

New
Specification

Rewarding Learning

General Certificate of Secondary Education
2011

Centre Number

71

Candidate Number

Technology and Design

Unit 3:
Product Design

[GTD31]

MONDAY 6 JUNE, MORNING



TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

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

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total
Marks

Answer **all** questions

- 1 (a) Two main types of plastic are thermosetting plastic and thermoplastic. Explain the main characteristic of each type.

Thermosetting _____
 _____ [1]

Thermoplastic _____
 _____ [1]

- (b) (i) Select, from the two plastics named below, the most appropriate plastic for the manufacture of the socket shown in **Fig. 1**.

Urea formaldehyde or **acrylonitrile butadiene styrene (ABS)**



Fig. 1

Plastic _____ [1]

- (ii) Describe **two** important factors that would have been considered and taken into account during the design of the socket.

Factor 1 _____
 _____ [1]

Factor 2 _____
 _____ [1]

Examiner Only	
Marks	Remark

- (c) (i) State the plastic manufacturing process that would be used to produce the plastic socket.

Process _____ [1]

- (ii) Describe **two** steps in the manufacturing process used to produce the plastic socket.

Step 1 _____
_____ [1]

Step 2 _____
_____ [1]

Examiner Only	
Marks	Remark

2 Fig. 2 shows a wind-up LED torch. The battery in the torch can be recharged by rotating the handle.



Fig. 2

(i) Explain the function of each of the following in the design of a torch.

Thought shower _____ [1]

Prototype _____ [1]

(ii) Name **two** methods for the communication of ideas in the design of the torch.

1. _____ [1]

2. _____ [1]

(iii) Name **two** other products which use rechargeable batteries.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

(iv) Rechargeable batteries are being developed for use in vehicles.

Suggest **one** disadvantage of battery operated vehicles compared to petrol driven vehicles. Give a reason for your answer.

Disadvantage _____

_____ [1]

Reason _____

_____ [1]

Examiner Only	
Marks	Remark

3 Fig. 3 shows two types of chisel.

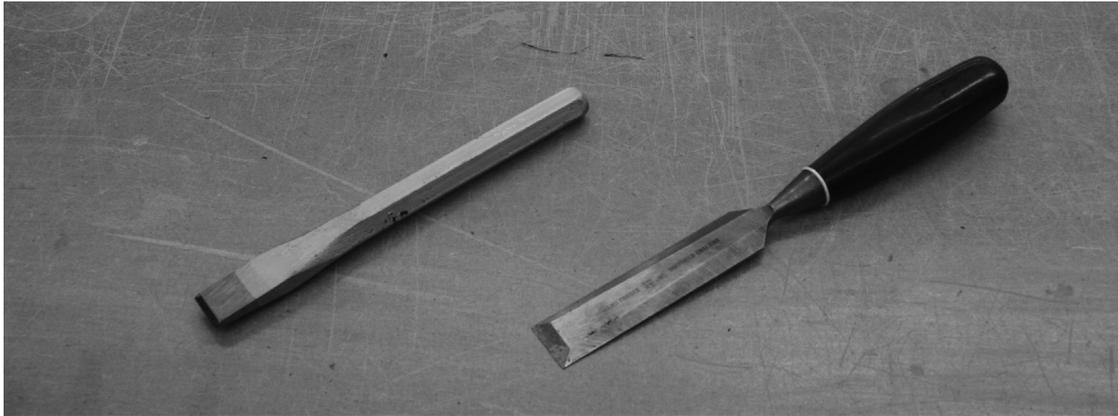


Fig. 3(a)

Fig. 3(b)

(a) (i) Name each chisel shown.

Fig. 3(a) _____ [1]

Fig. 3(b) _____ [1]

(ii) Select either chisel and describe a practical use for it in the school workshop.

 _____ [2]

(b) The point of the chisel is hardened and tempered. Outline **four** main steps in this process.

- (1) _____

- (2) _____

- (3) _____

- (4) _____
 _____ [4]

