

Candidate Name

Centre Number

Candidate
Number

--	--	--

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS****General Certificate of Secondary Education****DESIGN AND TECHNOLOGY
(INDUSTRIAL TECHNOLOGY)****1959/4****PAPER 4 HIGHER TIER****Specimen Paper 2003**

1 hour 15 minutes

Candidates answer on the question paper.

TIME 1 hour 15 minutes**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

Marks will be awarded for the use of correct conventions.

Dimensions are in millimetres unless stated otherwise.

Total marks for this paper is 50.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This specimen question paper consists of 9 printed pages and 3 blank pages.

1 Fig. 1 shows two different designs for a G-cramp.

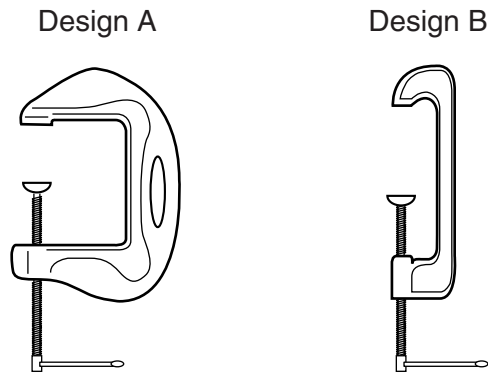


Fig. 1

(a) (i) State an advantage in using design A rather than design B.

_____ [1]

(ii) State an advantage in using design B rather than design A.

_____ [1]

Fig. 2 shows a view of the main body of design A. It is made from aluminium using the sand casting process.

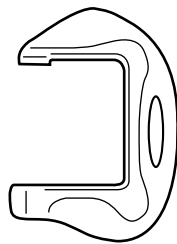


Fig. 2

(b) Complete the chart below by filling in the missing steps in the sand casting process. Steps 1 and 6 have been completed for you.

Step 1	Make a split pattern suitable for the body of the G-cramp.
Step 2	
Step 3	
Step 4	
Step 5	
Step 6	Clean up the finished casting.

[4]

(c) (i) Explain why it is necessary to use a split pattern for producing the G-cramp body.

_____ [1]

(ii) Using notes and sketches show a design for a split pattern suitable for producing the body of the G-cramp using the sand casting process.

[3]

- 2 A group of railway enthusiasts are constructing a miniature railway.
The railway will be able to take small carriages to carry young children around the track.

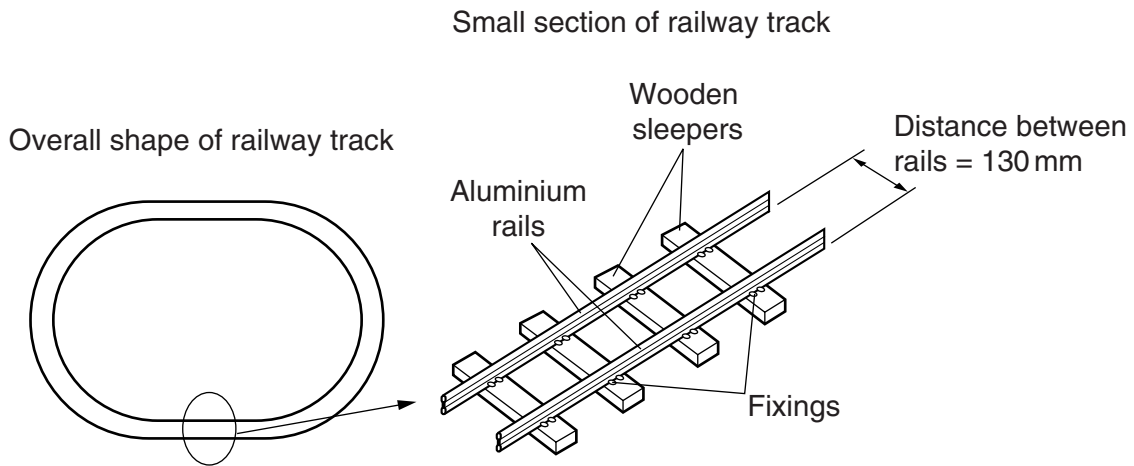


Fig. 3

Fig. 3 shows an overall view of the track and a small close up section.
It is very important that the aluminium rails are kept at an equal distance apart for the whole of the railway track.

- (a)** Explain why it is necessary to keep the rails apart at an equal distance.

[2]

It becomes more difficult to maintain the equal distance around the bends of the track.

- (b)** Using notes and sketches show your design for a jig that can be used to help keep the rails an equal distance apart around the bends of the track while it is being fixed to the wooden sleepers.

[4]

Fig. 4 shows a close up view and a cross section view of one of the wooden sleepers.

