

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

Monday 21 May 2018 – 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.
- 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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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 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
Toothpaste	<input type="checkbox"/>
Whey protein	<input type="checkbox"/>
Mechanics vice	<input type="checkbox"/>
Aluminium ladders	<input type="checkbox"/>
Satellite navigation	<input type="checkbox"/>
Shampoo	<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
Cycling shorts	<input type="checkbox"/>
Zeus chart	<input type="checkbox"/>
MicroSD card	<input type="checkbox"/>
Fuel tank	<input type="checkbox"/>
Curry powder	<input type="checkbox"/>
Gear knob	<input type="checkbox"/>

(Total for Question 1 = 4 marks)

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

(a) Complete Table 1 by naming each piece of equipment.

(2)

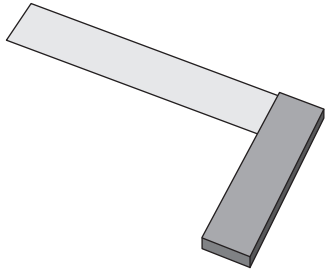
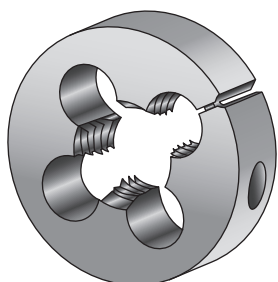
Equipment	Equipment name	Use
		To mark out lines 90 degrees to the edge of a material.
		Used with a holder to create an external thread.

Table 1

(b) Complete Table 2 by explaining the function of each component.

(4)

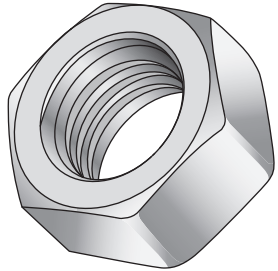
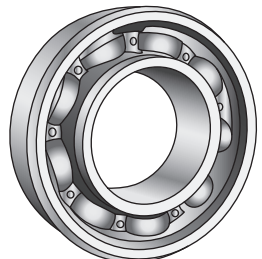
Component	Component name	Function
	Nut	
	Bearing	

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

Polypropylene (PP)

Internet

Word processing

Phosphor bronze

Remote operated vehicles (ROVs)

Integrated manufacturing systems

Carbon fibre

Modern materials

Control technology

Information and communications technology (ICT)

(Total for Question 3 = 7 marks)



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4 150mm adjustable wrenches belong to the mechanical/automotive sector and use automation and modern materials in their manufacture.

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

(2)

Product 1

Product 2

(b) (i) Name **one** type of automation used in the manufacture of products from this sector.

(1)

(ii) Explain **two** different reasons why the automation named in 4(b)(i) is used.

(4)

1

2



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(c) (i) Name **one** modern material used in the manufacture of a product from this sector.

(1)

(ii) Describe how the modern material named in 4(c)(i) changes the characteristics of a product from this sector.

(2)

(Total for Question 4 = 10 marks)



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

(a) Using CAM can reduce the product price for the consumer.

Describe **one other** benefit to the consumer of using CAM.

(2)

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(b) Using CAD speeds up the design process for the manufacturer.

Describe **three other** advantages of using CAD during the design process.

(6)

1

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2

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3

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(Total for Question 5 = 8 marks)



6 Communications technology is widely used by manufacturers of mechanical/automotive products.

(a) (i) Describe the communications technology 'Bluetooth'.

(2)

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(ii) Explain **one** advantage to a manufacturer of using video conferencing.

(2)

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(b) Electronic Point of Sale (EPOS) is also an example of communications technology.

(i) Name a traditional method it has replaced.

(1)

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

(4)

1

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2

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(Total for Question 6 = 9 marks)



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7 Systems and control technology, including the use of programmable logic controllers (PLCs), is an essential feature of mechanical/automotive companies.

Explain **one** benefit to a manufacturer of using PLCs in relation to:

(a) production efficiency

(3)

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(b) safety during manufacture.

(3)

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(Total for Question 7 = 6 marks)

