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Design technology
Higher level
Paper 3

Friday 6 May 2022 (morning)

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.
- Answer all of the questions.
- Answers must be written within the answer boxes provided.
- A calculator is required for this paper.
- The maximum mark for this examination paper is **[40 marks]**.



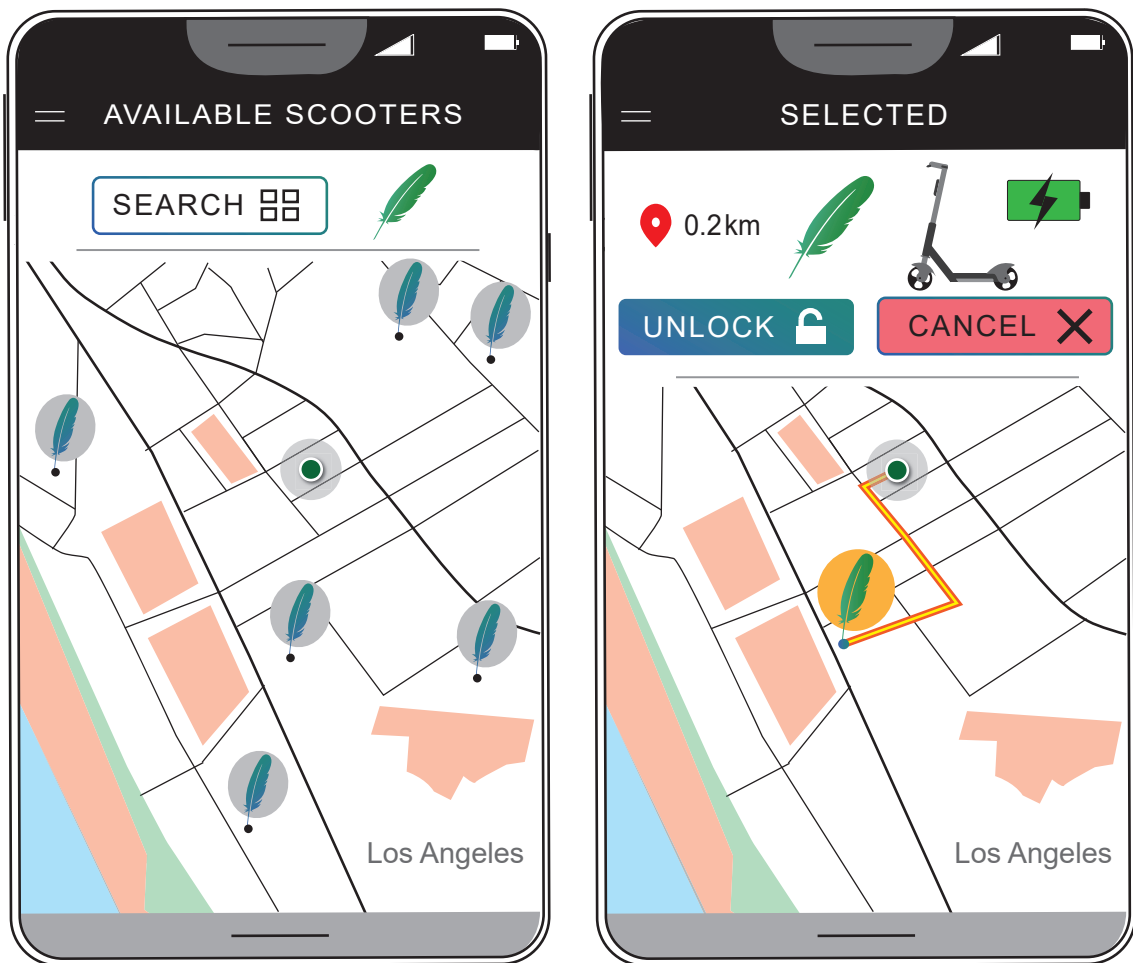
Section A

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

1. Soar Electric Scooter Rental

“Scooter sharing” has become popular in cities all over the world. E-scooters are being promoted as a sustainable mode of transport by providing an alternative to cars. One e-scooter company, Soar, offers e-scooters in several cities that can be easily rented via a smartphone app. A rider uses the Soar app to locate the nearest e-scooter, see **Figure 1**.

Figure 1: A representation of the Soar smartphone app



(This question continues on the following page)



(Question 1 continued)

Soar purchased their first-generation e-scooters from manufacturer Xiomani for US\$550 each. To break-even an e-scooter needs to be used five times a day for five months. As the Soar smartphone app tracks battery charge, location and usage, it was found that many of these Xiomani scooters were lasting less than two months. Many were simply discarded, see **Figure 2**.

Figure 2: Discarded e-scooters



[Source: MarioGuti / iStock.]

- (a) Outline **one** reason why Soar use just-in-case (JIC) production for their Soar e-scooter. [2]

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- (b) Outline **one** way how the use of statistical process control can lead to improvements in the design of the Soar e-scooter. [2]

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12EP03

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- 2. Many of Apple's customers own a number of Apple devices such as iPhones, iPads, laptops, iWatches and AirPods, see **Figure 3**.

