

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**

Monday 14 May 2012 – 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** the 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 of the products listed below belong to a manufacturing sector.

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

(2)

MP3 player	<input type="checkbox"/>
Shower gel	<input type="checkbox"/>
Trampoline frame	<input type="checkbox"/>
Swimwear	<input type="checkbox"/>
Adjustable spanner	<input type="checkbox"/>
Smartphone	<input type="checkbox"/>

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

(2)

Bumper	<input type="checkbox"/>
Nail varnish	<input type="checkbox"/>
Photographs	<input type="checkbox"/>
Dipstick	<input type="checkbox"/>
Laptop computer	<input type="checkbox"/>
Logbook	<input type="checkbox"/>

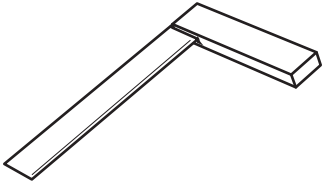
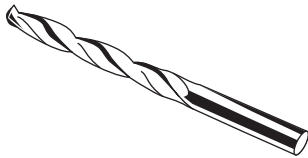
(Total for Question 1 = 4 marks)



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

(a) Complete Table 1 by naming each tool/equipment.

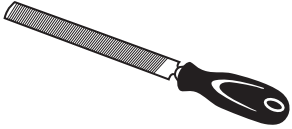
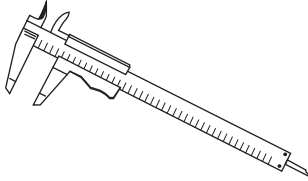
(2)

Tool/equipment	Tool/equipment name	Use
		To gauge right angles and mark out material.
		To make round holes of a known size in metal.

**Table 1**

(b) Complete Table 2 by explaining what each tool/equipment is used for.

(4)

Tool/equipment	Tool/equipment name	Use
	Flat file	
	Verner calipers	

**Table 2**

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



**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**

Programmable logic  
controllers (PLCs)

Anodised aluminium

Databases

Pick and place robots

Glass reinforced plastic (GRP)

Word processing

Polypropylene

Modern materials

Control technology

Information and  
communication technology  
(ICT)

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



4 (a) Inline ignition spark testers belong to the mechanical/automotive sector and use a variety of modern materials in their manufacture.

(i) Name **two other** products from this sector that use a polymer in their manufacture.

(2)

Product 1

Product 2

(ii) Name a polymer used in **Product 1**.

(1)

(iii) Explain **two** different reasons why this polymer is used in **Product 1**.

(4)

1 .....

2 .....



(b) Systems and control technology is used in the mechanical/automotive sector.

- (i) Name **one** stage in the manufacture of mechanical/automotive products where systems and control technology is used.

(1)

- (ii) Explain **one** advantage to a **manufacturer** of using systems and control technology at this stage.

(2)

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**(Total for Question 4 = 10 marks)**

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

(a) Describe **three** ways that CAD contributes to the efficiency of new product development.

(6)

1 .....

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2 .....

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3 .....

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(b) Explain why a **manufacturer** would use CAM rather than traditional methods.

(2)

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**(Total for Question 5 = 8 marks)**

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6 Communication technology is widely used by manufacturers.

(a) (i) Describe the term 'electronic mail' (email).

(2)

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(ii) Explain **one disadvantage** to a **manufacturer** of using email.

(2)

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(b) Video conferencing is also an example of communication technology.

(i) Name the traditional method it has replaced.

(1)

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(ii) Explain **two advantages** to a **manufacturer** of using video conferencing.

(4)

1 .....

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2 .....

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(Total for Question 6 = 9 marks)





**7** Handling information and data is an essential feature in mechanical/automotive companies.

(a) Explain **one** benefit information and data handling systems have on production efficiency.

(2)

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(b) Explain **two** benefits information and data handling systems have on packaging and dispatch.

(4)

1 .....

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2 .....