Examiner Only	
Marks	Remark

4 Fig. 4 shows a design for an ornamental wheelbarrow to display flowers in a garden.

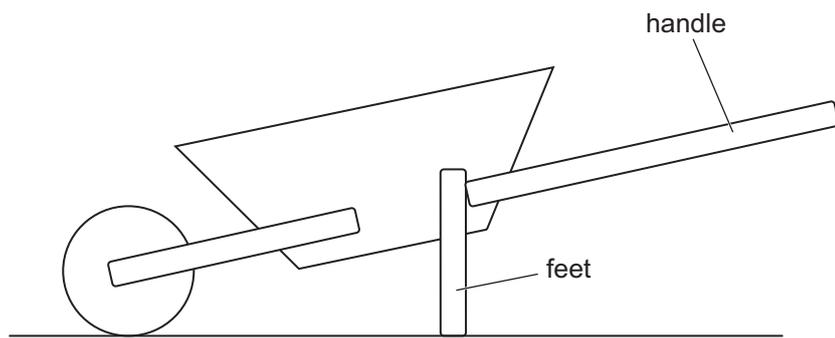


Fig. 4

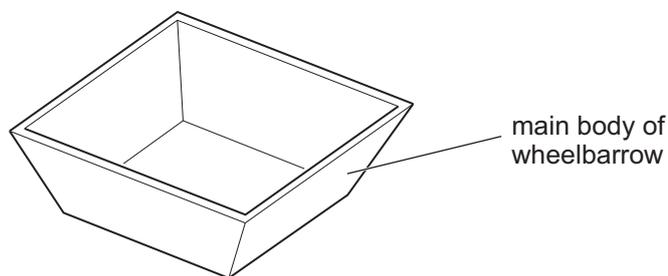


Fig. 5

(a) Give **two** reasons why you should choose solid timber compared to a manufactured board for the wheelbarrow.

1. _____ [1]

2. _____ [1]

(b) The main body of the wheelbarrow shown in **Fig. 5** is to be joined using mitre joints. In the space below, using annotated sketches, outline the main features of a mitre joint.

[3]

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Marks	Remark

(c) During quality assurance and control testing it was found that the mitre joints were weak and unsatisfactory. Explain with sketches how the mitre joints could be improved.

Examiner Only	
Marks	Remark

[3]

5 A toy kangaroo is shown in **Fig. 6**.



Fig. 6

(a) The kangaroo is made from MDF.

Suggest a suitable finish for the toy and give a reason for your choice.

_____ [2]

(b) (i) Name a suitable hand tool that could be used to cut out the parts of the toy in a school workshop.

_____ [1]

(ii) Name a suitable machine that could be used to cut out the parts to produce small quantities of the toy.

_____ [1]

Examiner Only	
Marks	Remark

6 (a) The production manager of a company which manufactures, assembles and distributes mobile phones has sub-contracted the manufacture of the circuit board for the mobile phone.

(i) Outline what sub-contracting means.

_____ [1]

(ii) Give **two** reasons why the company may wish to sub-contract the manufacture of the circuit board.

Reason 1 _____ [1]

Reason 2 _____ [1]

(b) Consumer demand for mobile phones has continued to grow at a fast rate.

Give **two** specific technological reasons and **one** specific social reason for the growth in consumer demand of mobile phones.

Technological Reason 1 _____ [1]

Technological Reason 2 _____ [1]

Social Reason _____ [1]

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Marks	Remark

(c) The huge growth in consumer demand for mobile phones has resulted in a large number of older mobile phones being disposed of.

Discuss why mobile phones should be recycled rather than disposed of in landfill sites.

Discuss _____

_____ [2]

Examiner Only	
Marks	Remark

7 Fig. 7 shows a seesaw for pre-school children.



Fig. 7

- (a) (i) Give **one** ergonomic factor which should be considered when designing the seesaw.

_____ [1]

- (ii) A risk assessment is carried out on the seesaw before it is marketed.
Explain what is meant by risk assessment.

_____ [1]

- (iii) Suggest **two** factors which should be considered in the risk assessment of the seesaw.

Factor 1 _____

Factor 2 _____ [2]

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- (b) The company manufacturing the seesaw is considering adapting the existing seesaw for use by older children.

Produce freehand sketches with notes to illustrate your ideas for possible modifications to the seesaw to enable it to be used by older children.

Examiner Only	
Marks	Remark

[4]

8 Using annotated sketches, design a holder for pens, pencils and an eraser. Your solution for the holder should consider the following specification points:

- Must be freestanding and stable to sit on a desk or table [4]
- Hold two pens, two pencils and an eraser in an efficient and effective manner [4]
- Efficient use of material [4]
- Ergonomic factors [4]
- Aesthetic factors [4]
- Material(s) selection and justification for their use [4]

Using the following information to help you:

The holder is intended to be used by children aged between 3–11 on a desk or table.

The holder should not be larger than 200 mm × 200 mm × 80 mm.

A typical pen is approximately 150 mm × 10 mm diameter

A typical pencil is approximately 180 mm × 8 mm diameter

A typical eraser is approximately 35 mm × 20 mm × 7 mm

Your answer should include all necessary dimensions.

Use the following 2 pages for your answer.

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Marks	Remark

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Marks	Remark

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Marks	Remark

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