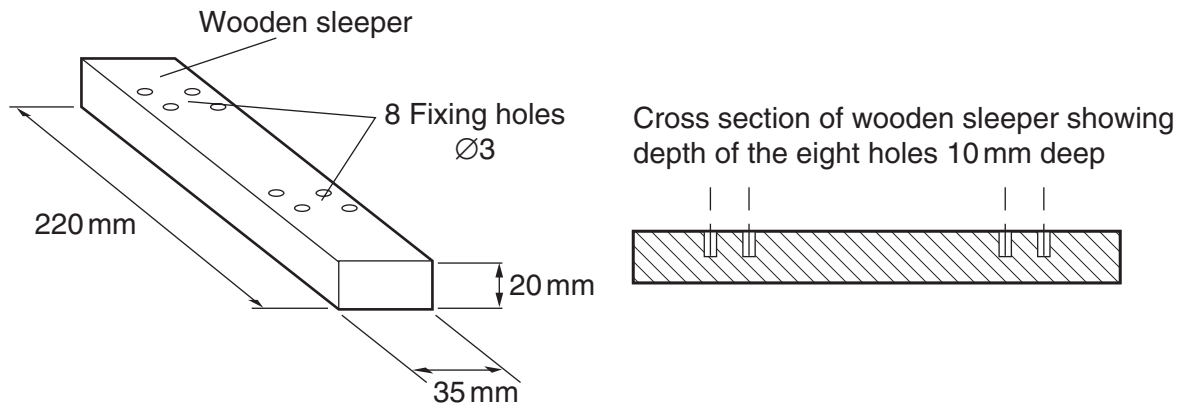


Fig. 4

400 of these sleepers need to be manufactured in the construction of the railway.

The sleepers are supplied cut to size and ready for drilling.

It is important that the holes are accurately drilled in position and depth.

- (c) (i)** Using notes and sketches show a design for a device that will allow accurate positioning of the holes.

[2]

- (ii)** Using notes and sketches show your method for maintaining accurate depth of drilling of the sleepers.

[2]

3 Fig. 5 shows four parts of a child's construction set.

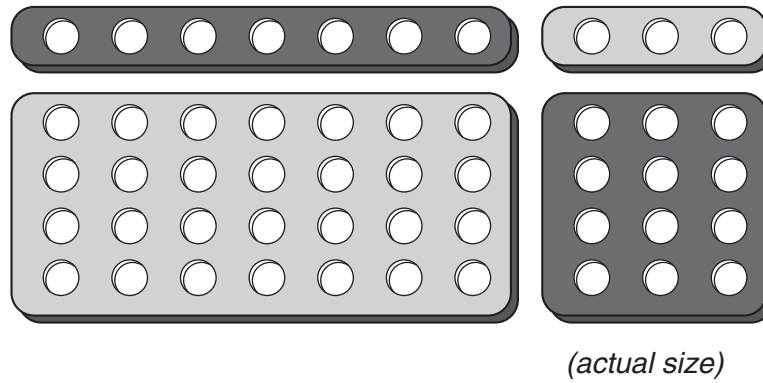


Fig. 5

The parts are made of 1.5 mm thick mild steel and painted in different colours.

(a) (i) State why it is important to apply a finishing coat of paint to the mild steel.

_____ [1]

(ii) Explain the benefit of using different coloured paint on each of the parts.

_____ [1]

To help to keep the parts well organised the manufacturers provide a plastic tray to store 20 of each part.

(b) (i) Use notes and sketches to show a design for a suitable tray to locate the parts.

[4]

(ii) State the name of a suitable manufacturing process for producing a large quantity of the plastic trays.

_____ [1]

(iii) State the name of a suitable plastic material for producing a large quantity of the trays.

_____ [1]

- (c) State two design features that would need to be considered when designing the parts of the construction set in order to make them safe for children to use.

Feature 1 _____ [1]

Feature 2 _____ [1]

4 Fig. 6 shows a prototype design for a novelty nutcracker.

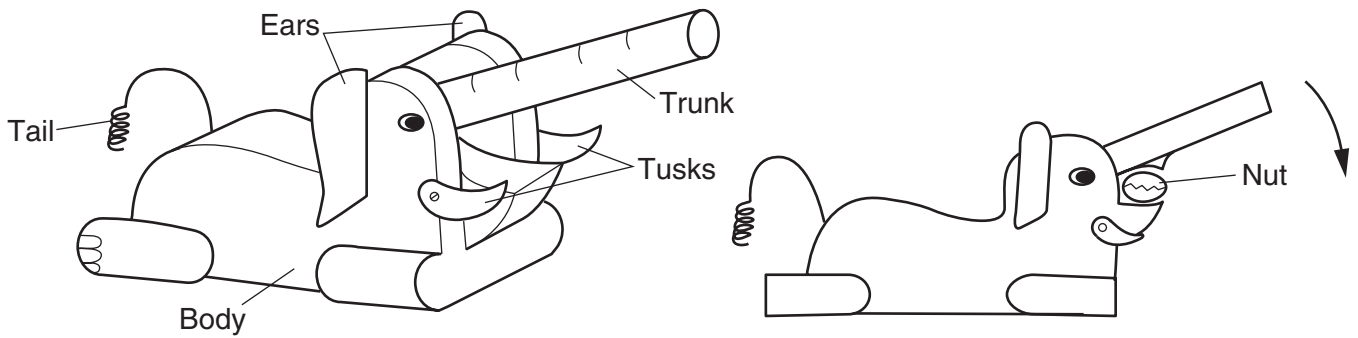


Fig. 6

(a) Complete the table below by selecting suitable materials and desirable properties for the nutcrackers components.

