Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCSE

Manufacturing (Double Award)
Engineering (Double Award)
Unit 3: Application of Technology in Engineering and Manufacturing
Paper B: Food and Drink, Biological and Chemical

Wednesday 15 May 2013 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
5EM03/3B

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 ▶

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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 below belong to a manufacturing sector.

(a) Put a cross ☒ in the **two** boxes below where the products belong to the **food and drink** sector.

(2)

Iced tea	☒
Train ticket	☒
Tea towel	☒
Brake calliper	☒
Popcorn	☒
Aluminium frame	☒

(b) Put a cross ☒ in the **two** boxes below where the products belong to the **biological and chemical** sector.

(2)

Bath towel	☒
Shower gel	☒
Hair conditioner	☒
Bread maker	☒
Aluminium foil	☒
Microwave oven	☒

(Total for Question 1 = 4 marks)

2 The tables below show some equipment used during the manufacture of food and drink, biological and chemical products.

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

(2)

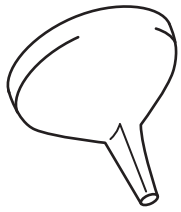
Equipment	Equipment name	Use
		Used to transfer liquid ingredients from larger containers to smaller ones.
		Used to indicate cooking duration.

Table 1

(b) Complete Table 2 by explaining what each piece of equipment is used for.

(4)

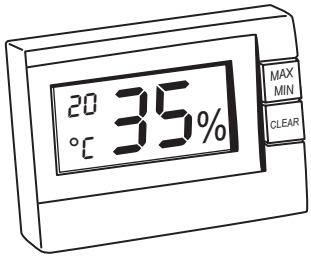
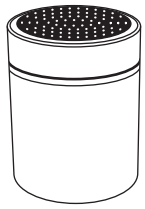
Equipment	Equipment name	Use
	Hygrometer	
	Dredger	

Table 2

(Total for Question 2 = 6 marks)

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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
Computer-aided design	
Automated conveyors	Information and communication technology (ICT)
Modified enzymes	
Embedded computers	Control technology
3D prototyping	
Probiotics	Modern materials
Fluorescers	

(Total for Question 3 = 7 marks)

4 Jars of strawberry jam belong to the food and drink, biological and chemical sector and use information and communication technology (ICT) in their manufacture.

(a) Name **two other** products from this sector where ICT is used in their manufacture.

(2)

Product 1

.....

Product 2

.....

(b) (i) Name **one stage** where ICT is used in the manufacture of **Product 1**.

(1)

.....

(ii) Explain **two** benefits to a **manufacturer** of using ICT at the stage named in 4(b)(i).

(4)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(c) (i) Name **one modern material** used in the manufacture of **Product 1**.

(1)

.....

(ii) Describe how this modern material changes the characteristics of **Product 1**.

(2)

.....

.....

.....

.....

(Total for Question 4 = 10 marks)

5 Computer-aided manufacture (CAM) and computer-aided design (CAD) are both used by manufacturers of food and drink, biological and chemical products.

(a) (i) State **one** use of CAM during manufacturing.

(1)

(ii) Explain **one** benefit to a manufacturer of using CAM in processing and production.

(2)

CAD is used when modifying existing products.

(b) (i) State **one other** use of CAD during manufacturing.

(1)

(ii) Explain **one** benefit to a **manufacturer** of using CAD when modifying existing products.

(2)

(c) Explain **one** benefit to the **consumer** when a manufacturer uses CAM.

(2)

(Total for Question 5 = 8 marks)

6 Sourcing and handling information and data is important to manufacturers.

(a) Describe the term **spreadsheet**.

(2)

(b) A database is also an example of sourcing and handling information and data.

(i) State **one** traditional method it has replaced.

(1)

(ii) Explain **two advantages** to the **retailer** when a manufacturer uses databases.

(4)

1

2

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

(2)

(Total for Question 6 = 9 marks)

7 Systems and control technology is an essential feature in food and drink, biological and chemical companies.

Explain **one** benefit to a manufacturer of using programmable logic controllers (PLCs) in relation to:

(a) safety during manufacture

(3)

(b) production efficiency.

