

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

Friday 23 May 2014 – 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

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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 . 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)

Products	Put a cross in two boxes below
Pressure valve	<input checked="" type="checkbox"/>
Computer keyboard	<input checked="" type="checkbox"/>
Event leaflet	<input checked="" type="checkbox"/>
Fabric bracelet	<input checked="" type="checkbox"/>
Drill set	<input checked="" type="checkbox"/>
Headache capsules	<input checked="" 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
Medium density fibreboard	<input checked="" type="checkbox"/>
Exhaust system manifold	<input checked="" type="checkbox"/>
Spray starch	<input checked="" type="checkbox"/>
Safety boots	<input checked="" type="checkbox"/>
Body panel	<input checked="" type="checkbox"/>
Anti-static mat	<input checked="" type="checkbox"/>

(Total for Question 1 = 4 marks)



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

(a) Complete Table 1 by naming each tool.

(2)



Tool	Tool name	Use
		Used to tighten or loosen nuts on engineering products.
		Used with a centre punch to create hole centres for drilling.

Table 1

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

(4)



Tool	Tool name	Use
	Dividers	
	Chuck key	

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

Electronic mail

Tungsten carbide

Titanium

Assembly robot

Composites

Social media

Continuous operation

Modern materials

Control technology

Information and
communications
technology (ICT)

(Total for Question 3 = 7 marks)



4 Sheet metal hand nibblers belong to the mechanical/automotive sector and use control technology and material removal processes in their manufacture.

(a) Name **two other** products from this sector that use control technology and material removal processes in their manufacture.

(2)

Product 1

Product 2

(b) (i) State **one** type of control technology used in the manufacture of **Product 1**.

(1)

(ii) Explain **two** different reasons why this type of control technology is used.

(4)

1

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2

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(c) (i) Name a material removal process used in the manufacture of **Product 1**. (1)

(ii) Briefly describe a material removal process used in the manufacture of **Product 1**. (2)

(Total for Question 4 = 10 marks)



5 Information and communication technology (ICT) and computer-aided manufacture (CAM) are both used by manufacturers of mechanical/automotive products.

(a) Describe **one** example of how a manufacturer would use websites to reduce its costs.

(2)

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(b) As a result of high product demand, a manufacturer has changed from using traditional to computer-aided manufacturing (CAM) methods.

Describe **three** benefits of this change for the manufacturer.

(6)

1

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2

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3

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(Total for Question 5 = 8 marks)



6 (a) Communications technologies are widely used by manufacturers of mechanical/automotive products. Email is an example of an electronic communications technology.

(i) Name **two other** examples of an electronic communications technology. (2)

1

2

(ii) A customer needs products to be made urgently. Describe **two** examples of how a manufacturer could make use of email in this situation. (4)

1

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2

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(b) In the mechanical/automotive sector, smart and modern materials are used in the manufacture of products.

(i) Name **one** smart material used in the mechanical/automotive sector. (1)

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(ii) Explain why finishes are applied to modern materials. (2)

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(Total for Question 6 = 9 marks)



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

Explain **one** benefit that information and data handling systems have for:

(a) Product sales

(3)

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(b) Production

(3)

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(Total for Question 7 = 6 marks)

TOTAL FOR SECTION A = 50 MARKS



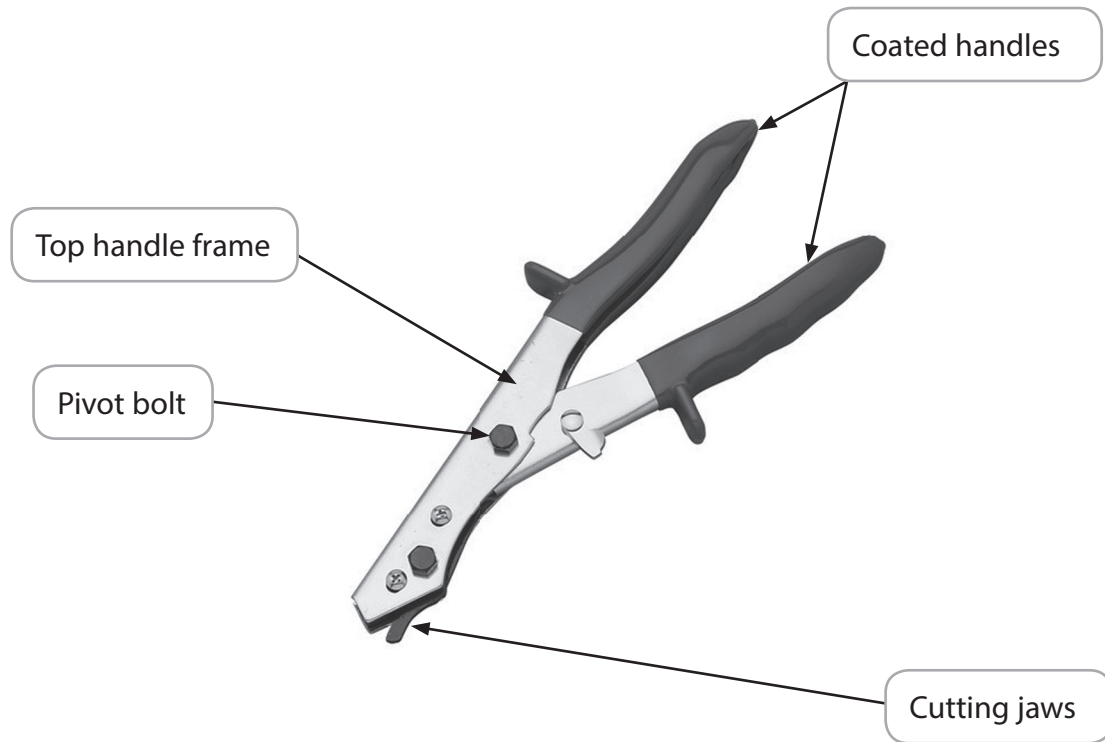
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SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass produced sheet metal hand nibblers.

