

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
 DESIGN AND TECHNOLOGY**

Systems And Control Technology Core

Paper 2 (Higher Tier)

THURSDAY 22 MAY 2008

Morning
 Time: 1 hour 15 minutes

Candidates answer on the question paper
Additional materials: No additional materials are required



* G U P / T 4 1 3 0 9 *

Candidate Forename

Candidate Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- Dimensions are in millimetres unless stated otherwise.
- Marks will be awarded for the use of correct conventions.

FOR EXAMINER'S USE	
1	
2	
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TOTAL	

This document consists of **12** printed pages.

1 Fig. 1 shows an incomplete design for a litter picker.

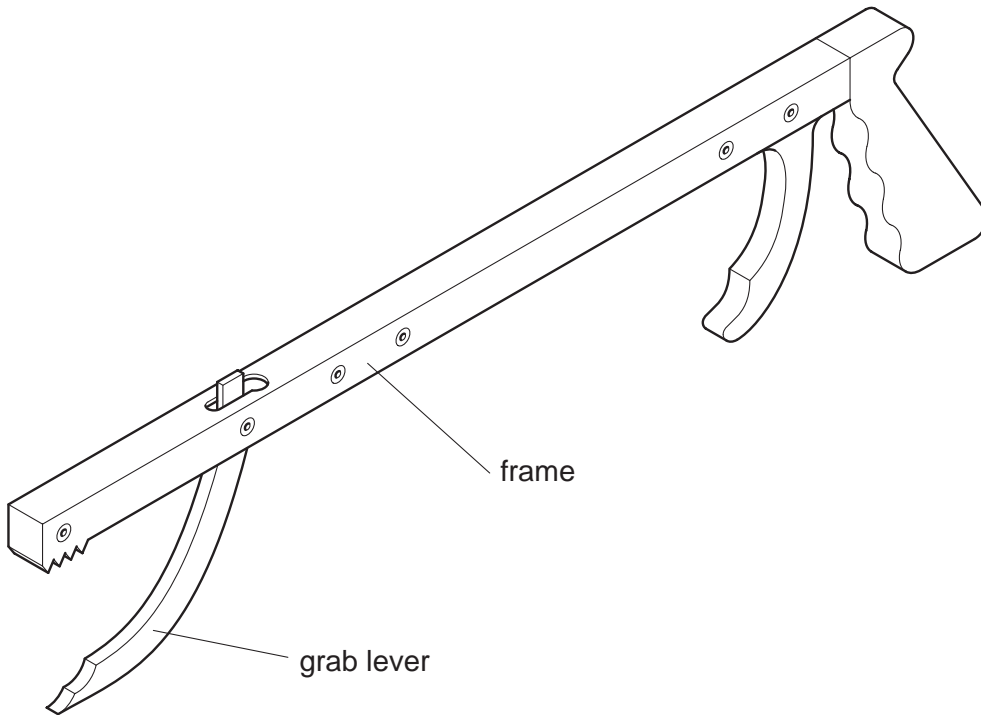


Fig. 1

(a) Label a fulcrum point on Fig. 1. [1]

(b) When designing and making a prototype of the grab lever the designer used a CAD/CAM system.

Give **one** advantage to the designer of using CAD compared to drawing it by hand.

.....
[1]

(c) A CNC milling machine was used to produce the prototype of the grab lever.

(i) Give **one** method of securing the workpiece to the CNC milling machine table.

.....
[1]

(ii) Give **two** settings of the CNC milling machine which need to be made.

Setting 1[1]

Setting 2[1]

- (d) Name the most appropriate production method to produce 5,000 identical litter pickers every day.

.....[1]

Fig. 2 shows incomplete detail of the grab lever and the frame.

