Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	

General Certificate of Secondary Education
June 2010

Engineering 48501

Unit 1

Written Paper

Monday 17 May 2010 1.30 pm to 2.30 pm

For this paper you must have:
- normal writing and drawing instruments.

Time allowed
- 1 hour

Instructions
- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the space provided.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

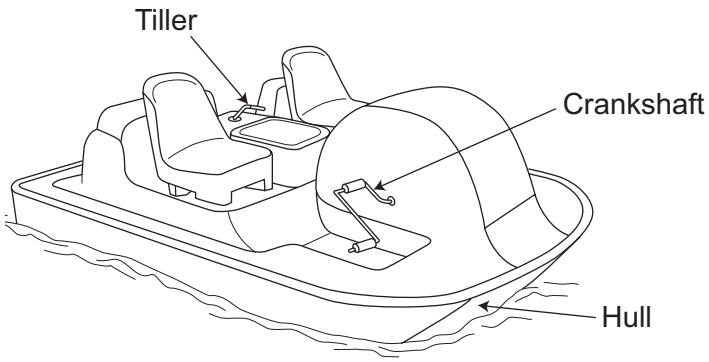
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 75.
- The questions in Section A relates to the context referred to in the preliminary materials that were previously issued.
- You are reminded of the need for good English and clear presentation in your answers. Quality of Written Communication will be assessed in Question 1(e).

Section A

Answer **all** questions.

1 A picture of a typical pedalo is shown below in **Figure 1**.

Figure 1



1 (a) In the spaces below, correctly identify what **each** labelled part does.

Hull.....

.....

Tiller .....

.....

Crankshaft.....

.....

(3 marks)

1 (b) Look at **Figure 1** opposite. For **each** part, suggest a *different* material that could be used **and** say why it is suitable.

Crankshaft material.....

.....

Why it is suitable.....

.....

Tiller material .....

.....

Why it is suitable.....

.....

Hull material.....

.....

Why it is suitable.....

.....

(6 marks)

