

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 D: Engineering Fabrication**

Tuesday 24 May 2016 – Morning  
**Time: 1 hour 30 minutes**

Paper Reference

**5EM03/3D**

**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 **engineering fabrication** sector.

(2)

Products	Put a cross in <b>two</b> boxes below
Mustard	<input type="checkbox"/>
T-shirt	<input type="checkbox"/>
Pliers	<input type="checkbox"/>
Bottled water	<input type="checkbox"/>
A4 diary	<input type="checkbox"/>
Ring spanner	<input type="checkbox"/>

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

(2)

Products	Put a cross in <b>two</b> boxes below
Garden rake	<input type="checkbox"/>
Bus ticket	<input type="checkbox"/>
Sun cream	<input type="checkbox"/>
Welding gloves	<input type="checkbox"/>
Bolt cutter	<input type="checkbox"/>
Dishwasher powder	<input type="checkbox"/>

(Total for Question 1 = 4 marks)

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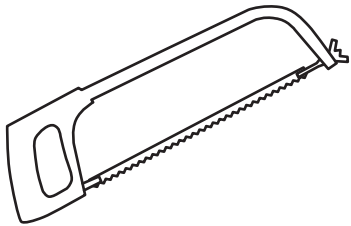
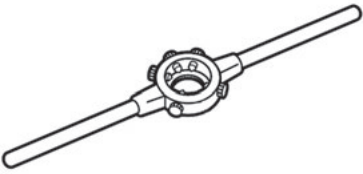
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2 The tables below show some tools and equipment used during the manufacture of engineering fabrication products.

(a) Complete Table 1 by naming each tool.

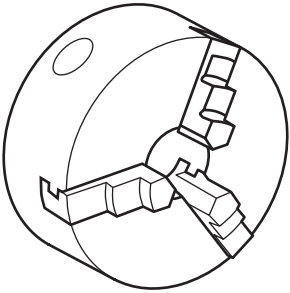
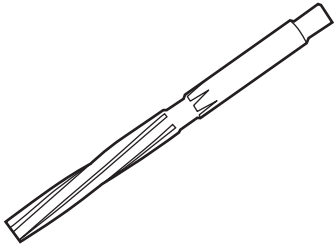
(2)

Tool	Tool name	Use
		Used primarily to cut metal using a fine toothed blade.
		Used to hold a cutting tool for external threads.

**Table 1**

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

(4)

Equipment	Equipment name	Use
	3 Jaw chuck	
	Hand reamer	

**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**

Thermostat

Voice over internet protocol

Polycarbonate

Smart grease

Programmable logic controllers (PLCs)

Quantum tunnelling composite (QTC)

Video conferencing

Modern materials

Control technology

Information and communications technology (ICT)

(Total for Question 3 = 7 marks)



4 Bicycle brake calipers belong to the engineering fabrication sector and use a joining process and automation in their manufacture.

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

(2)

Product 1

Product 2

(b) (i) Name a type of joining process used in the manufacture of a product you named in 4(a).

(1)

(ii) Describe the joining process used in the manufacture of a product you named in 4(a).

(3)

(c) Describe **two** examples of automation used in the manufacture of a product you named in 4(a).

(4)

1 .....

2 .....

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



5 Computer-aided design (CAD) and computer-integrated manufacturing (CIM) are both used by manufacturers of engineering fabrication products.

(a) State **two** functions of a computer-aided design (CAD) system.

(2)

1 .....

2 .....

(b) A manufacturer has changed from using traditional design methods to computer-aided design (CAD).

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

(2)

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(c) State **two** functions of a computer-integrated manufacturing (CIM) system.

(2)

1 .....

2 .....

(d) Explain **one** benefit of linking computer-aided design (CAD) and computer-integrated manufacturing (CIM) for the manufacturer.

(2)

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



6 Information and data are important to manufacturers.

(a) (i) Describe the term **database**.

(3)

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

(2)

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(b) Explain **two** reasons why a manufacturer would use an electronic spreadsheet.

(4)

1 .....

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2 .....

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**(Total for Question 6 = 9 marks)**



7 Communications technology is an essential feature in engineering fabrication companies.

(a) Explain **one** benefit of using communications technology on the global environment.

