

OCR

Oxford Cambridge and RSA

Monday 16 May 2016 – Afternoon**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. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- 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** the questions.

1 The design cycle is a process used by many designers to help them create new products.

(a) (i) Complete the table below by adding the missing phases of the design cycle in the correct order.

Phase 1 has been completed for you.

optimise phase design phase validate phase

Phase 1	identify phase
Phase 2	
Phase 3	
Phase 4	

[3]

(ii) Complete the statement below.

During the identify phase of the design cycle, designers will firstly discuss and create a design with the client. They will then carry out to assess the needs of the user.

[2]

(b) (i) State **one** activity carried out by the designer during the validate phase of the design cycle.

.....
 [1]

(ii) State **two** factors that could affect the budget when designing a new product.

1

 2

[2]

3

(c) Explain why many designers use the design cycle.

.....

.....

.....

..... [2]

2 A design specification must identify details of user needs and product requirements.

(a) State **two** other requirements that must be included in a design specification.

1

.....

2

.....

[2]

(b) Give **two** product requirements that should be included in a design specification for the scissors shown in Fig. 1.



Fig. 1

1

.....

2

.....

[2]

(c) Fig. 2 shows the **British Standard Kitemark™**.

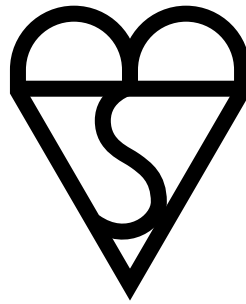


Fig. 2

Explain what the **British Standard Kitemark™** means when displayed on a product.

.....

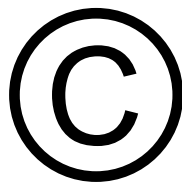
.....

.....

.....

..... [2]

(d) Fig. 3 shows two symbols.



Symbol 1



Symbol 2

Fig. 3

State the names of these two symbols.

Symbol 1

Symbol 2

[2]

6

(e) Explain why companies would apply for a patent when creating a new product.

.....

.....

.....

..... [2]

- 3 The table below shows a comparison of six modern materials.

Modern material	Factors to consider				
	Ease of storage	Easy to process	Lightweight	Strength	Cost
A	3	3	5	7	2
B	7	2	1	1	4
C	2	8	5	5	8
D	4	4	2	7	4
E	6	4	9	8	4
F	2	2	6	6	9

10 = excellent and 1 = very poor

- (a) Give **two** reasons why material E would be suitable for the production of a body shell for a racing car.

1

.....

2

.....

[2]

- (b) Explain why the availability of a material might be an important consideration when planning to mass-produce a product.

.....

.....

.....

..... [2]

8

(c) Fig. 4 shows a single-piece, cast-iron frying pan requiring no assembly of parts or finishing, thus reducing manufacturing costs.



Fig. 4

Give **four** ways in which the design of the frying pan has been influenced by manufacturing considerations.

- 1
- 2
- 3
- 4

[4]

(d) Shown below are three scales of production.

Join each scale of production to the example given.

One has been done for you.

Scale of production

Example

Batch production



Nuts and bolts

Mass production



Sport stadium

One-off production



Bread

[2]

4 (a) State **two** factors that should be considered in the design of new engineered products to ensure sustainable disposal.

1

.....

2

.....

[2]

(b) Explain what is meant by the term 'resource depletion'.

.....

.....

.....

..... [2]

(c) Explain, using a specific example, how the use of renewable resources may influence the design of an engineered product.

.....

.....

.....

.....

.....

.....

.....

..... [3]

(d) Explain what is meant by the term 'product life cycle'.

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

5 (a) Nuts and bolts are used as fasteners in engine assemblies.

Give **one** other standard component and its application in an engineered product.

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

(b) Give **two** advantages of using standard components in the maintenance of engineered products.

1

.....

.....

.....

2

.....

.....

..... [2]

(c) Fig. 5 shows a diameter dimension with a tolerance.

$$\varnothing 11.5 \pm 0.3$$

Fig. 5

Explain the meaning of the tolerance in Fig. 5.

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

6 Ergonomics is an important area of consideration when designing new products.

(a) Define what is meant by the term 'ergonomics'.

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

(b) Fig. 6 shows a remote control.



Fig. 6

Give **two** ergonomic user needs that would be considered during the design of a remote control.

1

.....

2

.....

[2]

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.