Write your name here

Surname		Other names

**Pearson
Edexcel GCSE**

Centre Number

Candidate Number

Manufacturing (Double Award)
Engineering (Double Award)

Unit 3: Application of Technology in Engineering
and Manufacturing
Paper F: Mechanical/Automotive

Wednesday 24 May 2017 – 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

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 ▶

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 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
Metal hinge	☒
Tea towel	☒
Soldering iron	☒
Tea cake	☒
Ring binder	☒
Machine vice	☒

(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
Clutch	☒
Train ticket	☒
Moisturiser	☒
Rear axle	☒
Tank cutter	☒
Endoscope	☒

(Total for Question 1 = 4 marks)

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

(a) Complete Table 1 by naming each component.

(2)
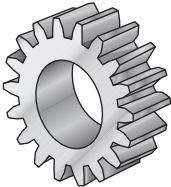
Component	Component name	Use
		A fixing that is used to secure two components together by passing through a hole in one component and into a female thread on the other component.
		Used to transfer and reverse directional rotary motion from one shaft to another, may change the speed.

Table 1

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

(4)

Tool	Tool name	Use
	Ring Spanner	
	Drill Bit	

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

Term

System remote panel

High impact polystyrene (HIPS)

Database

Polymorph

Conveyor systems

Acrylic (PMMA)

Virtual learning environment (VLE)

Key Area

Modern materials

Control technology

Information and communications technology (ICT)

(Total for Question 3 = 7 marks)

4 (a) Finishing processes are used when manufacturing 7mm capacity bolt croppers in the mechanical/automotive sector.

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

(2)

Product 1

....

Product 2

....

(ii) Name **two** different finishing processes used in the manufacture of products from this sector.

(2)

Finishing process 1

....

Finishing process 2

....

(iii) Describe **one** finishing process you named in 4(a)(ii).

(2)

....

....

....

(b) Quality control techniques are used in the manufacture of products in the mechanical/automotive sector.

Describe **two** examples of quality control techniques used in the manufacture of products from this sector.

(4)

1 ....

....

....

....

2 ....

....

....

....

(Total for Question 4 = 10 marks)

5 (a) State **two** functions of a computer-aided manufacturing (CAM) system.

(2)

1 ....

....

2 ....

....

(b) A manufacturer has changed from using traditional production methods to computer-aided manufacturing (CAM) techniques.

Describe **one** disadvantage of this change for the manufacturer.

(2)

....

....

....

(c) Programmable logic controllers (PLCs) are a control technology.

Describe **two** benefits of using PLCs for a manufacturer.

(4)

1 ....

....

....

2 ....

....

....

(Total for Question 5 = 8 marks)

6 Communications technologies, including **Wi-Fi**, are used by manufacturers of mechanical/automotive products.

(a) (i) Name **one** example, other than **Wi-Fi**, of a communications technology.

(1)

....

....

(ii) Describe the term **Wi-Fi**.

(2)

....

....

....

....

(b) Embedded computers are used by manufacturers of mechanical/automotive products.

Explain **three** reasons why a manufacturer would use embedded computers during manufacture.

(6)

1 ....

....

....

2 ....

....

....

3 ....

....

....

(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) design

(3)

....

....

....

....

....

....

(b) production planning

(3)

....

....

....

....

....

....

(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 7mm capacity bolt croppers.

The diagram below shows 7mm capacity bolt croppers.
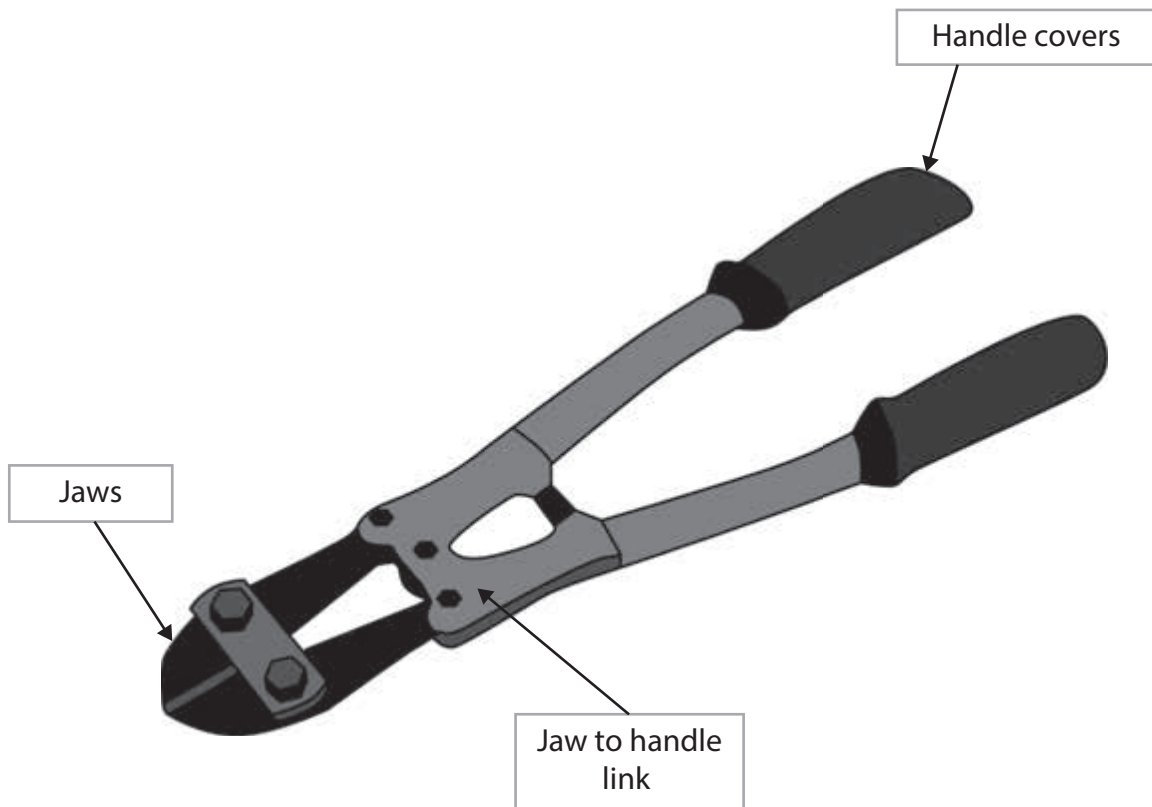
Handle covers