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

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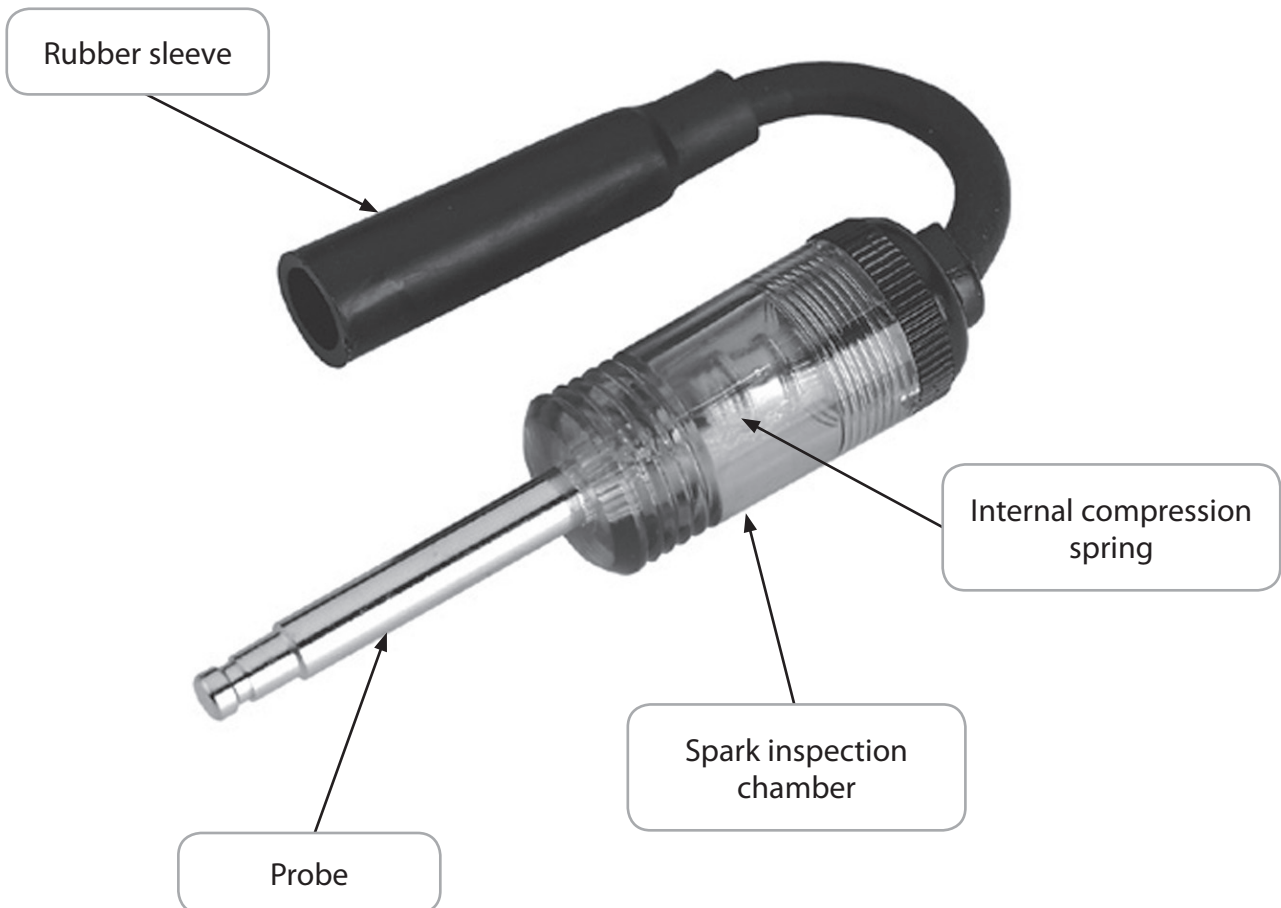
**TOTAL FOR SECTION A = 50 MARKS**



## SECTION B

Answer ALL questions in section B with reference to the manufacture of mass produced inline ignition spark testers.

The diagram below shows an **inline ignition spark tester**.



