

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

Systems And Control Technology Core

Paper 1 (Foundation Tier)

THURSDAY 22 MAY 2008

Morning
 Time: 1 hour

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



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

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	
3	
4	
5	
TOTAL	

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

1 Fig. 1 shows a storage unit to hold both waster paper and card for recycling.

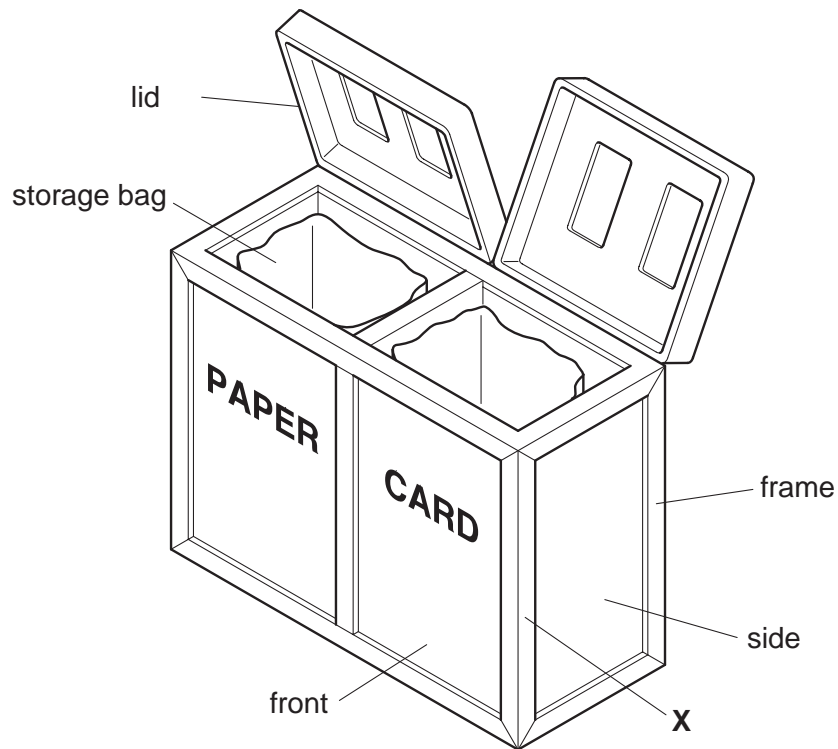


Fig. 1

(a) Complete the following table.

PART	MATERIAL	SURFACE FINISH
frame	mild steel	
side		preservative

[2]

Fig. 2 shows incomplete details of how the frame and side are joined at X.

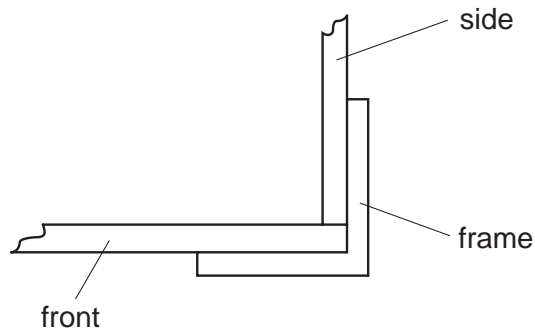


Fig. 2

(b) Draw on Fig. 2 a method of joining the side to the frame. Name any components used.

[2]

Fig. 3 shows one of the lids made from plastic.

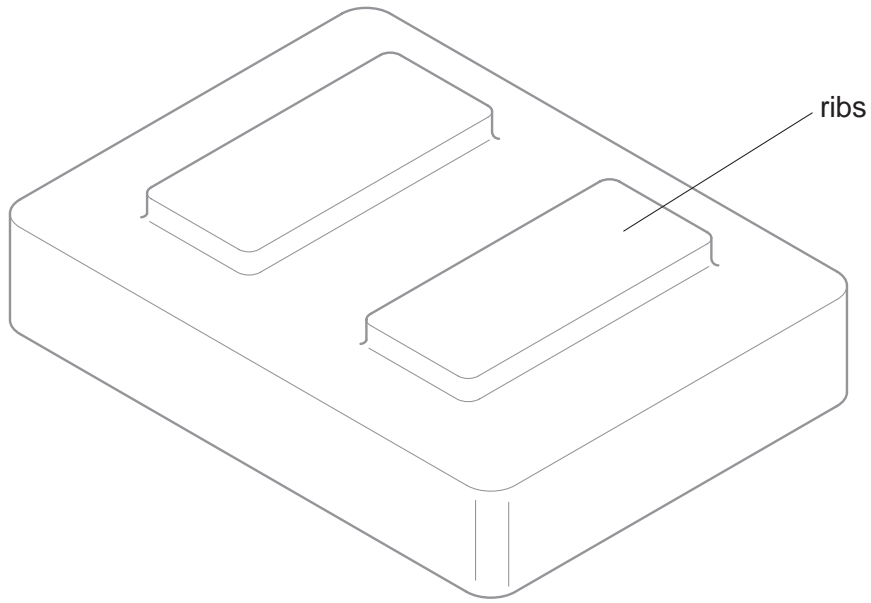


Fig. 3

The lid has raised areas in the middle called ribs.