(3)

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(b) Other than environmental benefits, explain **one** advantage of using communications technology when marketing a product.

(3)

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

**TOTAL FOR SECTION A: 50 MARKS**





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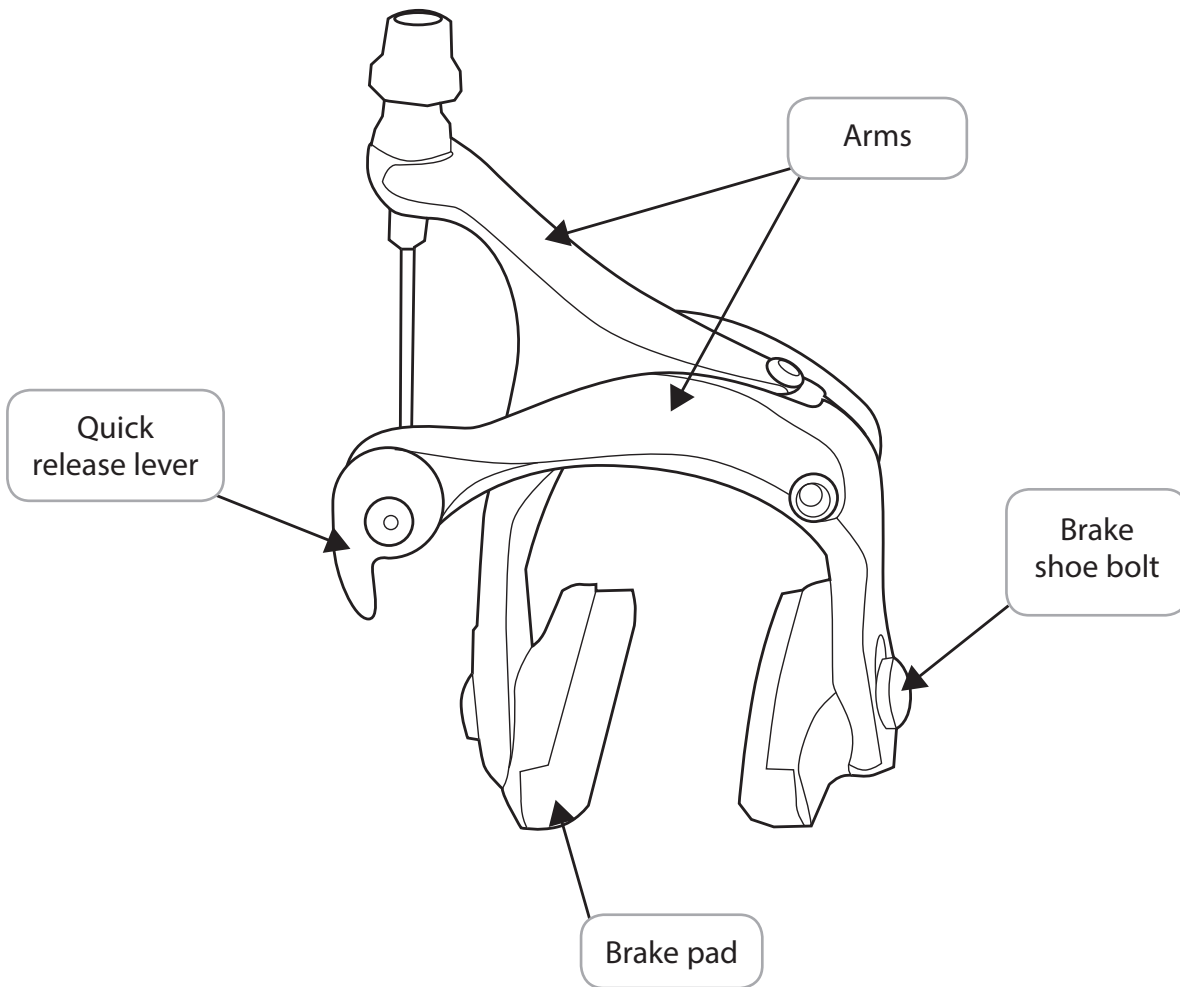
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## SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass produced bicycle brake calipers.

The diagram below shows bicycle brake calipers.