	Component	Material	Property
A	Body	Cast aluminium	
B	Trunk		
C	Tail		Flexible
D	Tusks	Acrylic	
E	Ears		Soft

[6]

The prototype nutcracker has a serious design fault.

(b) (i) Explain the design fault of the novelty nutcracker.

_____ [1]

(ii) Using notes and sketches shown how the design of the nutcracker can be improved.

[3]

5 Producing a 'one off' product is known as 'job production'. Every product produced is different and it is very labour intensive.

(a) Explain what is meant by the term labour intensive.

[2]

In order to produce products in quantity a manufacture may use 'batch production'.

(b) Explain what is meant by the term batch production.

[2]

Fig. 7 shows a design for an injection moulded plastic spoon.

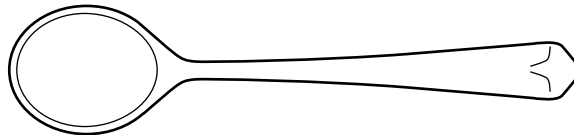


Fig. 7

The manufacturers of the spoon use a repetitive flow production system.

(c) Explain why repetitive flow production is used to produce the spoon.

[2]

Eventually the manufacturers decide to change the production of the spoon to a continual flow process.

(d) Explain the benefits to the manufacturer of changing the production process to continual flow.

[2]

The manufacturers have also adopted the philosophy of 'just in time' (JIT).

(e) Explain what is meant by the term 'just in time'.

[2]

BLANK PAGE

BLANK PAGE

BLANK PAGE

Oxford Cambridge and RSA Examinations

General Certificate of Secondary Education

DESIGN AND TECHNOLOGY (INDUSTRIAL TECHNOLOGY)
PAPER 4 HIGHER TIER

1959/4

MARK SCHEME

Specimen Paper 2003

Question	Answer	Total Marks Available
1(a) (i)	Greater reach of jaws	1
(ii)	Able to use in restricted spaces	1
1(b)	Step 2 – Encase pattern in casting sand Step 3 – Remove pattern leaving impression in sand Step 4 – Pour in the molten aluminium Step 5 – Leave to cool and remove casting from sand	4
1(c) (i)	Allows easy removal from sand. Ability to split mould. Or suitable response.	1
(ii)	Tapered sides. Location pegs. Radiused corners. (1 mark each)	3
		Total 10

2(a)	Constant gauge. Limited tolerance.	2
2(b)	Way of spacing rails constantly – 1 mark Allowing for curvature of rails – 1 mark Reference to outer and inner radius – 1 mark Level of communication – 1 mark	4
2(c) (i)	Ease of location onto sleeper – 1 mark Ease of locating holes – 1 mark	2
(ii)	Method showing accurate depth registration – 1 mark Ease for repeated use – 1 mark	2
		Total 10

Question	Answer	Total Marks Available
3(a) (i)	As a protective coating	1
(ii)	Ease of identification. Colour coding. Aesthetics.	1
3(b) (i)	Ability to take 20 of each component – 1 mark Suitability of design for purpose – 1 mark Ease of removing components – 1 mark Level of communication – 1 mark	4
(ii)	Vacuum forming. Injection moulding.	1
(iii)	High impact polystyrene (HP). Polyvinyl chloride (PVC).	1
3(c)	Non toxic materials. No sharp edges: no sharp corners. (1 mark each)	2
		Total 10

4(a)	Body – Heavy Trunk – Mild steel / steel – Tough (2 marks) Tail – Copper wire Tusks – Pre-coloured. Shiny. Ears – Leather / PVC / Fabric.	6
4(b) (i)	It will topple over when force is applied to the trunk	1
(ii)	Redesign of the nutcracker to produce an efficient prototype – up to 2 marks. Extension of base to counteract action of lever – 1 mark Any other design improvement – 1 mark Level of communication – 1 mark	3
		Total 10

Question	Answer	Total Marks Available
5(a)	Reference to being hand made. Cost of production.	2
5(b)	Either: Specified quantity of product. Ability to repeat production. Flexibility of production. Similar batches can be produced with small change to tooling. 1 mark each point covered, up to max 2.	2
5(c)	Either: Large production quantities. Cheap production costs. Automation or labour intensive. 1 mark each point covered, up to max 2.	2
5(d)	Either: Small workforce. Uninterrupted production. Very cheap production costs. Better for products that require no changes to tooling. 1 mark each point covered, up to max 2.	2
5(e)	Either: Materials for product arrive when needed for production. No storage problems. Finished products despatched as soon as complete. 1 mark each point covered, up to max 2.	2
		Total 10

Total marks: 50