(3)

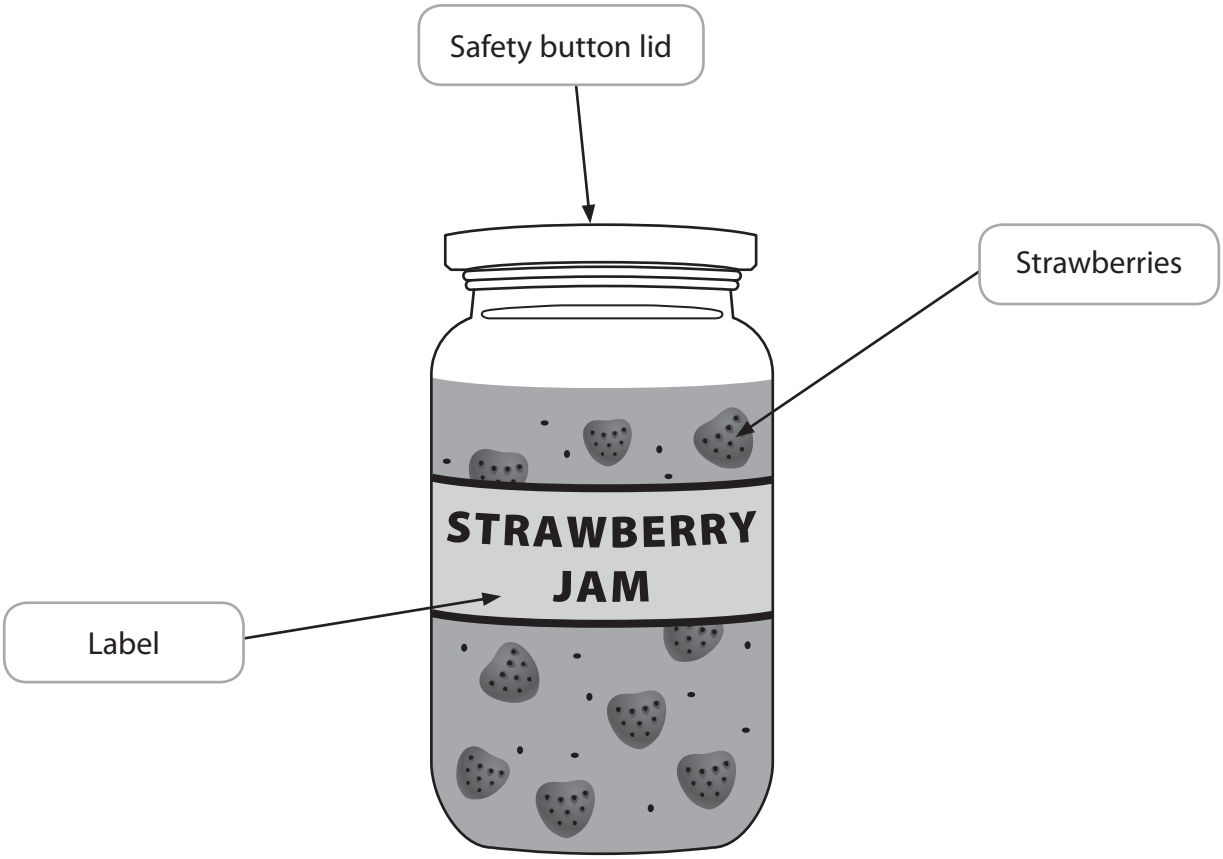
(Total for Question 7 = 6 marks)

TOTAL FOR SECTION A = 50 MARKS

SECTION B

Answer ALL questions in Section B with reference to the manufacture of mass-produced jars of strawberry jam.

The diagram below shows a **jar of strawberry jam**.



8 (a) Describe, using notes and sketches:

(i) the main function of the label

(3)

Label

(ii) the main function of the safety button lid

(3)

Safety button lid

(b) State **three** functions of the strawberries.

(3)

1 .....

.....

2 .....

.....

3 .....

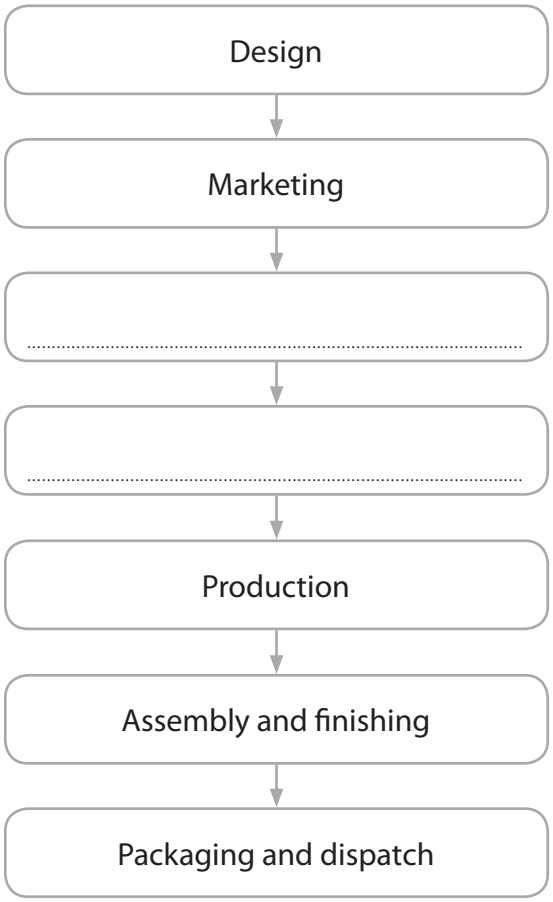
.....

(Total for Question 8 = 9 marks)

9 (a) The incomplete flow diagram below indicates some of the main stages in the manufacture of jars of strawberry jam.

(i) Complete the flow diagram by adding the **two** missing main stages in the manufacture of jars of strawberry jam.

(2)



(ii) State the stage where the jars of strawberry jam would be placed into cardboard boxes.

(1)

Stage

.....

(b) Describe the following **two** stages in the manufacture of jars of strawberry jam.

(i) Design

(3)

(ii) Marketing

(3)

(Total for Question 9 = 9 marks)

10 (a) State a **specific** ingredient commonly used as a gelling agent in the production of strawberry jam.

(1)

.....

(b) Weighing, measuring and boiling ingredients are processes used to mass-produce jars of strawberry jam.

(i) State **three** production processes, **other than** weighing, measuring and boiling ingredients, used during the manufacture of jars of strawberry jam.

(3)

Process 1

.....

Process 2

.....

Process 3

.....

(ii) Explain why accurately weighing and measuring ingredients are suitable processes for making strawberry jam.

(3)

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.....

.....

.....

.....

.....

(iii) Explain why a manufacturer should use vacuum pan boiling rather than open pan boiling for the production of strawberry jam.

(3)

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.....

.....

(Total for Question 10 = 10 marks)

11 Process control and quality control are used in the manufacture of jars of strawberry jam.

(a) (i) Explain the term **process control**.

(2)

(ii) Explain **two** reasons why a **manufacturer** uses process control during automated stages of manufacture.

(4)

1

2

(b) Describe **two** examples of quality control used during the **production** stage of the manufacture of jars of strawberry jam.

(4)

1 .....

.....

.....

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2 .....

.....

.....

.....

(Total for Question 11 = 10 marks)

12 (a) The use of modern technology in the manufacture of mass-produced jars of strawberry jam has brought changes.

(i) State **two** changes the use of modern technology has had on the **type** of workforce manufacturers require.

(2)

Change 1

Change 2

(ii) Describe **two** changes the use of modern technology has had on the production environment.

(4)

Change 1

Change 2

(iii) Explain **one** environmental benefit that has resulted from the use of modern technology.

(2)

(b) The use of barcodes is an important part of control technology in the manufacture of jars of strawberry jam.

Describe the advantages to a **manufacturer** of using barcodes at the packaging and dispatch stage.

(4)

(Total for Question 12 = 12 marks)

13 Modern materials are used in the manufacture of jars of strawberry jam.

Explain how the use of modern materials has impacted on customer satisfaction.

(Total for Question 13 = 4 marks)

***14** Discuss the effects on marketing and selling when a manufacturer of jars of strawberry jam uses modern technology to improve its production processes and profitability.

(Total for Question 14 = 6 marks)

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

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