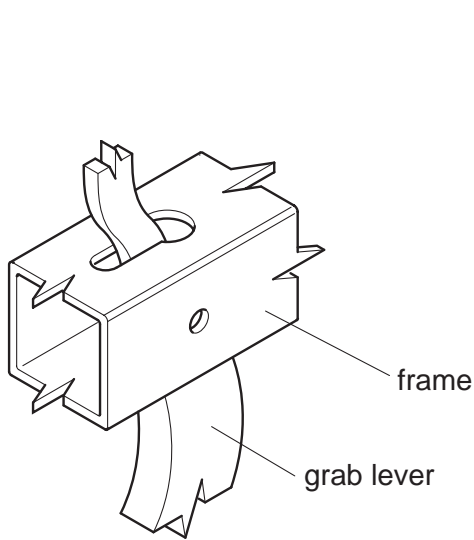


Fig. 2a

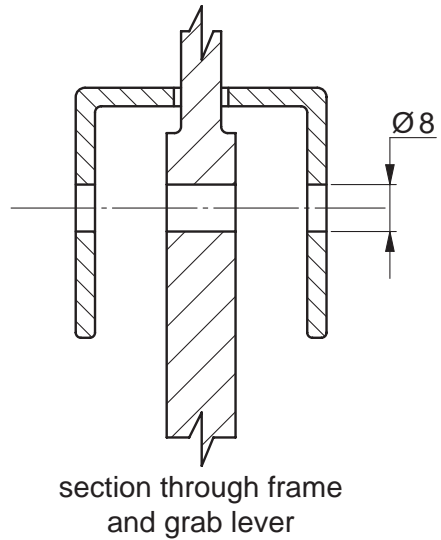


Fig. 2b

- (e) Draw on **Fig. 2b** a method which shows how the grab lever can be securely attached to the frame but allows the grab lever to pivot freely. [2]

Label all components used. [2]

2 Fig. 3 shows a wind up torch.

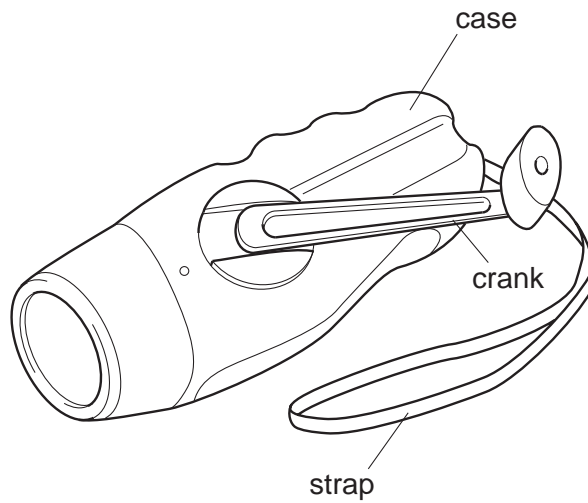


Fig. 3

The torch uses six ultra bright LEDs to produce the light beam.

(a) Give **one** advantage of using the LEDs compared to a standard 6.0V bulb.

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

(b) State **one** important feature of the energy system to ensure the LEDs can be lit when the crank handle is not turning.

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

(c) Give **two** benefits of a wind up torch.

Benefit 1
.....[1]

Benefit 2
.....[1]

(d) Describe how ergonomics has been considered when designing the wind up torch.

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

(e) Give **two** quality checks which could be carried out during manufacture of the wind up torch.

Quality check 1
.....[1]

Quality check 2
.....[1]

(f) New technologies such as SMART materials allow us to produce electricity in different ways.

(i) Name a component to convert light energy into electrical energy.
.....[1]

(ii) Give **one** environmental benefit of using alternative primary sources of energy to produce electricity.
.....
.....[1]

[Total: 10]

[Turn over

- 3 Fig. 4 shows a battery powered alarm which uses an LED to warn the user when the bath water reaches a maximum level.

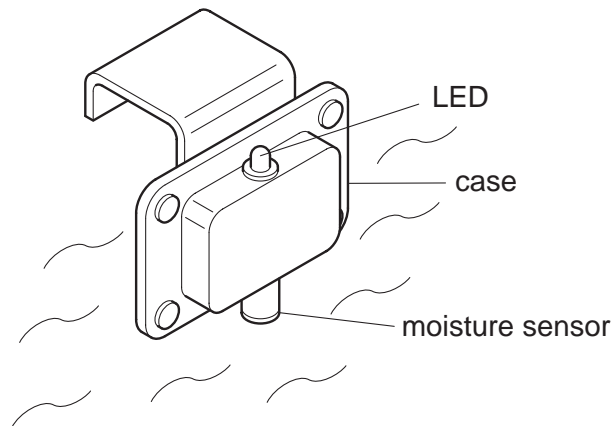


Fig. 4

Fig. 5 shows a simple circuit for the alarm.

