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Design technology
Higher level
Paper 3

Thursday 14 November 2019 (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. Over one billion plastic toothbrushes end up in landfills every year. In response, Heather and John McDougall designed the Bogobrush, a toothbrush made from biodegradable plastic. For every Bogobrush sold, the company donates one for someone in need. At the end of its life cycle the company encourages users to bury the toothbrush to decompose naturally instead of it ending up in a landfill*.

The Bogobrush company is growing and has recently designed a stand for the toothbrush. The toothbrush stand is sold as a separate item, see **Figure 1**.

Figure 1: The Bogobrush and stand



[Source: adapted from www.bogobrush.com]

* landfill: a site where waste is dumped in a hole in the ground

- (a) Outline how the Bogobrush is an example of a trigger product.

[2]

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12EP02

(Question 1 continued)

- (b) Outline **one** reason why the Bogobrush is a good example of decoupling economic growth and negative environmental impact.

[2]

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- (c) Explain how **two** of Datschefski's five principles of sustainable design apply to the Bogobrush.

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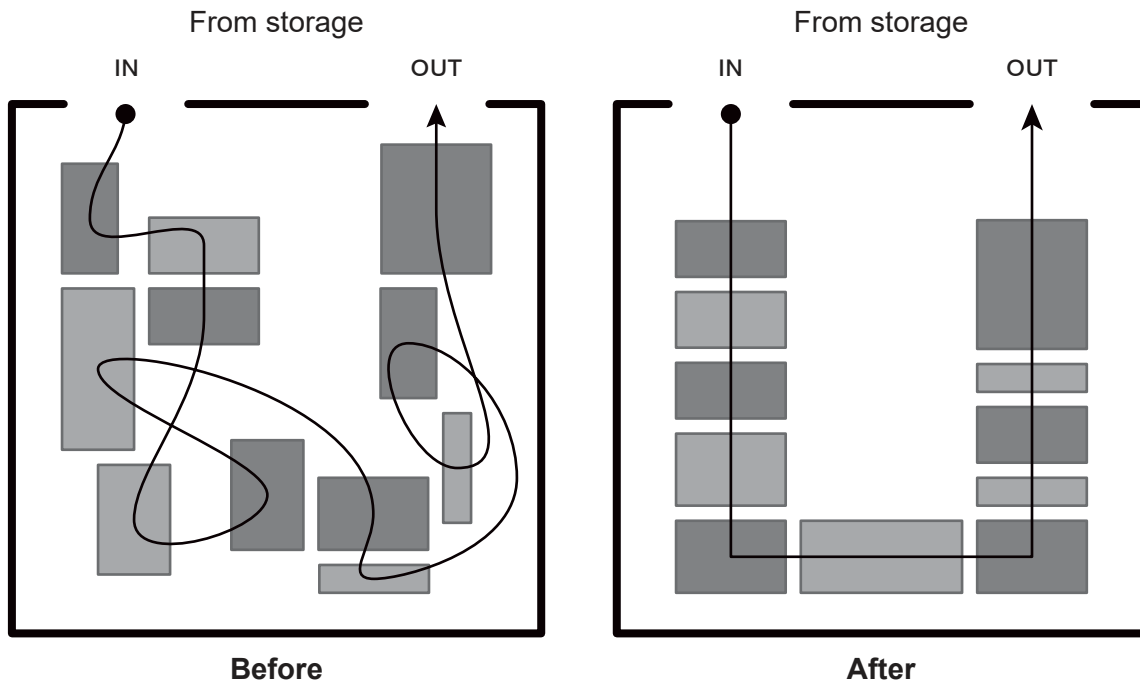


12EP03

Turn over

- 2. Petra Care is a company that assembles standard wheelchairs. The wheelchair parts are sent to their factory where they are assembled into final products. After carrying out value stream mapping and workflow analysis the company realized they needed to improve efficiency. To do this they changed their factory layout, see **Figure 2**, and implemented strategies for sorting and stabilizing the tools, see **Figure 3**.

Figure 2: Petra Care assembly factory layouts and workflow



[Source: © International Baccalaureate Organization]

Figure 3: Storage of tools implementing strategies for sorting and stabilizing the tools



Before



After

(This question continues on the following page)



12EP04

(Question 2 continued)

- (a) List **two** of the seven wastes eliminated by the new factory layout. [2]

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- (b) Outline why Petra Care used value stream mapping to improve the efficiency of assembling the wheelchairs. [2]

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- (c) Outline **one** reason, other than cost, why this factory did not adopt computer integrated manufacturing (CIM). [2]

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12EP05

Turn over

(Question 2 continued)

- (d) Maximising flow is one of the strategies used in lean production.

Explain how sorting and stabilising the tools as shown in **Figure 3** contributes to maximising flow at Petra Care.

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12EP06

Section B

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

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(Question 2 continued)

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12EP08

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12EP09

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(Question 2 continued)

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12EP10

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12EP11

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12EP12