OCR
Oxford Cambridge and RSA

Wednesday 10 January 2024 – Morning

Level 1/2 Cambridge National in Engineering Design

R105/01 Design briefs, design specifications and user requirements

Time allowed: 1 hour

No extra materials are needed.

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* 9 9 5 0 6 9 4 5 8 6 *

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.

INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**.
- Dimensions are in millimetres unless the question says something different.
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE

- Read each question carefully before you start your answer.

1 A client has placed an order for a new public address (PA) system to be designed.

The PA system will consist of a microphone, amplifier and loudspeakers. It will be used to make announcements to an audience.

(a) (i) Give **two** product **requirements** that may be included in the design specification.

1 .....

2 .....

[2]

(ii) In the table below, tick (✓) **one** term that is an example of 'aesthetic consideration' in a design **specification**.

Term	Tick (✓)
Comfort	
Scale	
Surface finish	
Tolerance	

[1]

(iii) Describe how **modern** manufacturing processes may influence the design **brief** for the PA system.

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..... **[2]**

(b) New designs for furniture are in demand.

(i) Give **two** standard components that may be used in furniture design and assembly.

1 .....

2 .....

[2]

(ii) Describe why the aesthetic considerations are important when developing designs for new furniture.

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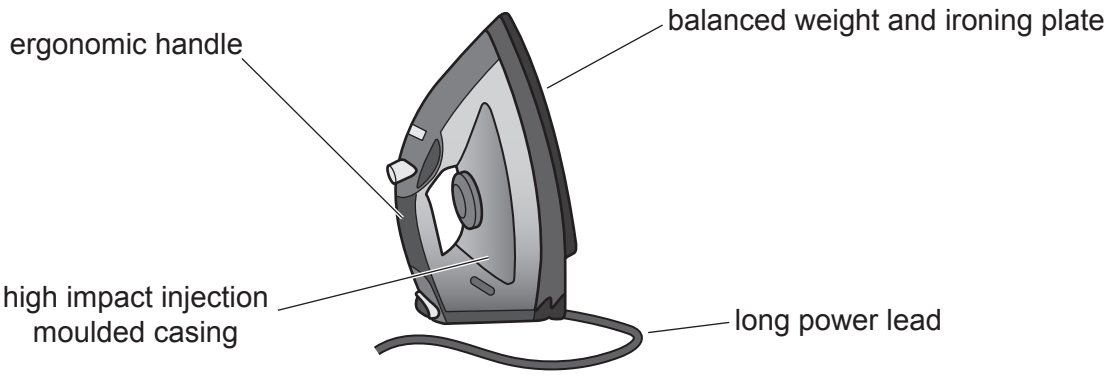
..... **[3]**

2 **Fig. 1** shows a steam iron.

Fig. 1



(a) **(i)** Describe the meaning of the term 'ergonomic' in relation to the **handle** of the iron.

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..... **[2]**

(ii) Describe, giving examples, how product safety has been considered in the design of the iron.

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..... **[3]**

(iii) A life cycle analysis (LCA) is to be carried out for the iron.

Give **one** type of information that the LCA could consider about raw material **extraction**.

..... **[1]**

(iv) Give **two** types of information that the LCA could consider about the product **in use**.

1 .....

2 .....

[2]

(b) Bioplastics are one example of an eco-material.

Explain how bioplastics reduce the impact of landfill.

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..... **[2]**

3 A client and designer meet to explore a new design for sunglasses.

(a) (i) Give **one** discussion point that would take place during the **initial brief**, between the client and designer.

..... **[1]**

(ii) Describe how corporate branding can be used to increase the potential market of the sunglasses.

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..... **[2]**

(iii) The sunglasses will be designed to use one or more smart materials.

Give **one** type of smart material suitable for the sunglasses.

..... **[1]**

(iv) Explain why manufacturers may choose **not** to use a smart material for the design of sunglasses.

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..... **[2]**

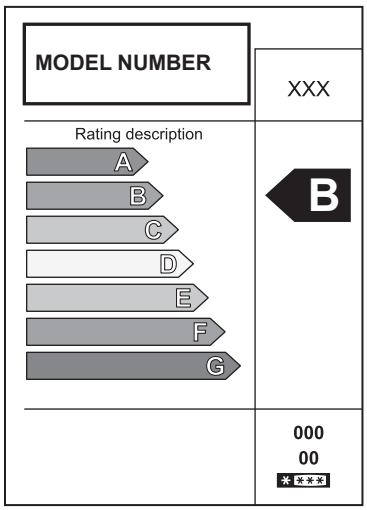
(b) 3D printing is one method of additive manufacture.

Give **one** way that 3D printing can be used to **test** the design of the sunglasses.

..... **[1]**

(c) **Fig. 2** shows an energy efficiency rating chart for a refrigerator.

Fig. 2



(i) State why energy efficiency is important to the manufacturer **and** the consumer.

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..... **[1]**

(ii) Describe why it may **not** be possible to design the refrigerator to be more energy efficient from a given brief.

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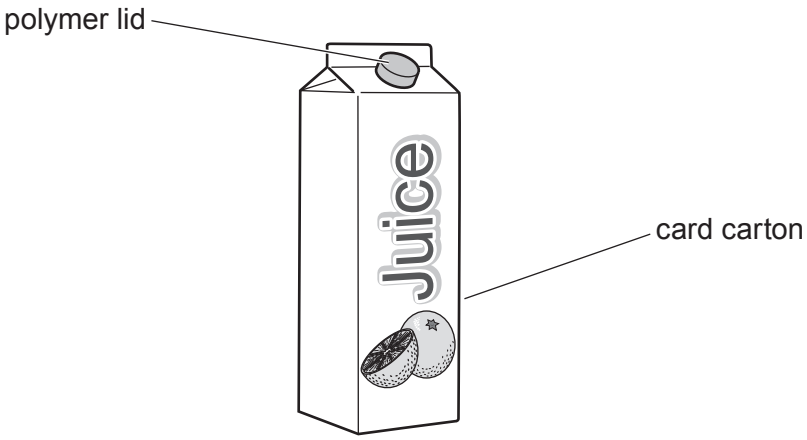
..... **[2]**

4 **Fig. 3** shows a laminated drinks carton container made from card.

Fig. 3



(a) (i) State the scale of production that would be used to manufacture the drinks carton **and** lid.

..... **[1]**

(ii) Describe how ease of manufacture has been considered in the design of the container.

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(b)* Discuss using examples, how **environmental pressures** can influence choice of **materials** for food packaging manufacture.

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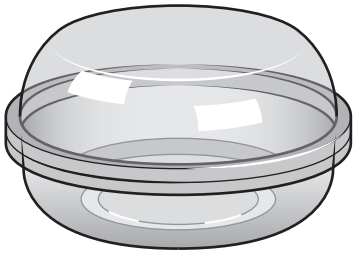
5 **Fig. 4** shows a transparent container made of polyethylene terephthalate (PET) plastic.

The container will be used as packaging for pastry products.

Fig. 4



(a) **(i)** State **one** type of symbol that could be included on the packaging as part of **sustainable design**.

..... **[1]**

(ii) Give **two** ways the choice of materials for the container shown in **Fig. 4** benefits the product and the user.

1 .....

2 .....

[2]

(iii) Thermoforming is used to produce the plastic clamshell design for this type of packaging.

Describe how the design of the packaging is influenced by the **processes** available for production.

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..... **[3]**

(iv) Give **one** way packaging shown in **Fig. 4** can be made more sustainable.

..... **[1]**

(b) The use of fossil fuels is one example of resource depletion.

Explain using **one other** example, what is meant by the term 'resource depletion'.

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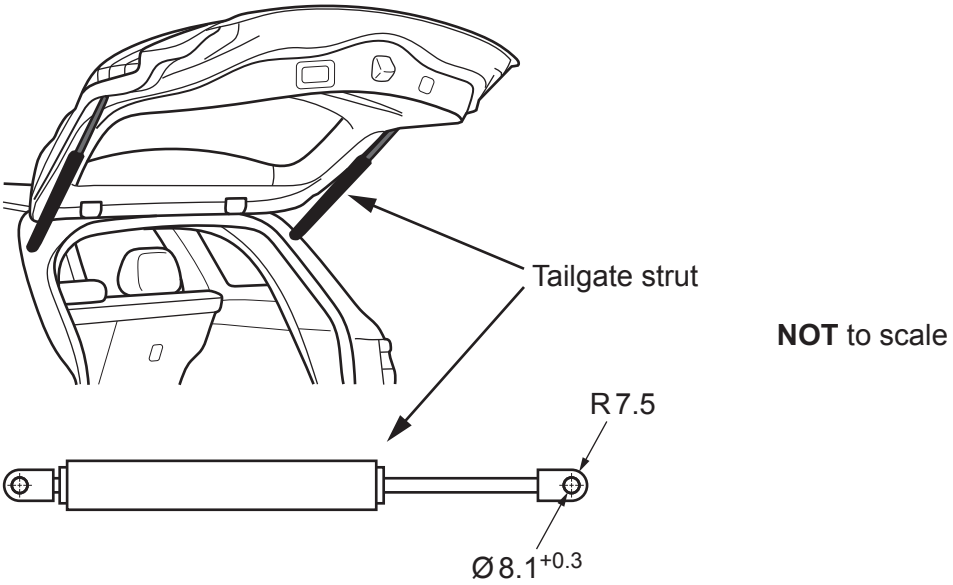
..... **[3]**

6 **Fig. 5** shows tailgate struts on a car and the engineering drawing for one of the struts.

The tailgate struts hold the tailgate open when in use.

Fig. 5



(a) **(i)** State which phase of the **design cycle** the engineering drawing would be produced in.

..... **[1]**

(ii) The dimensions of the strut and a tolerance of +0.3 mm for the mounting are shown on the drawing in **Fig. 5**.

Explain why the tolerance is important to the operation of the strut.

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..... **[3]**

(iii) Give **one other** piece of information usually shown on engineering drawings.

..... **[1]**

(b) A patent has been applied to the design of the strut.

Patents are used to protect the intellectual property of the design.

Describe what is meant by 'intellectual property'.

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..... **[2]**

(c) Many products require regular maintenance to ensure correct operation.

Explain why product maintenance is an important product requirement.

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END OF QUESTION PAPER

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