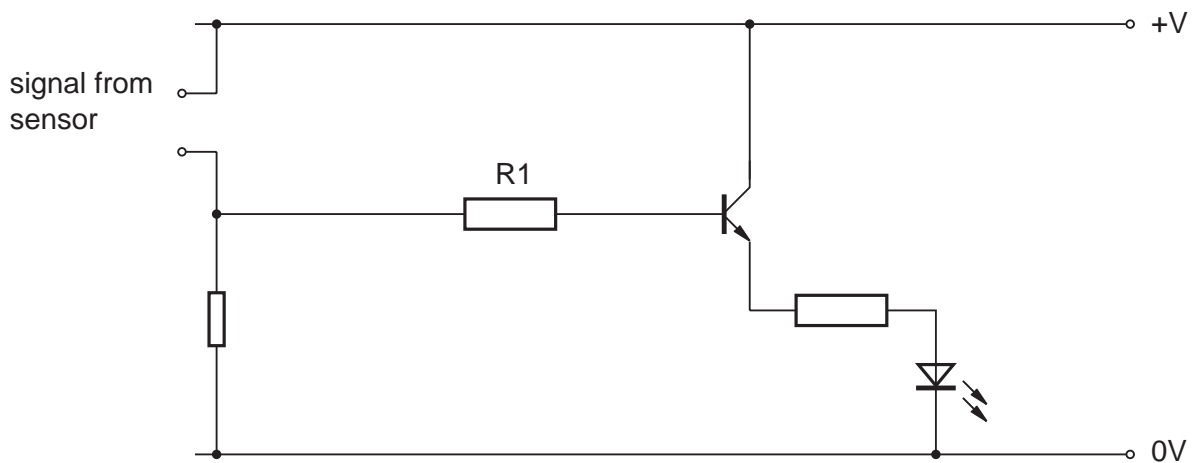


Fig. 5

The circuit in Fig. 5 uses an LED as an indicator of the water level.

- (a) Complete the table below by naming an alternative indicator component.
Draw the circuit symbol of the component chosen.

alternative indicator component	circuit symbol

[2]

4 Fig. 7 shows a wind powered electricity generator used on a boat.

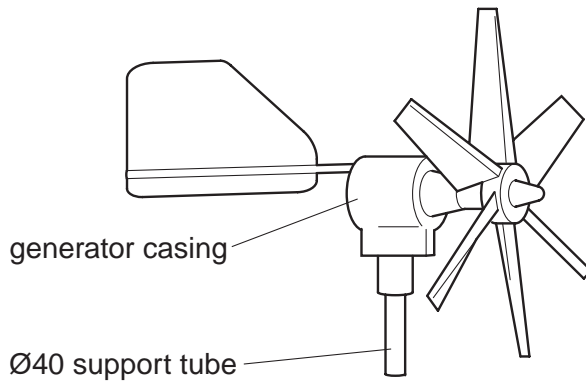


Fig. 7

The generator casing is made in two halves.

(a) Explain why the injection moulding process would be more suitable than blow moulding for the manufacture of the casing.

.....

.....

.....[2]

(b) Another process used to form plastic is vacuum forming. Fig. 8 shows part of a flowchart for the vacuum forming process. Complete this part of the flowchart using standard symbols and labels.

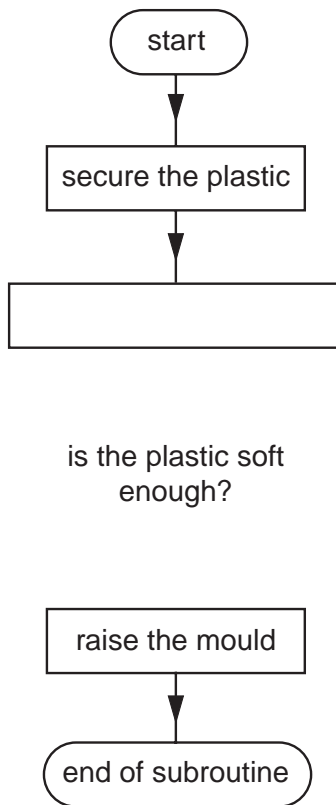


Fig. 8

[3]

Fig. 9 shows incomplete details of the support tube for the wind powered electricity generator.

