Pearson Edexcel GCSE

Manufacturing (Double Award) (2MN02)

Engineering (Double Award) (2EG02)

Unit 3: Application of Technology in Engineering and Manufacturing

May 2016 Pre-release material
To be opened on receipt

Paper Reference
5EM03

You do not need any other materials.

Instructions to Centres

This pre-release material contains instructions for all **six** sectors.
Candidates should be entered for, study and select the research product from only **one** of these sectors.

Advice to Candidates

You may take your research notes and sketches into the examination room and use these as reference materials. **None** of this material should be sent to Pearson Edexcel and pre-release work will **not** be marked.

ALL the questions in Section B of the question paper will relate to your selected product.

Turn over ▶

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This pre-release material contains instructions for the following sectors:

- Printing and Publishing, Paper and Board (5EM03/3A)
- Food and Drink, Biological and Chemical (5EM03/3B)
- Textiles and Clothing (5EM03/3C)
- Engineering Fabrication (5EM03/3D)
- Electrical and Electronics, Process Control, Computers, Telecommunications (5EM03/3E)
- Mechanical, Automotive (5EM03/3F)

Introduction

The examination for Unit 3 is offered as **six** different sector pathways. Centres are free to select which sector paper they wish to enter their candidates.

This pre-release material consists of guidance for the candidates and notes to the centre. Staff at the centre should read the information for all six sectors before deciding which sector is most suitable for them to support the needs of their candidates.

Generally speaking, Engineering is split into **three** sectors: Engineering Fabrication; Electrical and Electronics, Process Control, Computers, Telecommunications; and Mechanical, Automotive. Manufacturing is split into **three** sectors: Printing and Publishing, Paper and Board; Food and Drink, Biological and Chemical; and Textiles and Clothing. Regardless of the route the centre is planning for the other two units in the qualification, the sector for this unit can be chosen to suit the best support a centre can offer rather than being defined by any preconceived ideas.

Introduction to using this pre-release material

The product selected by Pearson Edexcel for each of the sectors is a product that is in general use, easy to recognise and easy to obtain. Most of these products would be of a reasonable price to purchase or are already available or owned by centres.

Whilst the internet is a very valuable source of information, centres should not rely totally on this and may need to be diligent in their own research before deciding which sector is best for their candidates. For some sector products there may be a wealth of materials on the internet, such as food industry information. However, searching for manufacturers of traditional engineering type products may prove more difficult. Often adding the word 'manufacturer' when carrying out searches using 'advanced search tools' on search engines provides better results than not entering, or using, this word alongside the product name.

Supporting the candidates

After defining the sector-specific paper, centres need to develop a support strategy for their candidates. They need to consider the local support that can be gained from either industry, colleges or even universities, together with the information known to be available from the teacher's initial search and investigation to decide which sector paper to use.

In an area where manufacturer support for the exact product may be difficult to come by, the centre needs to source local support that uses similar processes and techniques to those found in almost any engineering or manufacturing environment. A typical way to support the candidates would be to visit the local company before the planned visit, establish what the company can show/offer, and then match or simulate this to the manufacturing processes of the chosen pre-release product. Different groups of candidates could be asked to get information on a particular aspect on application of technology from the company visit and briefed to give feedback to the rest of the group on return to the centre. The teacher's role would be to draw out the similarities between the technology seen and that of the product. Back at the centre the product should be made available and dismantled. Again, the teacher should be able to relate what is required for the manufacture and application of technology to that seen on any visits to local companies.

Further support

The delivery of the vocational curriculum requires that centres support candidates in the context of their course by applying work-related learning techniques to their area of study. Engineering and Manufacturing has the support of SEMTA and local STEMNET, as well as all other local support mechanisms, such as Work Related Learning Officers, either in schools or local authorities. Appropriate trade associations and professional bodies may also be useful sources of information.

Once the centre has facilitated the research required by the pre-release material and instructions, teachers should encourage the candidates to consider the usefulness of any materials gained. Often materials will be found on websites and centres need to ensure that the candidates print/copy only pages that are relevant to what is required and defined by the pre-release material. They should not print masses of web pages. If studied closely the pre-release material highlights the areas of knowledge required for the examination and can become the focus for collecting information. Just like an internally assessed unit, the candidates should be encouraged to produce a portfolio of their research. This can then be taken into the examination and used by the candidates when answering the questions in the paper. Research notes and sketches therefore need to be well organised, or they may be more of a hindrance than a help.

What not to do

Take into the examination more than their own research notes and sketches, such as practice or previous examination papers, or materials supplied by Pearson Edexcel as support materials. This often damages candidates' opportunities when they give a very detailed answer, but fail to put their answer into the context of the question being asked. Centres should think about their responsibility in this matter as candidates may be disadvantaged and not be awarded the marks that match their potential.

Sector 3A: Printing and Publishing, Paper and Board

The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

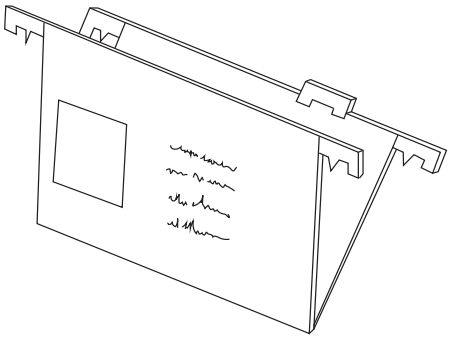
In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Printing and Publishing, Paper and Board* sector.

