

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
LEVEL 1/2**

R105/01

**CAMBRIDGE NATIONAL AWARD/
CERTIFICATE IN ENGINEERING DESIGN**
**Design briefs, design specifications and
user requirements**

MONDAY 16 MAY 2016: Afternoon

**DURATION: 1 hour
plus your additional time allowance**

MODIFIED ENLARGED

Candidate forename						Candidate surname				
Centre number						Candidate number				

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:
None

OTHER MATERIALS REQUIRED:
None

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

Use black ink. HB pencil may be used for graphs and diagrams only.

Complete the boxes on the first page 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).

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 (*).

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]

(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



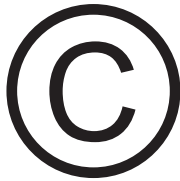
Explain what the British Standard Kitemark™ means when displayed on a product.

[2]

(d) Fig. 3 shows two symbols.

Fig. 3

Symbol 1



Symbol 2



State the names of these two symbols.

Symbol 1 _____

Symbol 2 _____

[2]

(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.

10 = EXCELLENT AND 1 = VERY POOR

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

(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]**

- (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

Nuts and bolts



Batch production

Sport stadium



Mass production

Bread



One-off production

[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.

Fig. 5

$\varnothing 11.5 \pm 0.3$

Explain the meaning of the tolerance in Fig. 5.

[2]

(d) Explain how allowing tolerances on the critical dimensions of engineered products can help to control production costs.

[4]

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]

[illegible]

END OF QUESTION PAPER



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