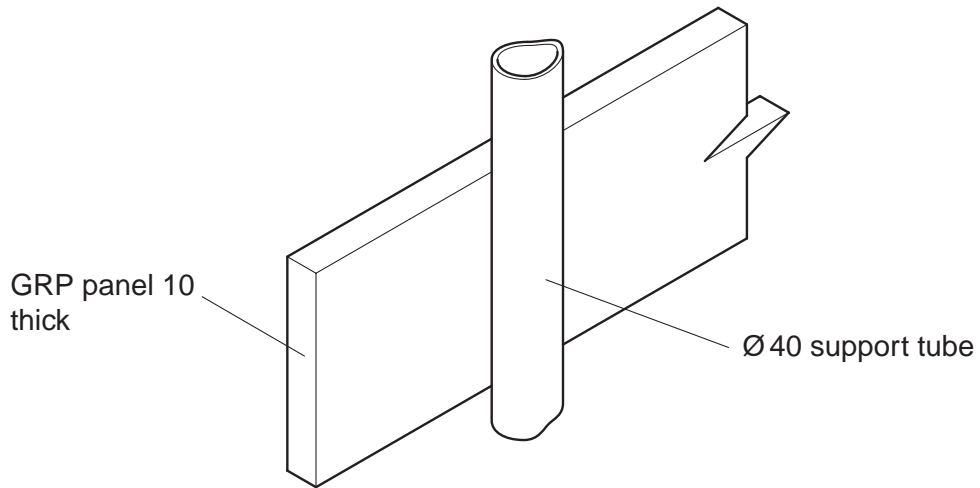


Fig. 9

(c) The support tube needs to be attached to a GRP panel on a boat.

Use sketches and notes to show a method of attaching the support tube to the GRP panel which would allow:

- (i)** the support tube to be attached securely and prevented from rotating. [2]
- (ii)** easy removal of the support tube. [2]

(d) Name a suitable material for your design of the attachment.

.....[1]

5 Fig. 10 shows a storage unit to hold both waste paper and card for recycling.

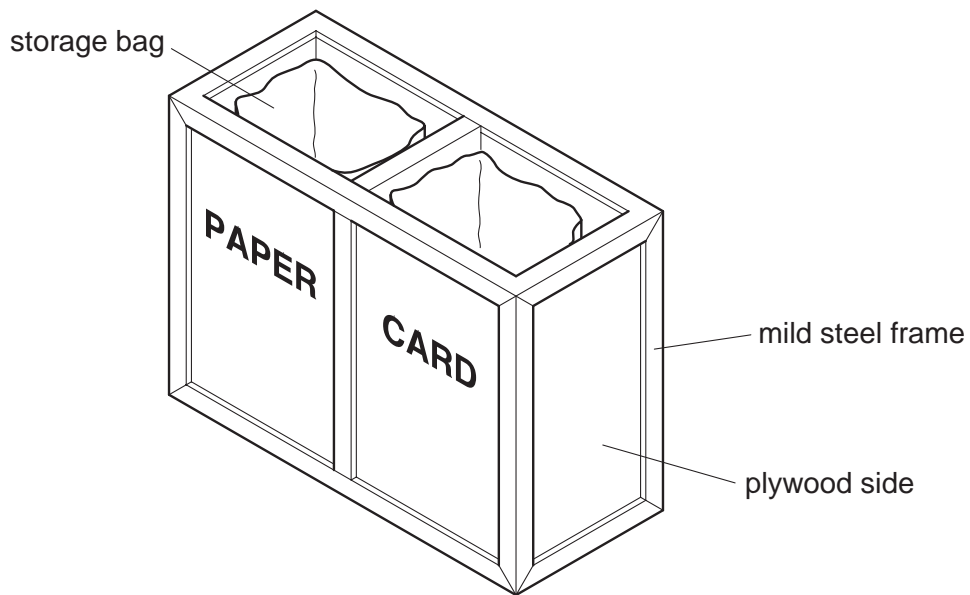


Fig. 10

(a) Plastic lids are needed for each half of the storage unit. One to cover the paper storage section and one to cover the card storage section.
In the space below use sketches and notes to show:

- (i) **one** plastic lid of suitable shape which shows sufficient rigidity. [2]
- (ii) a suitable method of attaching the lid to the frame which allows it to be easily opened. [2]

(b) The opening of each lid is to be controlled by a simple mechanical system.

(i) In the space below use sketches and notes to show a simple mechanical opening system. [4]

(ii) Name the materials and components used in your simple mechanical system. [2]

[Total: 10]

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