Jaws

Jaw to handle link

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8 Describe, using notes and sketches:

(a) the function of the handle covers

(3)

handle covers

(b) the function of the jaws

(3)

jaws

P 4 8 6 6 3 A 0 1 1 2 0

(c) the function of the jaw to handle link

(3)

jaw to handle link

(Total for Question 8 = 9 marks)

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)

Design

↓

Marketing

↓

Production planning

↓

Material supply and control

↓

↓

↓

Packaging and dispatch
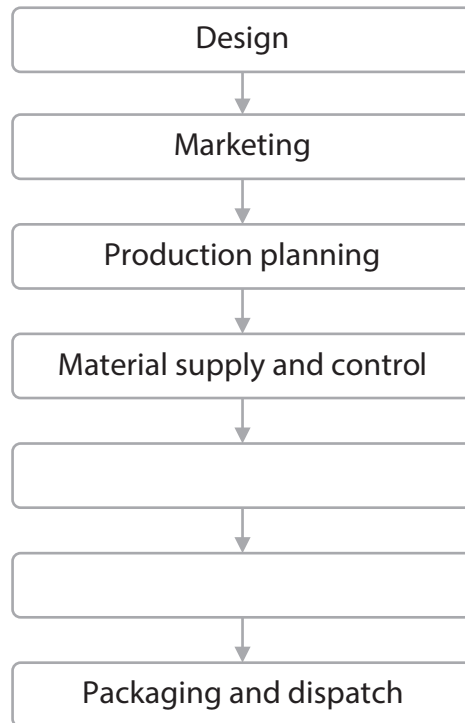
(ii) State the stage in manufacturing where the drawings for the bolt croppers are created.

(1)

Stage

....

(b) List **three** activities carried out at the marketing stage when manufacturing the bolt croppers.

(3)

1 ....

2 ....

3 ....

(c) Describe the packaging and dispatch stage when manufacturing the bolt croppers.

(3)

....

....

....

....

....

(Total for Question 9 = 9 marks)

10 (a) State a modern polymer commonly used for the handle covers on the bolt croppers.

(1)

....

(b) Grinding is a material removal process used during the manufacture of the jaws of the bolt croppers.

(i) State **three** production processes, other than grinding, used during the manufacture of the bolt croppers.

(3)

Process 1

....

Process 2

....

Process 3

....

(ii) Explain why grinding is a suitable material removal process to use during the manufacture of the jaws of the bolt croppers.

(3)

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....

....

....

....

....

....

(c) Explain how the use of modern materials has helped manufacturers of bolt croppers to increase sales.

(3)

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....

(Total for Question 10 = 10 marks)

11 Automation is used in the manufacture of mass produced 7mm capacity bolt croppers.

(a) Explain the term **automation**.

(2)

....

....

(b) (i) Describe **three** different examples of automation used in the production stage of the manufacture of bolt croppers.

(6)

1 ....

....

....

2 ....

....

....

3 ....

....

....

(ii) Explain **one** disadvantage to the manufacturer of applying a type of automation when manufacturing bolt croppers.

(2)

....

....

(iii) Explain **one** benefit to the consumer of applying a type of automation when manufacturing bolt croppers.

(2)

....

....

....

(Total for Question 11 = 12 marks)

12 (a) The introduction of modern technology has an impact on safety and efficiency when manufacturing mass produced 7mm capacity bolt croppers.

(i) State **two** benefits the introduction of modern technology has had for the safety of the workforce.

(2)

1 ....

....

2 ....

....

(ii) Explain **two** effects the introduction of modern technology has had on the efficiency of the production process.

(4)

1 ....

....

....

2 ....

....

....

(b) The introduction of modern technology when manufacturing bolt croppers has an impact on the global environment.

Explain **two** advantages the use of modern technology has had for the global environment.

(4)

1 ....

....

....

2 ....

....

....

(Total for Question 12 = 10 marks)

13 Information and communications technology (ICT) is an essential feature in the manufacture of mass produced 7mm capacity bolt croppers.

Explain **two** impacts of ICT on the material supply and control stage in manufacturing.

1 ....

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....

....

....

2 ....

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(Total for Question 13 = 4 marks)

*14 Discuss how manufacturers monitor and control energy consumption when manufacturing bolt croppers.

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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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