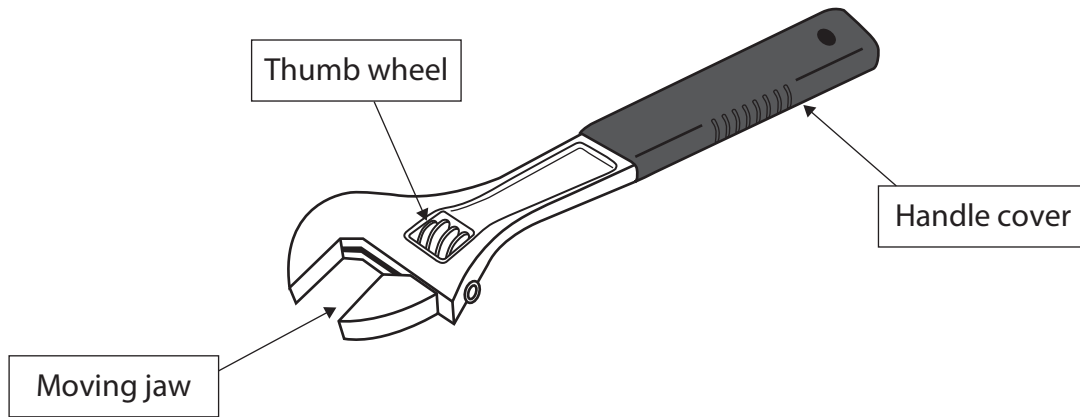
TOTAL FOR SECTION A = 50 MARKS



SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass produced 150mm adjustable wrenches.

The diagram below shows a 150mm adjustable wrench.



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8 Describe, using notes and sketches:

(a) the function of the moving jaw

(3)

moving jaw

(b) the function of the handle cover

(3)

handle cover



(c) the function of the thumb wheel.

(3)

thumb wheel

(Total for Question 8 = 9 marks)

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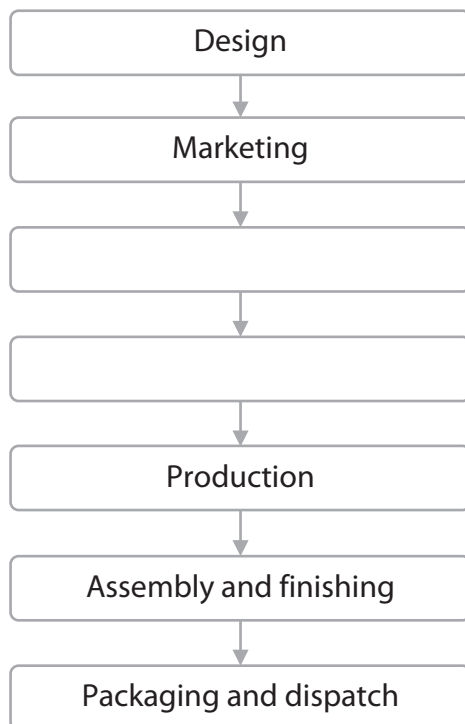
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9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing.

(i) Complete the flow diagram by adding the **two** missing stages in manufacturing.

(2)



(ii) State the stage in manufacturing where the moving jaw for the adjustable wrench would be made.

(1)

Stage



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(b) List **three** activities carried out at the assembly and finishing stage when manufacturing adjustable wrenches.

(3)

- 1
- 2
- 3

(c) Describe the marketing stage when manufacturing adjustable wrenches.

(3)

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(Total for Question 9 = 9 marks)



10 (a) State a specific metal commonly used for the moving jaw of the adjustable wrench. (1)

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(b) Adjustable wrenches are manufactured using a range of computer numerical control (CNC) machining processes.
(i) State **three** production processes, other than CNC machining, used during the manufacture of the adjustable wrench. (3)

Process 1

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Process 2

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Process 3

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(ii) Explain why CNC machining is a suitable process to use during the manufacture of adjustable wrenches. (3)

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(c) Explain why a polymer material is appropriate for the handle cover of the adjustable wrench. (3)

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(Total for Question 10 = 10 marks)



11 Quality control is used when manufacturing mass produced 150mm adjustable wrenches.

(a) Explain the term 'quality control'.

(2)

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(b) (i) Describe **three** different examples of quality control procedures used in the production stage when manufacturing adjustable wrenches.

(6)

1

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2

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3

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(ii) Explain **one** disadvantage to the manufacturer of using quality control when manufacturing adjustable wrenches.

(2)

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(iii) Explain **one** benefit to the consumer of using quality control when manufacturing adjustable wrenches.

(2)

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(Total for Question 11 = 12 marks)



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12 (a) The use of modern technology in the manufacture of mass produced adjustable wrenches has brought changes.

(i) State **two** positive changes the use of modern technology has had on the working environment.

(2)

1

2

(ii) Explain **two** effects the use of modern technology has had on the efficiency of the packaging and dispatch stage.

(4)

1

2

(b) The use of modern technology when manufacturing adjustable wrenches has had an impact on the workforce.

Explain **two** disadvantages the use of modern technology has had on the workforce.

(4)

1

2

(Total for Question 12 = 10 marks)



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13 The use of 'just in time' (JIT) techniques when manufacturing mass produced 150mm adjustable wrenches has brought changes.

Explain the effects of these changes for the manufacturer.

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(Total for Question 13 = 4 marks)

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***14** Discuss the impact of the use of modern technologies on the sustainable manufacture of 150mm adjustable wrenches.

Dotted lines for writing.

(Total for Question 14 = 6 marks)

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



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