

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel GCSE**

**Manufacturing (Double Award)**

**Engineering (Double Award)**

**Unit 3: Application of Technology in Engineering and Manufacturing**

**Paper F: Mechanical/Automotive**

Wednesday 15 May 2013 – Afternoon

**Time: 1 hour 30 minutes**

Paper Reference

**5EM03/3F**

**You must have:**

Notes and sketches collected during your pre-release research.  
Ruler, pen, pencil, rubber.

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **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 110.
- 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.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

## SECTION A

Answer ALL questions.

Some questions must be answered with a cross . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

1 All the products below belong to a manufacturing sector.

(a) Put a cross  in the **two** boxes below where the products belong to the **mechanical** sector.

(2)

Train ticket	<input type="checkbox"/>
Tea towel	<input type="checkbox"/>
Metal curtain rail	<input type="checkbox"/>
Pasta sauce	<input type="checkbox"/>
Aluminium frame	<input type="checkbox"/>
Music book	<input type="checkbox"/>

(b) Put a cross  in the **two** boxes below where the products belong to the **automotive** sector.

(2)

Business card	<input type="checkbox"/>
Brake calliper	<input type="checkbox"/>
Fuel cap	<input type="checkbox"/>
Domestic heating control	<input type="checkbox"/>
Computer mouse	<input type="checkbox"/>
Beach sandals	<input type="checkbox"/>



(Total for Question 1 = 4 marks)



2 The tables below show some tools and components used during the manufacture of mechanical/automotive products.

(a) Complete Table 1 by naming each tool.

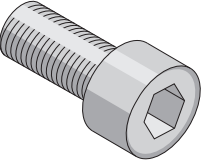
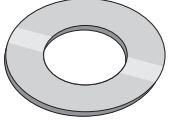
(2)

Tool	Tool name	Use
		<p>Marks or creates a line on metal surfaces when used with a rule or engineers' square.</p>
		<p>Used to hold material or a component when clamped to a pillar drill table.</p>

**Table 1**

(b) Complete Table 2 by explaining what each component is used for.

(4)

Component	Component name	Use
	<p>Socket head cap screw</p>	
	<p>Washer</p>	

**Table 2**

**(Total for Question 2 = 6 marks)**



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**3** Draw a straight line to link each **Term** listed below to the most appropriate **Key Area**.  
Each Key Area can be used more than once.

**Term**

**Key Area**

Computer-aided design

Automated conveyors

Polymer

Embedded computers

3D prototyping

Aluminium alloy

Kevlar

Information and  
communication  
technology (ICT)

Control technology

Modern materials

**(Total for Question 3 = 7 marks)**



**4** Triple leg reversible pullers belong to the mechanical/automotive sector and use information and communication technology (ICT) in their manufacture.

(a) Name **two other** products from this sector where ICT is used in their manufacture.

(2)

Product 1

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Product 2

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(b) (i) Name **one stage** where ICT is used in the manufacture of **Product 1**.

(1)

(ii) Explain **two** benefits to a **manufacturer** of using ICT at the stage named in 4(b)(i).

(4)

1

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2

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(c) (i) Name **one modern material** used in the manufacture of **Product 1**.

(1)

(ii) Describe how this modern material changes the characteristics of **Product 1**.

(2)

(Total for Question 4 = 10 marks)



5 Computer-aided manufacture (CAM) and computer-aided design (CAD) are both used by manufacturers of mechanical/automotive products.

(a) (i) State **one** use of CAM during manufacturing.

(1)

(ii) Explain **one** benefit to a manufacturer of using CAM in processing and production.

(2)

CAD is used when modifying existing products.

(b) (i) State **one other** use of CAD during manufacturing.

(1)

(ii) Explain **one** benefit to a **manufacturer** of using CAD when modifying existing products.

(2)

(c) Explain **one** benefit to the **consumer** when a manufacturer uses CAM.

(2)

(Total for Question 5 = 8 marks)





6 Sourcing and handling information and data is important to manufacturers.

(a) Describe the term **spreadsheet**.