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

(a) the function of the rubber sleeve

(3)

Rubber sleeve

(b) the function of the probe

(3)

Probe



(c) the function of the internal compression spring

(3)

Internal compression spring

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



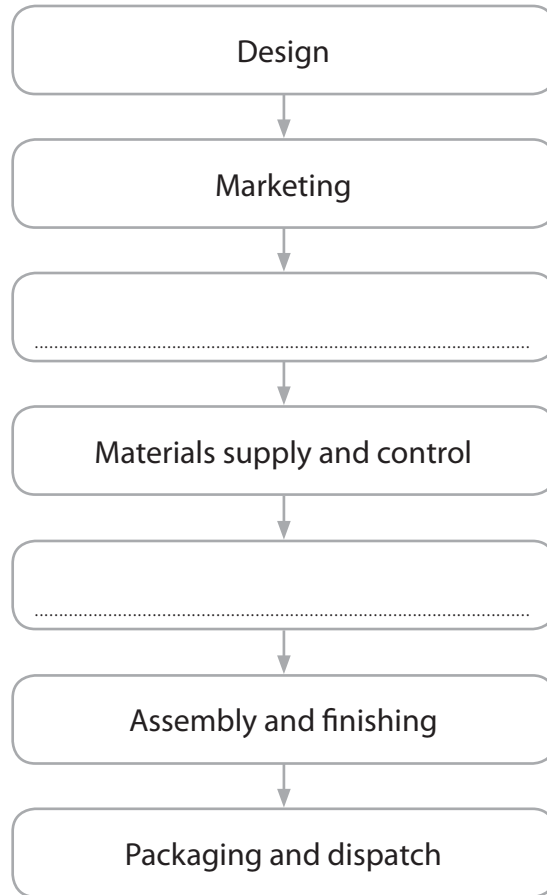
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9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing inline ignition spark testers.

(i) Complete the flow diagram by adding the **two** missing main stages in manufacturing inline ignition spark testers.

(2)



(ii) State the stage where the inline ignition spark testers would be put together.

(1)

Stage

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(b) Describe the following **two** stages in the manufacture of inline ignition spark testers.

(i) Marketing

(3)

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(ii) Materials supply and control

(3)

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

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10 (a) State a specific metal commonly used for the probe of the inline ignition spark tester. (1)

(b) Injection moulding is a process used to produce some parts of the inline ignition spark tester.

(i) State **three** production processes, other than injection moulding, used during the manufacture of inline ignition spark testers. (3)

Process 1

Process 2

Process 3

(ii) Explain why injection moulding is a suitable process for making the spark inspection chamber. (3)





(c) Explain how the development of modern materials has helped the manufacturer of inline ignition spark testers improve their products.

(3)

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



**11** Quality control and automation are used in the manufacture of inline ignition spark testers.

(a) (i) Describe **two** examples of quality control used at the packaging and dispatch stage during the manufacture of inline ignition spark testers.

(4)

1 .....

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2 .....

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(ii) Describe **two** examples of automation used at the packaging and dispatch stage during the manufacture of inline ignition spark testers.

(4)

1 .....

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2 .....

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(b) Explain **one** advantage to the **manufacturer** of applying quality control during automated stages of manufacture.

(2)

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

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**12 (a)** A manufacturer of inline ignition spark testers has changed their working environment from traditional to modern technology as a result of high product demand.

Explain the impact of these changes for:

(i) employees

**(3)**

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(ii) the global environment

**(3)**

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(b) Information and communication technology (ICT) plays an important role in the manufacture of inline ignition spark testers.

(i) State **two** uses of ICT at the marketing stage.

(2)

1 .....

2 .....

(ii) Describe **one** use of ICT at the assembly and finishing stage.

(2)

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(iii) Explain **one** benefit of using ICT to the distributor of inline ignition spark testers.

(2)

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



**13** Control technology is an essential feature in the manufacture of inline ignition spark testers.

Explain the impact of control technology on safety when manufacturing.

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



**\*14** Discuss how manufacturers can reduce energy consumption when manufacturing inline ignition spark testers.

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(Total for Question 14 = 6 marks)

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**TOTAL FOR SECTION B = 60 MARKS  
TOTAL FOR PAPER = 110 MARKS**



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