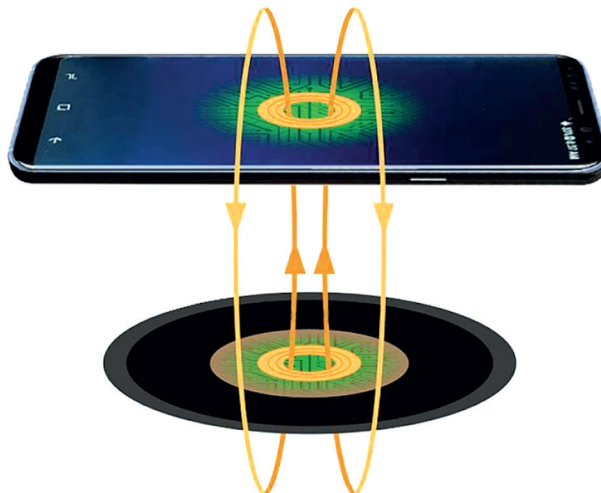
Figure 3: A selection of Apple products



[Source: Zurijeta/Shutterstock.com.]

Many Apple users found the efficient charging of multiple devices could be difficult. Apple aimed to solve this issue when they filed their patent for the AirPower, a wireless charger that could charge three devices at once. To achieve this the coils must be placed directly on top of one another, see **Figure 4**. If the coils are not aligned, the device will not charge.

Figure 4: Wireless charging



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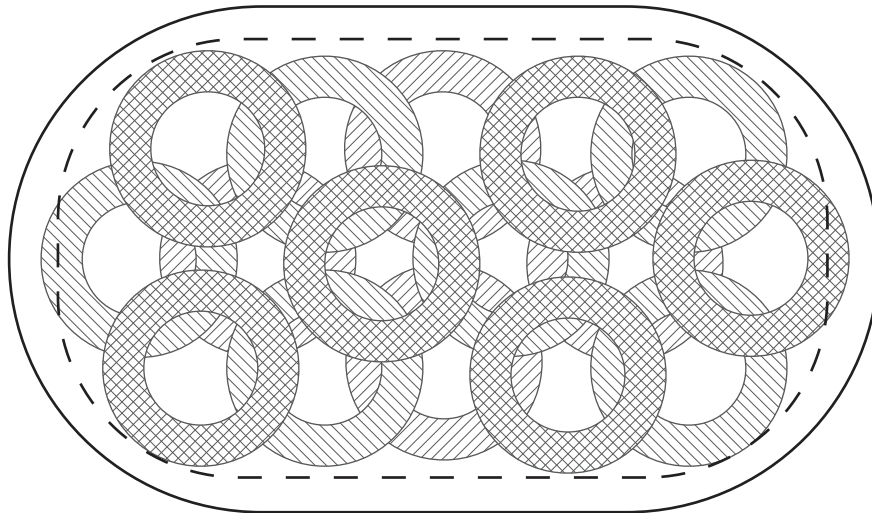
12EP05

Turn over

(Question 2 continued)

The AirPower aimed to solve this issue by stacking and offsetting the coils, see **Figure 5**. Stacked coils gave the AirPower the ability to charge multiple devices at once. The large charging area made it easier to align the coils.

Figure 5: Registered patent for the design of the AirPower, showing many stacked coils



During testing, Apple found that the AirPower was unsafe because the coils overheated. This led to Apple cancelling the development of the AirPower and the product was never released to the public.

- (a) Outline **one** way Apple is using the corporate strategy of product development for the AirPower.

[2]

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- (b) List **two** ways the AirPower was intending to achieve enhanced usability.

[2]

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Section B

Read the case study. Answer the following question. Answers must be written within the answer boxes provided.

3. The first version of the Impossible Burger was released in 2016, with the aim to be “craveable” to meat eaters. To achieve this, Impossible Foods developed a meat substitute that had everything a “meat lover” looks for in a burger: juicy and flavorful with a pink middle and a convincing texture and smell. This meatless burger even cooks and “bleeds” like beef.

To market the Impossible Burger to meat eaters, Impossible Foods partnered with well-recognized restaurants such as Burger King who have included the Impossible Burger on their menu. This provided customers the opportunity to try this new food without changing where they would normally eat.

(a) List **two** members that could have been included in the multidisciplinary team that would have been used by Impossible Foods to develop the Impossible Burger. [2]

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(b) Outline how physio-pleasure was considered in the development of the Impossible Burger. [2]

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(c) The development cycle requires considerable consumer testing. Outline why iterative design is a feature of a pioneering strategy. [2]

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Answers written on this page
will not be marked.



12EP11

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References:

Figure 2 MarioGuti / iStock.

Figure 3 Zurijeta/Shutterstock.com.

Figure 4 With permission from Powermat Technologies.

Figure 5 AirPower charger patent was granted by the patent office on 2019-12-17, Figure 2 [image online] Available at: <https://uspto.report/patent/grant/10,511,197>. Source adapted.

Question 3 With permission from Impossible Foods Inc.

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12EP12