Write your name here

Surname	Other names

Pearson
Edexcel GCE

Centre Number	Candidate Number

Design and Technology

Product Design: Resistant Materials Technology
Advanced Subsidiary
Unit 2: Design and Technology in Practice

Tuesday 2 June 2015 – Morning
Time: 1 hour 30 minutes

Paper Reference
6RM02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- The total mark for this paper is 70.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P44934A

1/1/1/1/1/1

P 4 4 9 3 4 A 0 1 1 6

PEARSON

Answer ALL questions. Write your answers in the spaces provided.

1 Figure 1 shows a piece of 12mm square mild steel bar that is to be cut in the position shown.

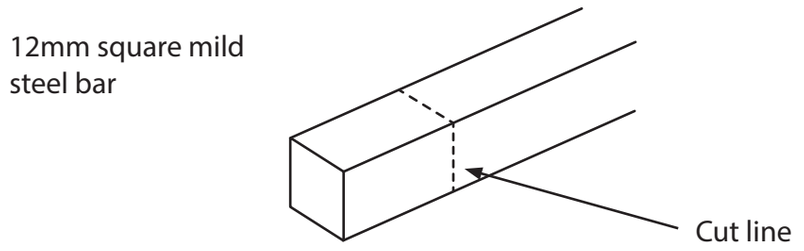

Figure 1

(a) Name a manual saw suitable for cutting the mild steel bar.

(1)

.....

(b) Name a suitable metal from which to make the blade of the saw.

(1)

.....

(c) The blade of the saw will be hardened during manufacture.

Describe the process of hardening the blade.

(2)

.....

.....

.....

.....

(d) After hardening, the blade needs to be tempered.

Explain why tempering is necessary.

(2)

.....

.....

.....

.....

(e) Before any manufacturing processes are carried out a risk assessment must be completed.

Outline the **five** steps involved in a risk assessment.

(5)

1 .....

.....

2 .....

.....

3 .....

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4 .....

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5 .....

.....

(Total for Question 1 = 11 marks)

2 (a) After a tree has been felled, it needs to be converted into planks.

In the boxes below draw a diagram of a through and through (slab) sawn log and a quarter sawn log.

(2)

Through and through (slab) sawn	Quarter sawn

(b) Explain **two** advantages of through and through (slab) sawing over quarter sawing.

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(c) Explain **one** advantage of quarter sawing over through and through (slab) sawing.

(2)

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(Total for Question 2 = 8 marks)

3 Figure 2 shows a bicycle sprocket and crank arm made from duralumin.

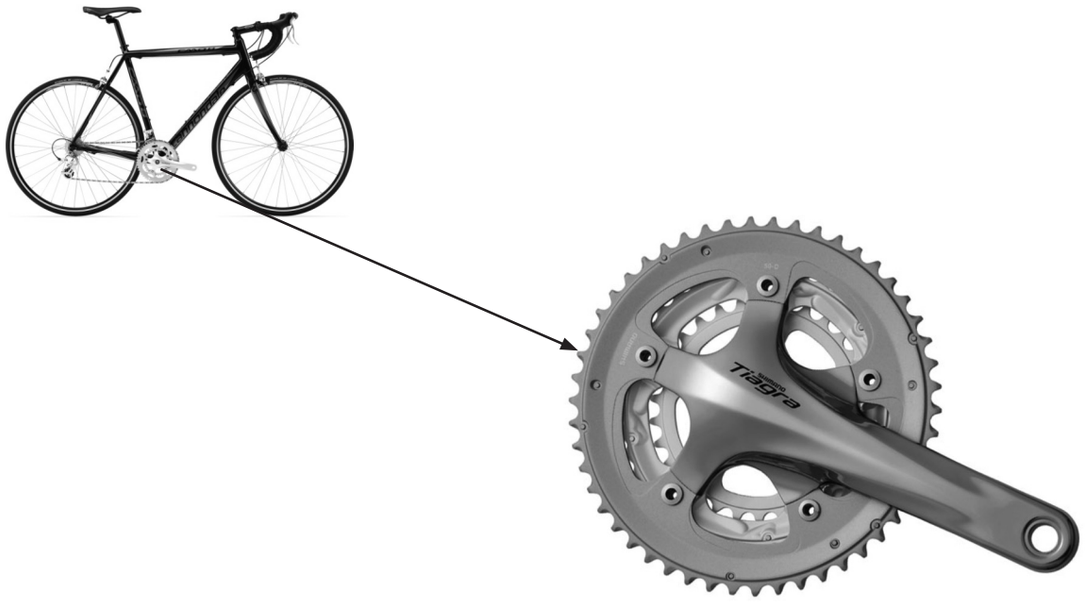

Figure 2

Two properties of duralumin are strength and aesthetics.

(a) State **five** further properties of duralumin that make it suitable for this application.

(5)

1 .....

2 .....

3 .....

4 .....

5 .....

(b) One quality control test that would be used during volume production of the sprocket and crank arm is to check dimensional accuracy.

Outline **three** further quality control checks that could be carried out on the assembled sprocket and crank arm.

(3)

1 .....

.....

.....

2 .....

.....

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3 .....

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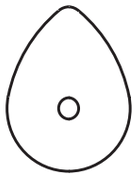
(Total for Question 3 = 8 marks)

4 Cams are used in a range of situations.

Complete the missing information in the table below, giving different responses to those already shown.

Name	Diagram	Characteristic	Appropriate use
Eccentric	(1)	.... (1)	Fuel pumps
..... (1)		Causes follower to dwell for part of its (the cam's) rotation.	.... (1)
Snail	(1)	.... (1)	Toys/automata

(Total for Question 4 = 6 marks)

5 CNC (Computer Numerically Controlled) machines require a set-up procedure prior to component manufacture.

Give the steps that must be performed prior to component manufacture when using a CNC lathe, router or milling machine.

The first and last steps have been given below.

Step 1 – Generate an image of the component required on a suitable piece of CAD (computer-aided design) software

Step 2

.....

.....

Step 3

.....

.....

Step 4

.....

.....

Step 5

.....

.....

Step 6

.....

.....

Step 7

.....

.....

Step 8 – Start manufacture

(Total for Question 5 = 6 marks)

6 Figure 3 shows the end of a drain pipe manufactured from polyvinyl chloride (PVC) tubing.

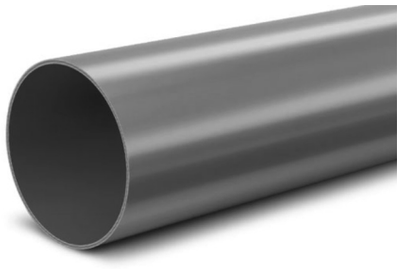


Figure 3

Two characteristics of PVC are its strength and its availability in a range of colours.

(a) Explain **three** further characteristics that make this polymer suitable for the manufacture of drain pipes.

(6)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

3 .....

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(b) Continuous lengths of PVC tubing can be produced by extrusion.

Describe, using notes and/or annotated sketches, the process of extruding continuous PVC tubing.

(8)

(Total for Question 6 = 14 marks)

***7** Evaluate the use of liquid crystal display (LCD) technology in mobile phone screens.

(Total for Question 7 = 6 marks)

8 Figure 4 shows a stool made from a painted mild steel frame and a plywood seat.

Figure 4

(a) Explain **two** mechanical properties that make plywood suitable for this application.

(4)

*(b) Evaluate the cost implications to a business of running effective quality control systems.

(7)

(Total for Question 8 = 11 marks)

TOTAL FOR PAPER = 70 MARKS

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