(c) (i) Give a reason for the lid being shaped in this way.

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

(ii) Name a suitable thermoplastic for making the lid.

.....[1]

(d) The lids were found to be difficult to grip when being opened.
Draw and label on Fig. 3 how the lid could be improved.

[2]

(e) Name **one** process for forming plastic into various shapes.

.....[1]

(f) The storage units are to be made in batches of 50.
Give **one** method to produce the lettering for the signs 'CARD' and 'PAPER', applied to each storage unit.

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

[Total: 10]

2 Fig. 4 shows a model wind powered generator.

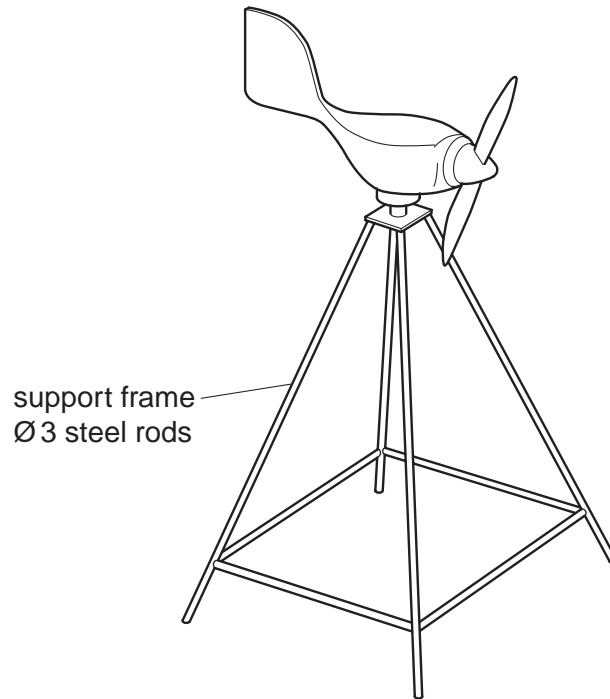


Fig. 4

- (a) (i) Label on Fig. 4 **one** part of the support frame which is in tension. [1]
- (ii) Label on Fig. 4 **one** part of the support frame which is in compression. [1]
- (b) The support frame should remain rigid in use but was found to twist. Use sketches and notes on Fig. 5 below to show how the support frame could be improved to prevent twisting.

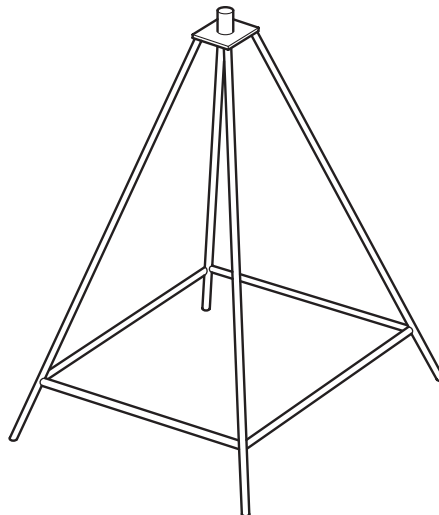
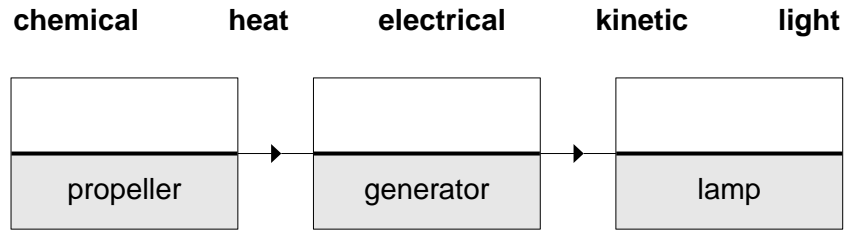


Fig. 5

[2]

- (c) Energy conversions take place when the wind powered generator is used to light a lamp. Complete the block diagram by choosing from the list below the correct type of energy at each stage.



[3]

- (d) The $\varnothing 3$ mild steel rods for the support frame are joined by brazing. Give **one** way to ensure a successful brazed joint.

.....
[1]

- (e) A jig is used when the mild steel rods are brazed together. Give **two** specification points for the jig.

The jig must[1]
 The jig must[1]

- 3 Fig. 6 shows a battery powered alarm which has an LED that warns the user when the bath water reaches a maximum level.