(2)

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(b) A database is also an example of sourcing and handling information and data.

(i) State **one** traditional method it has replaced.

(1)

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(ii) Explain **two advantages** to the **distributor** when a manufacturer uses databases.

(4)

1 .....

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2 .....

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(iii) Explain **one disadvantage** to a **manufacturer** of using databases.

(2)

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(Total for Question 6 = 9 marks)



**7** Systems and control technology is an essential feature in mechanical/automotive companies.

Explain **one** benefit to a manufacturer of using programmable logic controllers (PLCs) in relation to:

(a) safety during manufacture

(3)

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(b) production efficiency.

(3)

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**(Total for Question 7 = 6 marks)**

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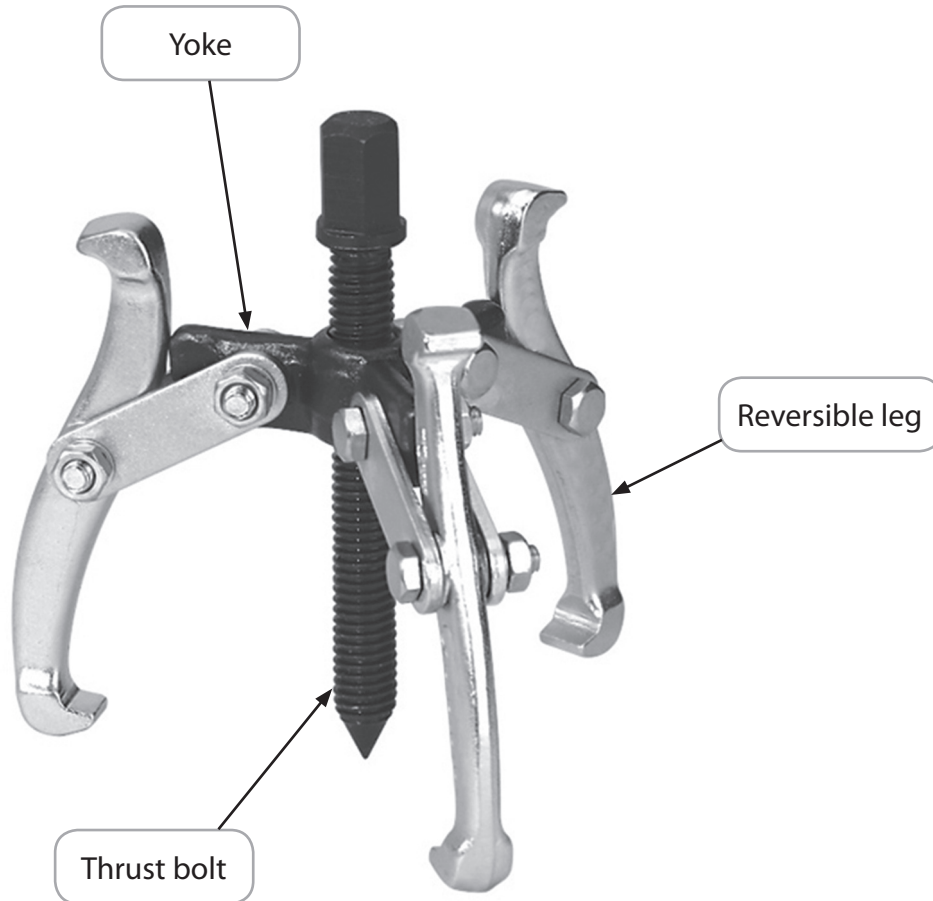
**TOTAL FOR SECTION A = 50 MARKS**



## SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass-produced triple leg reversible pullers.

The diagram below shows a triple leg reversible puller.



