

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Manufacturing (Double Award)
Engineering (Double Award)

Unit 3: Application of Technology in Engineering and Manufacturing

Paper F: Mechanical/Automotive

Tuesday 19 May 2015 – Morning

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

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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.
- 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 in a box ☒. 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 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)

Products	Put a cross in two boxes below
Lathe tailstock	<input type="checkbox"/>
Smartphone	<input type="checkbox"/>
Baking powder	<input type="checkbox"/>
Rucksack	<input type="checkbox"/>
Birthday card	<input type="checkbox"/>
Setscrew	<input type="checkbox"/>

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

(2)

Products	Put a cross in two boxes below
Swimming costume	<input type="checkbox"/>
Recipe book	<input type="checkbox"/>
Steering column	<input type="checkbox"/>
Windscreen	<input type="checkbox"/>
Cardigan	<input type="checkbox"/>
Welding hearth	<input type="checkbox"/>

(Total for Question 1 = 4 marks)



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

(a) Complete Table 1 by naming each tool.

(2)

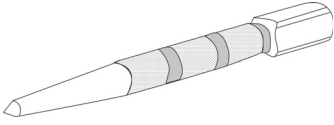
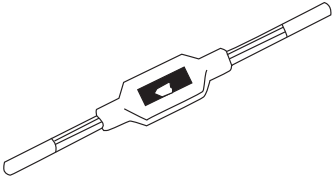
Tool	Tool name	Use
		Used to mark out hole positions prior to drilling.
		Used to hold a tool when cutting internal threads.

Table 1

(b) Complete Table 2 by explaining the use of each piece of equipment.

(4)

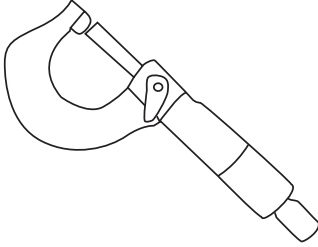
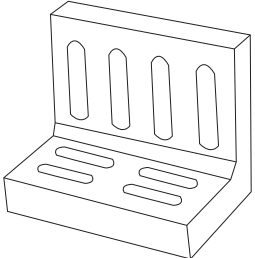
Equipment	Equipment name	Use
	Micrometer	
	Angle plate	

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

Ceramics

Presentation software

Polystyrene

Automation systems

Stainless steel

Wi-Fi

Computer-integrated engineering (CIE)

Modern materials

Control technology

Information and communications technology (ICT)

(Total for Question 3 = 7 marks)



4 Low voltage circuit testers belong to the mechanical/automotive sector and use modern materials in their manufacture.

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

(2)

Product 1

Product 2

(b) (i) State **one** modern material used in the manufacture of a product you named in 4(a).

(1)

(ii) Explain **two** benefits to the **consumer** of using this material.

(4)

1

2



(c) (i) State **one** smart material used in the mechanical/automotive sector.

(1)

(ii) Briefly describe the features of the smart material you named in 4(c)(i).

(2)

(Total for Question 4 = 10 marks)



5 Communications technology is widely used by manufacturers of mechanical/automotive products. The internet is an example of communications technology.

(a) (i) Using an example, describe the term **internet**.

(3)

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.....

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

(2)

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.....

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(b) (i) Name **one** example, other than the internet, of a communications technology.

(1)

.....

(ii) Explain **one** benefit to the distributor of using the example named in 5(b)(i).

(2)

.....

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.....

.....

(Total for Question 5 = 8 marks)



6 Robotics and computer-integrated manufacturing systems (CIM) are used increasingly in mechanical/automotive companies.

(a) (i) State **one** way in which robots may be used when manufacturing a mechanical/automotive product.

(1)

(ii) Explain **two** disadvantages to a mechanical/automotive manufacturer of using robotics.

(4)

1

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2

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(b) Describe **two** main features of a CIM system.

(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) Describe how a manufacturer would use production planning and scheduling information at the materials supply and control stage.

(4)

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(b) Explain **one** way that the use of information and data handling systems would benefit the manufacturer when marketing and selling products.

(2)

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(Total for Question 7 = 6 marks)

TOTAL FOR SECTION A = 50 MARKS



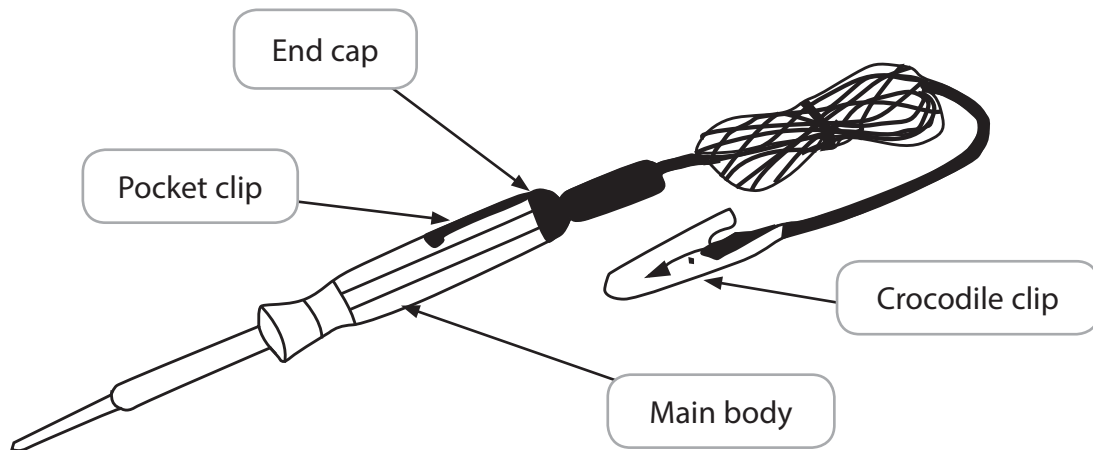
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SECTION B