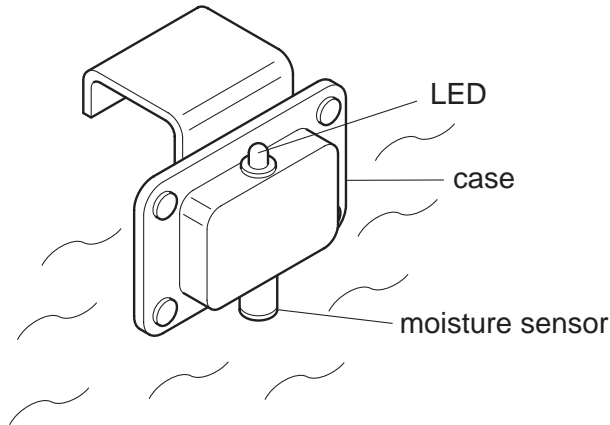
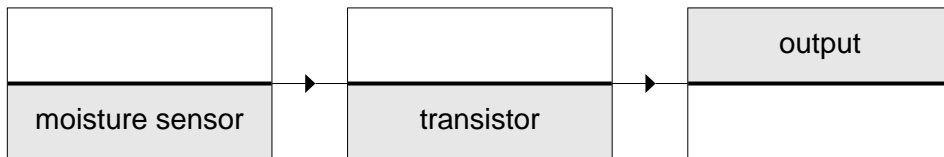


Fig. 6

- (a) An incomplete block diagram for the alarm is shown below. Complete the boxes by adding the missing words.



[3]

Fig. 7 shows a simple circuit for the alarm.

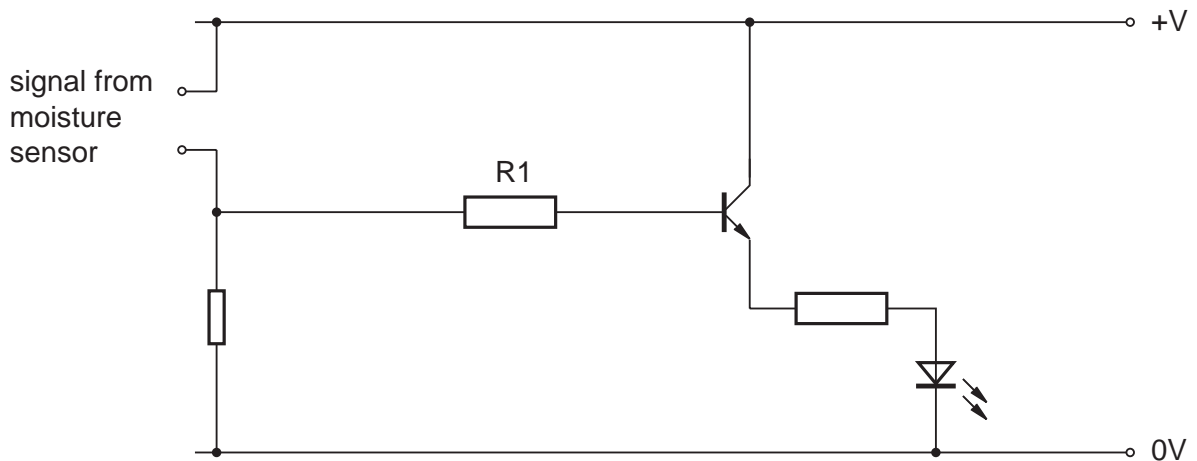


Fig. 7

- (b) State the purpose of resistor R1.

.....[1]

- (c) When the moisture sensor detects water it conducts electricity. Choose which of the following is a **poor** electrical conductor. [circle your choice]

aluminium carbon acrylic copper

[1]

(d) An alternative warning device is a buzzer.
In the space below draw the correct **circuit symbol** for a buzzer.

[1]

(e) Choose the most appropriate electrical supply for the alarm in Fig. 6 (Circle your choice).

24V a.c. 1.5V a.c. 9.0V d.c. 90V d.c. [1]

(f) Give **one** specification point for the case.

.....[1]

(g) A prototype case is to be made by vacuum forming.
Give **two** features of a mould used for vacuum forming.