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8 Describe, using notes and sketches:

(a) the function of the brake pads.

(3)

brake pads

(b) the function of the quick release lever.

(3)

quick release lever



(c) the function of the brake shoe bolt.

(3)

brake shoe bolt

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

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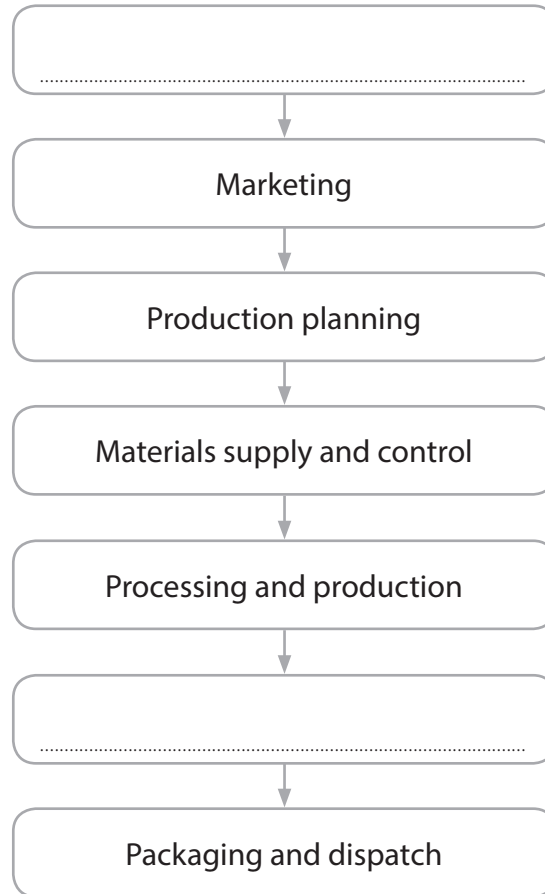
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9 (a) The incomplete flow diagram below indicates some of the main stages in manufacturing bicycle brake calipers.

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

(2)



(ii) State the stage in manufacturing where the bicycle brake calipers are advertised.

(1)

Stage .....

(b) List **three** activities carried out at the production planning stage when manufacturing bicycle brake calipers.

(3)

1 .....

2 .....

3 .....



(c) Describe the materials supply and control stage when manufacturing bicycle brake calipers.

(3)

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

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10 (a) State a specific type of polymer commonly used to make the quick release lever of the bicycle brake calipers. (1)

(b) Forging is a process used to produce the arms of the brake calipers.

(i) State **three** production processes, other than forging, used during the manufacture of bicycle brake calipers. (3)

Process 1

Process 2

Process 3

(ii) Explain why forging is a suitable process to use during the manufacture of the arms of the brake calipers. (3)

(c) Explain how the use of modern materials can reduce wastage when producing bicycle brake calipers. (3)

(Total for Question 10 = 10 marks)



11 Computer-aided manufacture (CAM) and quality control are used in the manufacture of bicycle brake calipers.

(a) State **two** reasons why computer-aided manufacture (CAM) is used at the packaging and dispatch stage.

(2)

- 1 .....
- 2 .....

(b) Describe **three** quality control procedures carried out at the packaging and dispatch stage.

(6)

- 1 .....
- 2 .....
- 3 .....

(c) Explain **two** benefits of using quality control at the packaging and dispatch stage.

(4)

- 1 .....
- 2 .....

**(Total for Question 11 = 12 marks)**





12 The introduction of modern technology and modern materials in the manufacture of mass produced bicycle brake calipers has brought changes.

(a) (i) State **two** different changes the introduction of modern technology has had on the workforce.

(2)

1 .....

2 .....

(ii) Explain **two** different effects the introduction of modern technology has had on the working environment.

(4)

1 .....

2 .....

(b) Explain **two** different benefits modern materials have had on product characteristics and sales.

(4)

1 .....

2 .....

**(Total for Question 12 = 10 marks)**



**13** Control technology is an essential feature in the manufacture of bicycle brake calipers.

Explain the impact of control technology on safety.

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

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\*14 Manufacturers of engineering fabrication products are increasingly using robotics.

Discuss the impact of robotics on production efficiency, product quality and manufacturing costs.

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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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