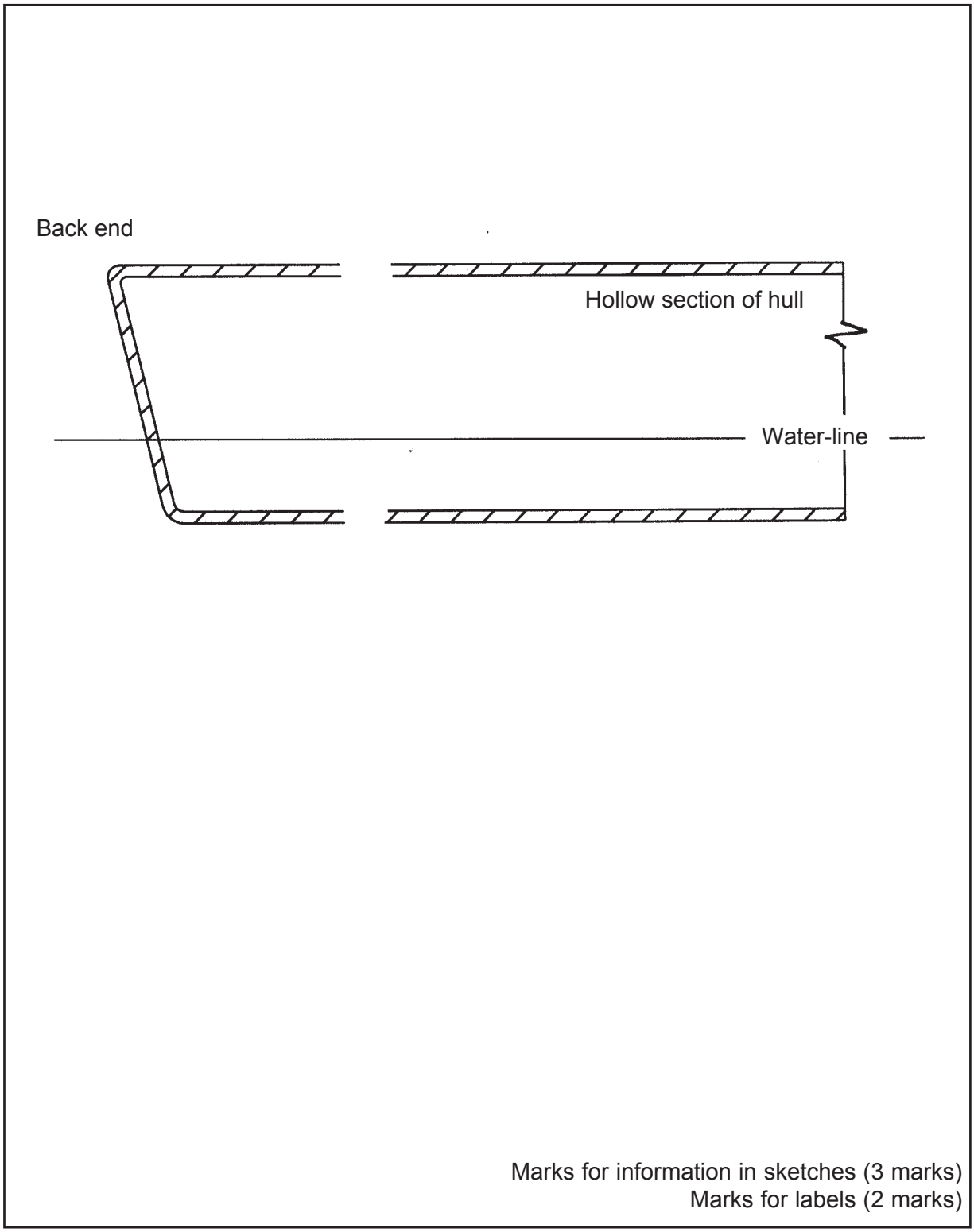
Question 1 continues on the next page

1 (c) Using notes **and** sketches, describe a method of driving a pedalo through the water.

Marks for information in sketches (3 marks)
Marks for information in notes (2 marks)

(5 marks)

1 (d) The sketch below shows a cross-section through a pedalo hull. Add a method of steering the pedalo to this sketch **and** label the parts you have drawn.



Marks for information in sketches (3 marks)
Marks for labels (2 marks)

(5 marks)

Question 1 continues on the next page

1 (e) The steering system has to be fitted through the hollow sections of the boat. This can cause problems. Describe how these problems can be overcome.

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.....

.....

(4 marks)

23

2 Pedalos are designed to be hard wearing because they are constantly rented out for use on rivers, ponds, lakes **and** being launched from beaches into the sea.

2 (a) In the spaces below identify and explain **two** hazards for a pedalo created by its working conditions.

Hazard 1 .....

.....

Explanation 1 .....

.....

.....

.....

Hazard 2 .....

.....

Explanation 2 .....

.....

.....

.....

(6 marks)

Question 2 continues on the next page

2 (b) For each hazard identified in 2(a), suggest a way a pedalo designer may have tried to prevent it.

To prevent hazard 1 .....

.....

.....

.....

To prevent hazard 2 .....

.....

.....

.....

(4 marks)

10

Section B

Answer **all** questions.

3 **Figure 2** shows a modern design for a pedalo.
Study **Figure 2** to answer the questions below.

Figure 2

3 (a) (i) Identify a process used to manufacture the hulls of this type of pedalo.

Manufacturing process .....

.....

(1 mark)

3 (a) (ii) Describe a process used to manufacture the hulls of this type of pedalo.

Description of manufacturing process .....

.....

.....

.....

.....

.....

.....

.....

(5 marks)

Turn over ▶

3 (b) Look again at **Figure 2**.

The seats on the pedalo in **Figure 2** are produced separately to the rest of the body. Explain how the seats are attached to the pedalo.

Marks for information in sketch 2 marks
Marks for information in notes 2 marks

(4 marks)

3 (c) Pedalos often have logos on the sides, made from self-adhesive vinyl stickers. Give an advantage of using a CNC machine to produce the vinyl stickers.

.....

.....

(1 mark)

3 (d) Describe the process of creating a self-adhesive vinyl logo, from initial artwork to final cutting using a CNC machine.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

15

Turn over for the next question

4 **Figures 3** and **4** below show a bronze bearing for the crankshaft system of a pedalo. The bearings are supplied partially finished with all the exterior surfaces machined to the indicated dimensions.

The central hole has been pilot drilled so that it can be machined to fit specific sizes of crankshaft.