Feature 1[1]

Feature 2[1]

[Total: 10]

[Turn over

4 Fig. 8 shows an incomplete design for a litter picker.

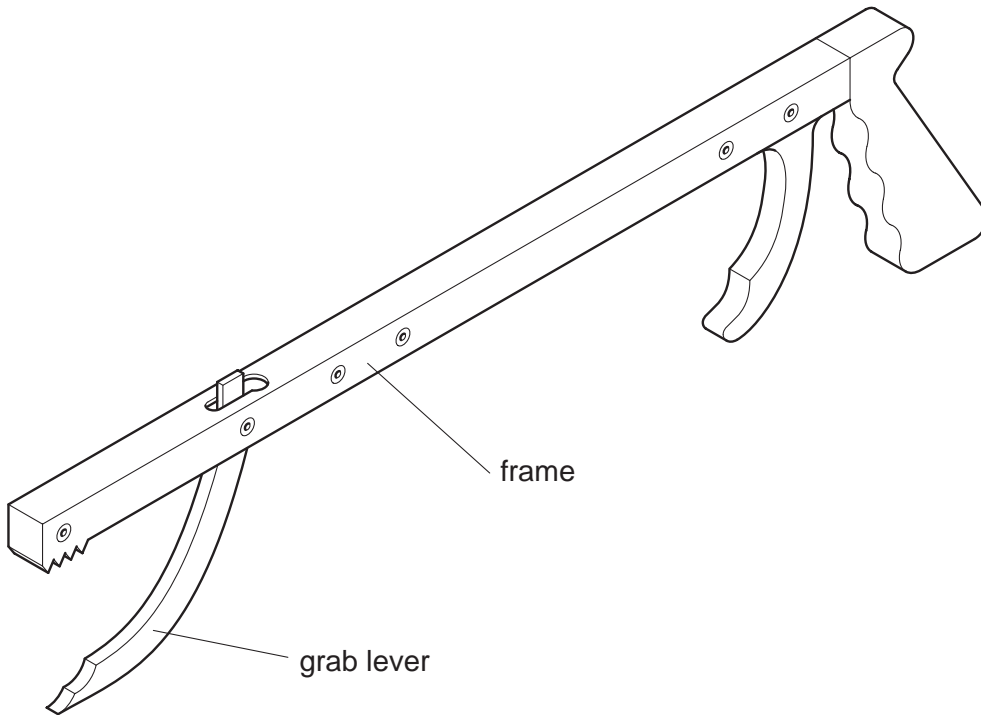


Fig. 8

(a) Label a fulcrum point on Fig. 8. [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. 9 shows incomplete detail of the grab lever and the frame.

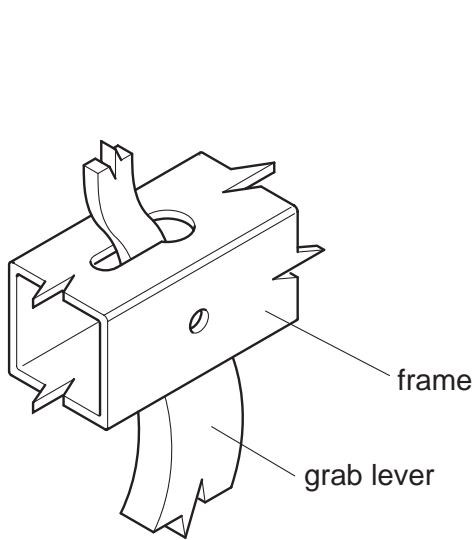


Fig. 9a

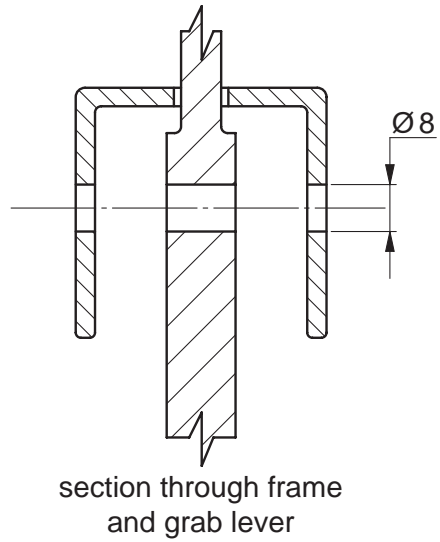


Fig. 9b

- (e) Draw on **Fig. 9b** 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]

5 Fig. 10 shows a wind up torch.

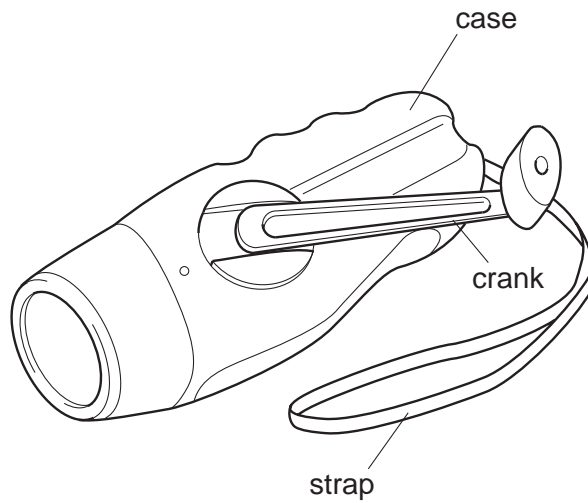


Fig. 10

The torch uses six ultra bright LEDs.

(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]

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