The diagram below shows a **sheet metal hand nibbler**.



8 Describe, using notes and sketches:

(a) the function of the coated handles.

(3)

Coated handles

(b) the function of the pivot bolt.

(3)

Pivot bolt



(c) the function of the top handle frame.

(3)

Top handle frame

(Total for Question 8 = 9 marks)

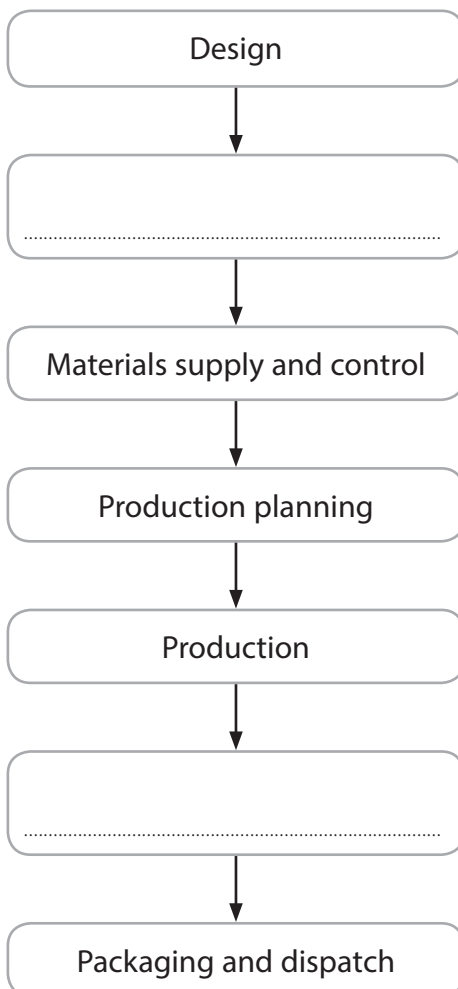


P 4 3 3 9 6 A 0 1 3 2 4

9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing sheet metal hand nibblers.

(i) Complete the flow diagram by adding the **two** missing main stages in manufacturing sheet metal hand nibblers.

(2)



(ii) State the stage in manufacturing where the shape of the handles would be decided.

(1)

Stage

.....



(b) List **three** activities carried out at the materials supply and control stage when manufacturing sheet metal hand nibblers.

(3)

- 1
- 2
- 3

(c) Describe the production planning stage when manufacturing sheet metal hand nibblers.

(3)

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(Total for Question 9 = 9 marks)



10 (a) State a specific material commonly used for the cutting jaws of the sheet metal hand nibbler. (1)

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(b) Grinding is a process used to produce the cutting edge on the cutting jaws for the sheet metal hand nibbler.

(i) State **three** production processes, other than grinding, used during the manufacture of sheet metal hand nibblers. (3)

Process 1

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Process 2

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Process 3

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(ii) Explain why grinding is a suitable process for producing the cutting edge on the cutting jaws. (3)

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(c) Explain how the use of modern materials has reduced the environmental impact of manufacturing sheet metal hand nibblers.

(3)

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(Total for Question 10 = 10 marks)



11 Information and communication technology (ICT) plays an important role in the manufacture and sale of sheet metal hand nibblers.

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

(2)

1

2

(ii) Describe **two** uses of ICT in the packaging and dispatch stage.

(4)

1

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2

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(b) Explain **one** benefit of the use of ICT to the distributor of sheet metal hand nibblers.

(2)

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(c) Explain the impact ICT has on the design, development and production of sheet metal hand nibblers.

(4)

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(Total for Question 11 = 12 marks)



12 A manufacturer of sheet metal hand nibblers is considering increasing its use of automation. It is aware that an increase in its use of automation will have an impact on the workforce and working environment.

(a) Explain **two** different effects the increased use of automation will have on the workforce.

(4)

1

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2

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(b) Explain **two** benefits the increased use of automation will have on the working environment.

(4)

1

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2

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(c) State **two** other issues that the manufacturer should consider, other than the impact on the workforce and working environment.

(2)

1

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(Total for Question 12 = 10 marks)



13 Most modern production processes generate heat.

Explain how waste heat can be used by a manufacturer of sheet metal hand nibblers.

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(Total for Question 13 = 4 marks)



***14** Discuss the benefits of using 'just-in-time' techniques when manufacturing sheet metal hand nibblers.

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(Total for Question 14 = 6 marks)

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



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