**8** Describe, using notes and sketches:

(a) the function of the yoke

(3)

Yoke

(b) the function of the thrust bolt

(3)

Thrust bolt



(c) the function of the reversible leg

(3)

Reversible leg

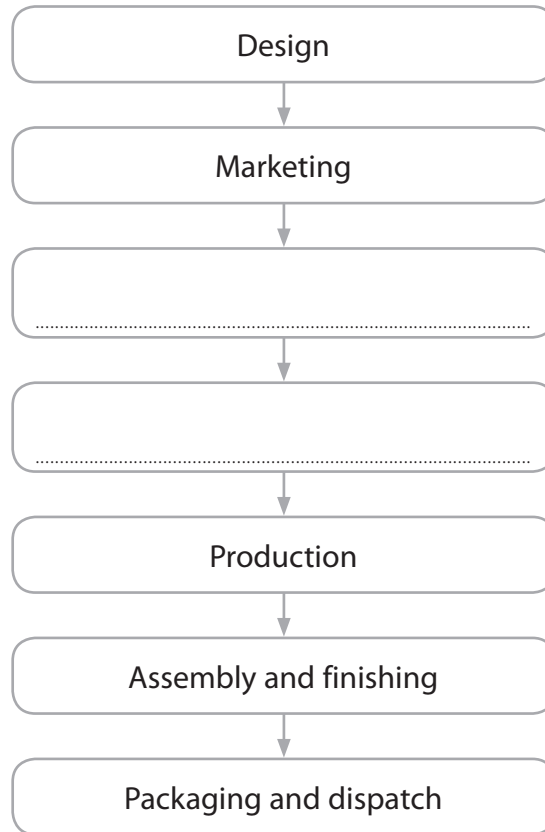
**(Total for Question 8 = 9 marks)**



9 (a) The incomplete flow diagram below indicates some of the main stages in the manufacture of triple leg reversible pullers.

(i) Complete the flow diagram by adding the **two** missing main stages in the manufacture of triple leg reversible pullers.

(2)



(ii) State the stage where the triple leg reversible pullers would be placed into cardboard boxes.

(1)

Stage

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(b) Describe the following **two** stages in the manufacture of triple leg reversible pullers.

(i) Design

(3)

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(ii) Marketing

(3)

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**(Total for Question 9 = 9 marks)**



10 (a) State a **specific** metal commonly used for the reversible leg of the triple leg reversible puller.

(1)

(b) Forging and thread rolling are processes used to produce some parts of the triple leg reversible puller.

(i) State **three** production processes, **other than** forging and thread rolling, used during the manufacture of triple leg reversible pullers.

(3)

Process 1

Process 2

Process 3

(ii) Explain why forging is a suitable process for making the reversible legs.

(3)





(iii) Explain why a manufacturer should use thread rolling rather than thread cutting for the production of the thrust bolt.

(3)

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**(Total for Question 10 = 10 marks)**



**11** Process control and quality control are used in the manufacture of triple leg reversible pullers.

(a) (i) Explain the term **process control**.

(2)

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(ii) Explain **two** reasons why a **manufacturer** uses process control during automated stages of manufacture.

(4)

1 .....

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2 .....

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(b) Describe **two** examples of quality control used during the **production** stage of the manufacture of triple leg reversible pullers.

(4)

1 .....

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2 .....

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**(Total for Question 11 = 10 marks)**

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**12** (a) The use of modern technology in the manufacture of mass-produced triple leg reversible pullers has brought changes.

(i) State **two** changes the use of modern technology has had on the **type** of workforce manufacturers require.

(2)

Change 1

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Change 2

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(ii) Describe **two** changes the use of modern technology has had on the production environment.

(4)

Change 1

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Change 2

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(iii) Explain **one** environmental benefit that has resulted from the use of modern technology.

(2)

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(b) The use of barcodes is an important part of control technology in the manufacture of triple leg reversible pullers.

Describe the advantages to a **manufacturer** of using barcodes at the packaging and dispatch stage.

(4)

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**(Total for Question 12 = 12 marks)**



**13** Modern materials are used in the manufacture of triple leg reversible pullers.

Explain how the use of modern materials has impacted on customer satisfaction.

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**(Total for Question 13 = 4 marks)**





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