Answer ALL questions in section B with reference to the manufacture of mass produced low voltage circuit testers.

The diagram below shows a low voltage circuit tester.



8 Describe, using notes and sketches:

(a) the function of the crocodile clip

(3)

crocodile clip

(b) the function of the end cap

(3)

end cap



(c) the function of the main body.

(3)

main body

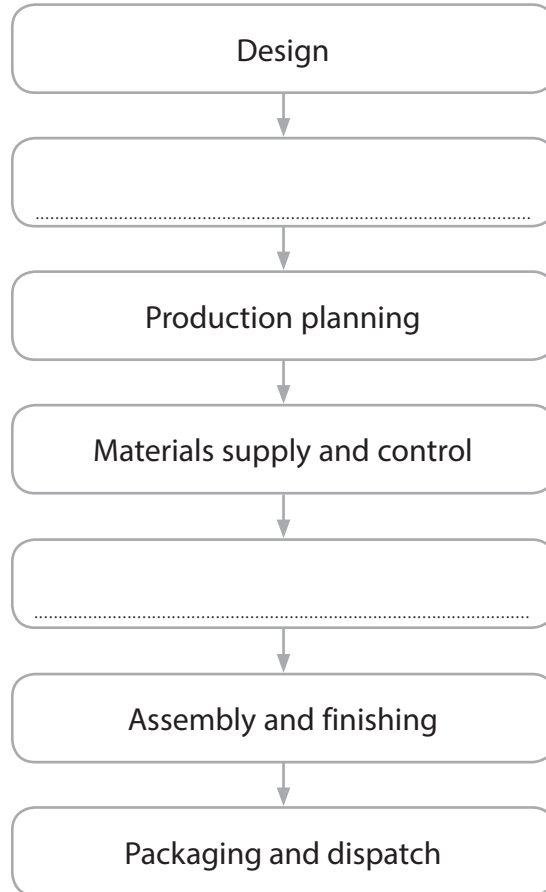
(Total for Question 8 = 9 marks)



9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing low voltage circuit testers.

(i) Complete the flow diagram by adding the **two** missing stages in the manufacture of low voltage circuit testers.

(2)



(ii) State the stage in manufacturing where the pocket clip is placed onto the main body.

(1)

Stage



(b) List **three** activities carried out at the design stage when manufacturing low voltage circuit testers.

(3)

- 1
- 2
- 3

(c) Describe the packaging and dispatch stage when manufacturing low voltage circuit testers.

(3)

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(Total for Question 9 = 9 marks)



10 (a) State a specific material commonly used for the main body of the low voltage circuit tester. (1)

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(b) The end cap of the low voltage circuit tester is produced by injection moulding.

(i) State **three** production processes, other than moulding, used during the manufacture of low voltage circuit tester. (3)

Process 1

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Process 2

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Process 3

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(ii) Explain why injection moulding is a suitable process to use during the manufacture of low voltage circuit testers. (3)

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(c) Explain why steel is an appropriate material for the pocket clip of the low voltage circuit tester.

(3)

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(Total for Question 10 = 10 marks)



11 Control technology plays an important role in the manufacture of low voltage circuit testers.

(a) (i) State **two** uses of control technology during assembly and finishing.

(2)

1

2

(ii) Describe **two** ways in which control technology is used when producing low voltage circuit testers.

(4)

1

2

(b) Describe **three** benefits to the manufacturer of using computer controlled production.

(6)

1

2

3

(Total for Question 11 = 12 marks)



12 A manufacturer of low voltage circuit testers has decided to change its production methods so that it follows lean manufacturing principles.

(a) (i) Explain the term **lean manufacturing**.

(2)

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(ii) Describe **two** advantages lean manufacturing could have for the distributor of low voltage circuit testers.

(4)

1

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2

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(b) Changing to lean manufacturing methods will have an impact on the global environment and on the manufacturer's workforce.

(i) State **two** reasons why using lean manufacturing could have a positive effect on the global environment.

(2)

1

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2

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(ii) Explain **one** benefit that this change could have on the workforce.

(2)

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(Total for Question 12 = 10 marks)



13 Low voltage circuit testers are manufactured from a variety of materials.

Discuss how a manufacturer can process these materials sustainably.

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(Total for Question 13 = 4 marks)



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