Figure 3

Bearing as supplied

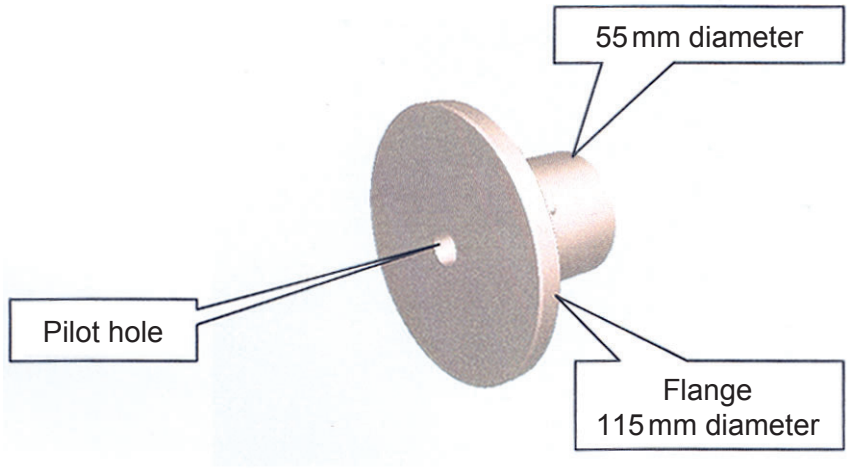
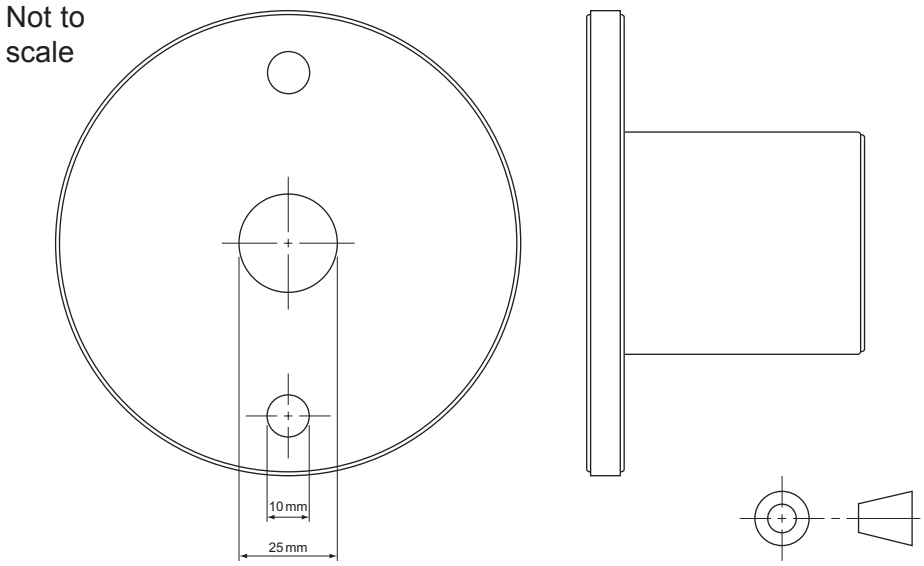


Figure 4

Bearing should look like this after it has been machined



4 (a) Complete the side elevation on **Figure 4** above, using the correct conventions. Do **not** add further dimensions.

(2 marks)

4 (b) In the table below, create a Production Plan listing **five** major operations that need to be completed so that a bearing meets the specification. Some parts have been done for you; select the others from the information given below the table **and** insert the identification letter in the appropriate box.

Order	Operation	Tools and Equipment	Description of task carried out
1	Drill central hole		
2	Chamfer		
3	Mark centres of holes in flange		
4	Make holes in flange		
5	Deburr holes		

Use the information below to complete the production plan.

Position bearing, hold securely in position, machine and repeat. **A**

Remove sharp 'crown' from exit holes. **G**

Steel rule
Odd leg callipers
Centre punch **C**

Lathe tool **H**

Fit supplied bearing to chuck, fit required tool to tailstock, advance into spinning work. **F**

Remove sharp edges from both ends of the hole so shaft fits more easily. **D**

Lathe
Etc
25 mm dia. drill bit **B**

Countersink bit
Large dia. Drill **E**

Use tools to fix hole positions, and to prevent drill bit skipping. **J**

Pillar drill
Drill vice / clamp10 mm dia. drill bit **I**

(10 marks)

12

5 The correct choice of material is vital to the successful operation of any product.

5 (a) Give **two** reasons why bronze is a suitable material for a pedalo crankshaft bearing.

Reason 1 .....

.....

Reason 2 .....

.....

(2 marks)

5 (b) Name **one** piece of equipment for accurately checking the dimension of internal diameters.

Measuring tool .....

.....

(1 mark)

5 (c) Give **two** health and safety hazards associated with machining metals and suggest suitable Personal Protective Equipment (PPE) for each.

Hazard 1 .....

PPE 1.....

Hazard 2 .....

PPE 2.....

(4 marks)

7

6 The use of modern technologies has made great changes in the way engineering companies are run. Depending upon whether you run a company or work for a company, these changes can be seen as either good or bad.

6 (a) In the spaces below identify **and** explain the changes in each of the following.

The size of the workforce .....

.....

Explanation .....

.....

.....

.....

Buying raw materials .....

.....

Explanation .....

.....

.....

.....

(6 marks)

6 (b) Describe **one** positive and **one** negative effect on society arising from the use of modern technology.

Positive effect .....

.....

.....

Negative effect .....

.....

.....

(2 marks)

8

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED