



Oxford Cambridge and RSA

Friday 8 January 2016 – Morning

**LEVEL 1/2 CAMBRIDGE NATIONAL AWARD/
CERTIFICATE IN ENGINEERING DESIGN**

R105/01 Design briefs, design specifications and user requirements

Candidates answer on the Question Paper.

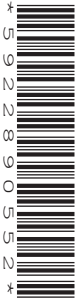
OCR supplied materials:

None

Other materials required:

None

Duration: 1 hour



Candidate forename		Candidate surname	
-----------------------	--	----------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided.
- Do **not** write in bar codes.

INFORMATION FOR CANDIDATES

- The total number of marks for this paper is **60**.
- The number of marks for each question is given in brackets [] at the end of each question or part question.
- Dimensions are in millimetres unless stated otherwise.
- Your quality of written communication will be assessed in questions marked with an asterisk(*).
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** questions.

- 1 A headphone manufacturer wants to introduce a new pair of headphones into its product range. Fig. 1 shows an example pair of headphones.



Fig. 1

- (a) Shown below are five client requirements.

Join each client requirement to the correct suggested product feature.

One has been done for you.

Client requirement

Suggested product feature

Must connect with mobile devices

3 m extendable cable

Must allow the user a good range of movement when wearing the headphones

Made from high impact plastic

Must block out external noise

Standard 3.5 mm headphone jack

Must be easy to store and carry

Seal well around the ears

Must be durable and withstand being dropped

Foldable hinge

[4]

(b) Corporate branding is an important part of design for consumer electronic products.

Give **two** ways in which the headphone design could incorporate corporate branding.

1

.....

2

.....

[2]

(c) State **two** methods of research that the headphone manufacturer could use to identify the needs of the target market.

1

.....

2

.....

[2]

(d) Describe how the manufacturer's budget could influence the design of the headphones.

.....

.....

.....

.....

.....

.....

.....

[2]

2 Fig. 2 shows an electric toothbrush.

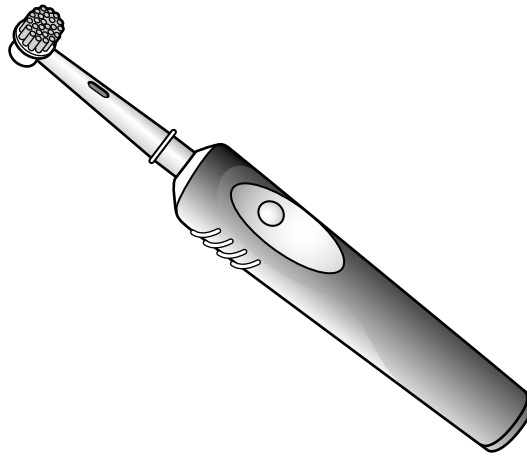


Fig. 2

(a) One design specification point for the electric toothbrush would be that it must be comfortable to hold when in use.

(i) Identify **two** further design specification points for the electric toothbrush.

1

.....

2

.....

[2]

(ii) Explain how your design specification points could influence the design of an electric toothbrush.

Specification point 1

.....

.....

.....

Specification point 2

.....

.....

.....

[4]

(b) Describe the main activities of the designer in **each** of the following two phases of the design cycle.

(i) Design phase:
.....
.....
.....
..... [2]

(ii) Optimise phase:
.....
.....
.....
..... [2]

3 Fig. 3 shows a one piece moulded plastic school chair.

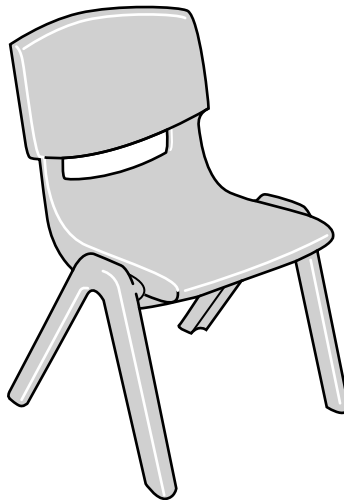


Fig. 3

(a) Describe how the following areas have influenced the design of the school chair.

Product safety

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

Cost of production

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

Ergonomics

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

(b) Describe the product lifecycle considerations that have influenced the design of the school chair.

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

(c) Give **two** performance requirements of the school chair when in use.

1
.....
2
..... [2]

4 Fig. 4 shows a plastic clip.

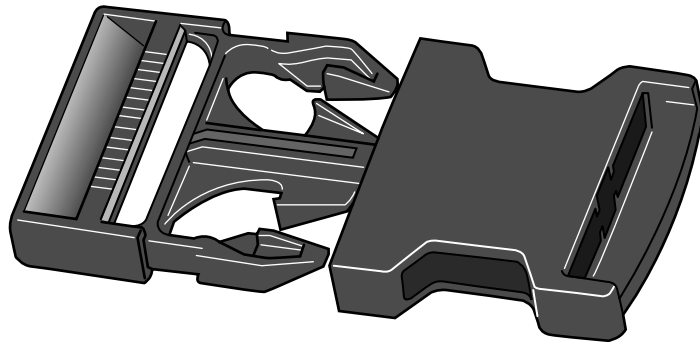


Fig. 4

(a) Give **two** reasons why plastic is a suitable material for the clip.

- 1
- 2

[2]

(b) Give **four** ways in which the design of the clip has been influenced by manufacturing considerations.

- 1
- 2
- 3
- 4

[4]

(c) Explain why high volume production is used in the manufacture of plastic products.

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

(d) Explain why the availability of material is important in high volume production.

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

5 (a) Standard components are commonly used in engineered products.

(i) Give **two** examples of standard components.

1

.....

2

.....

[2]

(ii) Explain how the use of standard components can reduce production costs.

.....

.....

.....

.....

.....

.....

[2]

(b) Explain how designers consider product maintenance when designing products.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

[3]

(c) Explain why designers have to consider tolerances when designing components.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

6 (a) Composites and smart materials are examples of modern materials.

(i) Name **one** modern material and a product it is used in.

Modern material

.....

Product

.....

..... [2]

(ii) Describe **one** benefit of using the material in the product you have named.

.....

.....

.....

.....

..... [2]

14
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

15
BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

PLEASE DO NOT WRITE ON THIS PAGE



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.