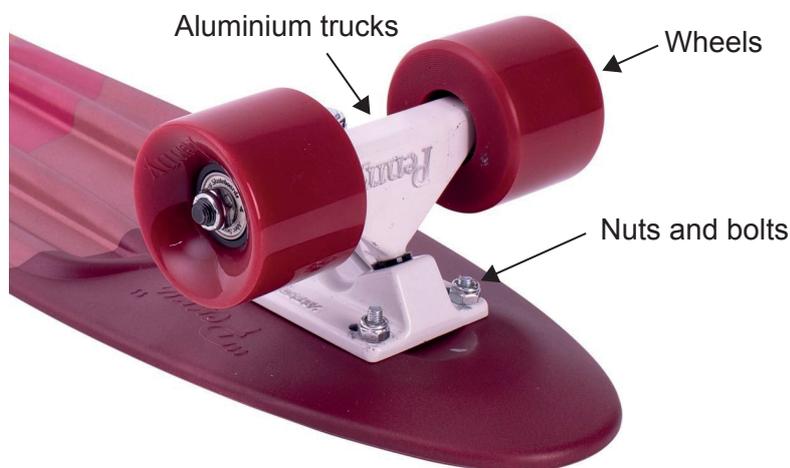
- 5. The Penny® Skateboard, shown in **Figure 9**, is a type of skateboard that is designed for cruising around town. It is smaller than a standard skateboard and has softer wheels, making it easier to ride over rough surfaces.

The Penny® Skateboard deck is made from an injection-moulded plastic material known as Polypropylene (PP). This is a strong, lightweight and durable material that makes it ideal for skateboarding. The aluminium trucks, wheels and deck shown in **Figure 10**, are joined together using nuts and bolts.

**Figure 9: The Penny® Skateboard**



**Figure 10: Trucks and wheels assembly**



(This question continues on the following page)



**(Question 5 continued)**

- (a) Outline how the principle of design for disassembly influences the longevity of the Penny® Skateboard. [2]

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- (b) Explain why anthropometric data is required in the design of the Penny® Skateboard deck. [3]

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- 6. The Smart Kayak is a functional prototype that is being developed for commercial production. It uses a range of technologies as shown in **Figure 11** to measure water quality and identify illegal discharges, leaking sewers and other contamination sources.

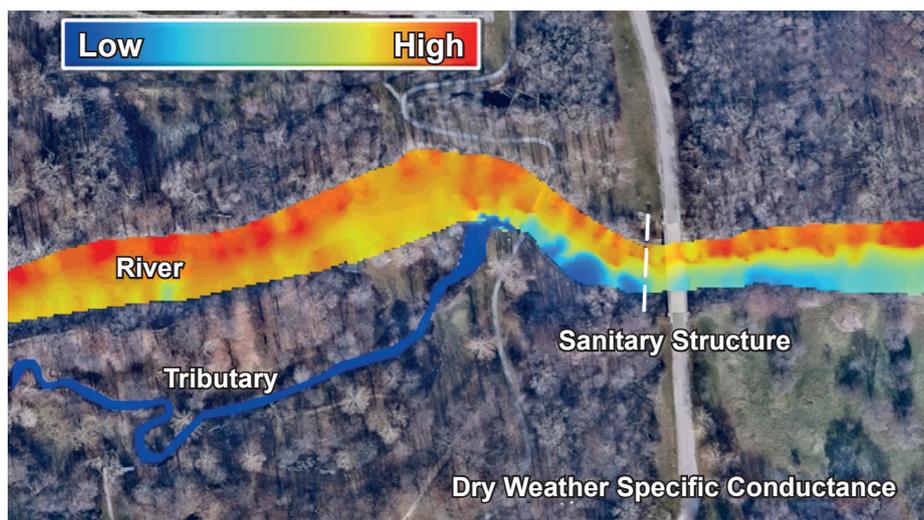
The smart technology used provides real-time cloud-based data analytics to greatly expand water quality monitoring capabilities.

The quantitative data gathered as shown in **Figure 12** can be used as a communication tool to inform the public, raising awareness of water quality issues, treatment options and infrastructure improvements.

**Figure 11: The Smart Kayak and various technologies**



**Figure 12: Real-time mapping of water contamination**



(This question continues on the following page)



**(Question 6 continued)**

- (a) Outline the influence of technology push on the design of the Smart Kayak. [2]

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- (b) Explain **one** benefit for using conceptual modelling in the early parts of the design phase of the Smart Kayak. [3]

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7. The Airbag bicycle helmet, see **Figure 13**, uses incorporated sensors to detect movement.

An electronic control unit auto-inflates the airbag inside of the hard helmet shell casing when activated by a sudden fall.

Tests in **Figure 14**, show the user's risk of moderate to fatal head injuries can be reduced from 80 % (if using a regular helmet) down to 30 % when wearing the Airbag bicycle helmet system.

**Figure 13: A computer aided design (CAD) of the final Airbag bicycle helmet**



**Figure 14: Testing the Airbag bicycle helmet system prototype**



(This question continues on the following page)



**(Question 7 continued)**

- (a) Outline **one** reason why an ordinal scale is used to collect data about the comfort of the Airbag bicycle helmet in **Figure 13**. [2]

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- (b) Explain **one** disadvantage of using a multidisciplinary approach in the design and development of a new product such as the Airbag bicycle helmet. [3]

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#### References:

- Figure 1:** bijutoha, n.d. Новый Nokia 3310. [image online] Available at: <https://openverse.org/image/24dfcd42-6c93-4f35-9d17-53d337b81c65?q=nokia+3310> [Accessed 2 September 2024]. Public Domain. Source adapted.
- Figure 2:** Photo: Rainer Knäpper, Free Art License (<http://artlibre.org/licence/lal/en/>), [https://commons.wikimedia.org/wiki/File:Nokia\\_3310\\_Blue\\_R7309170\\_\(retouch\).png](https://commons.wikimedia.org/wiki/File:Nokia_3310_Blue_R7309170_(retouch).png). Source adapted.
- Figure 3:** SweetBunFactory, 2023. *Advanced High Precision Robot Arm inside Bright Electronics Factory. Electronic Devices Production Industry. Component Installation on Circuit Board. Fully Automated Modern PCB Assembly Line.* [image online] Available at: <https://www.gettyimages.co.uk/detail/photo/advanced-high-precision-robot-arm-inside-bright-royalty-free-image/1569540490> [Accessed 2 September 2024].
- Figure 6:** Liudmila Chernetska, 2024. *One glass pot with lid isolated on white* [image online] Available at: [www.gettyimages.co.uk/detail/photo/one-glass-pot-with-lid-isolated-on-white-royalty-free-image/1942814124?phrase=borosilicate+glass+cooking+pot&adpopup=true](http://www.gettyimages.co.uk/detail/photo/one-glass-pot-with-lid-isolated-on-white-royalty-free-image/1942814124?phrase=borosilicate+glass+cooking+pot&adpopup=true) [Accessed 11 July 2024].
- Figure 7:** FabrikaCr, 2021. *New silver metal stewpan on white background* [image online] Available at: [www.gettyimages.co.uk/detail/photo/new-silver-metal-stewpan-on-white-background-royalty-free-image/1303115632](http://www.gettyimages.co.uk/detail/photo/new-silver-metal-stewpan-on-white-background-royalty-free-image/1303115632) [Accessed 11 July 2024].
- Figure 8:** Nemer-T / iStock.
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