You should be able to:

- Name and identify products from this sector including appropriate uses and applications
- Identify a range of items and equipment, and understand their use, which are used in the manufacture of printing and publishing, paper and board products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced suspension files**.



You should be able to:

- Identify the different components used in the manufacture of mass-produced suspension files and know about their functions
- Name and describe the stages in manufacturing mass-produced suspension files, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced suspension files
- Explain shaping and manipulation processes, and know about a range of other processes, used in the production of mass-produced suspension files
- Understand how CAM is used, and its impact, when manufacturing mass-produced suspension files
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced suspension files

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.

Sector 3B: Food and Drink, Biological and Chemical

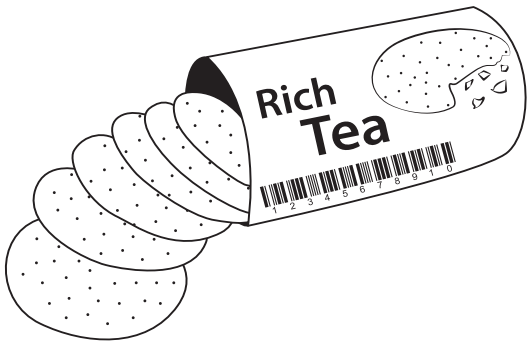
The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Food and Drink, Biological and Chemical* sector.

You should be able to:
- Name and identify products from this sector including appropriate uses and applications
- Identify a range of equipment, and understand their use, which are used in the manufacture of food and drink, biological and chemical products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced packs of Rich Tea biscuits**.



You should be able to:
- Identify the different materials and packaging used in the manufacture of mass-produced packs of Rich Tea biscuits and know about their functions
- Name and describe the stages in manufacturing mass-produced packs of Rich Tea biscuits, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced packs of Rich Tea biscuits
- Explain production processes used in the manufacture of mass-produced packs of Rich Tea biscuits
- Understand how CAM is used, and its impact, when manufacturing mass-produced packs of Rich Tea biscuits
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced packs of Rich Tea biscuits

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.

Sector 3C: Textiles and Clothing

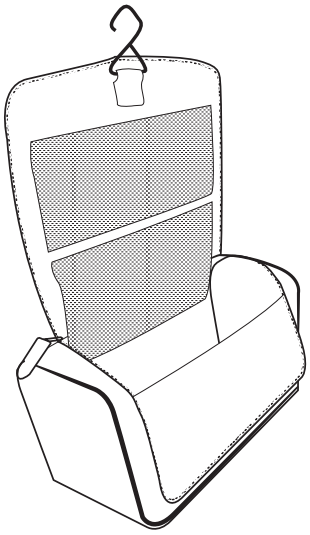
The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Textiles and Clothing* sector.

You should be able to:
- Name and identify products from this sector including appropriate uses and applications
- Identify a range of equipment and components, and understand their use, which are used in the manufacture of textiles and clothing products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced toiletry bags**.



You should be able to:
- Identify the different materials and components used in the manufacture of mass-produced toiletry bags and know about their functions
- Name and describe the stages in manufacturing mass-produced toiletry bags, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced toiletry bags
- Explain production processes used in the manufacture of mass-produced toiletry bags
- Understand how CAM is used, and its impact, when manufacturing mass-produced toiletry bags
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced toiletry bags

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.

Sector 3D: Engineering Fabrication

The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

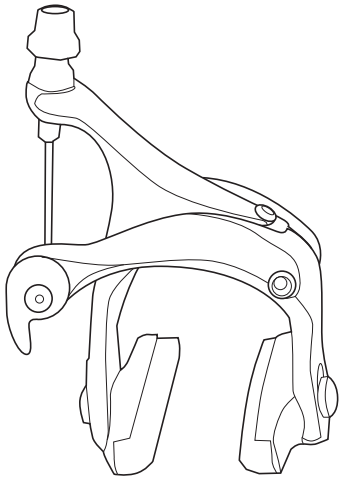
In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Engineering Fabrication* sector.

You should be able to:

- Name and identify products from this sector including appropriate uses and applications
- Identify a range of tools and equipment, and understand their use, which are used in the manufacture of engineering fabrication products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced bicycle brake calipers**.



You should be able to:

- Identify the different components used in the manufacture of mass-produced bicycle brake calipers and know about their functions
- Name and describe the stages in manufacturing mass-produced bicycle brake calipers, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced bicycle brake calipers
- Explain shaping and manipulation processes, and know about a range of other processes, used in the production of mass-produced bicycle brake calipers
- Understand how CAM is used, and its impact, when manufacturing mass-produced bicycle brake calipers
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced bicycle brake calipers

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.

Sector 3E: Electrical and Electronic, Process Control, Computers, Telecommunications

The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

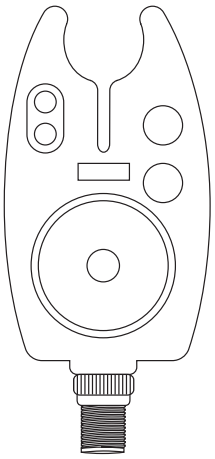
In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Electrical & Electronic, Process Control, Computers, Telecommunications* sector.

You should be able to:

- Name and identify products from this sector including appropriate uses and applications
- Identify a range of components and equipment, and understand their use, which are used in the manufacture of electrical & electronic, process control, computers, telecommunications products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced bite alarms**.



You should be able to:

- Identify the different components used in the manufacture of mass-produced bite alarms and know about their functions
- Name and describe the stages in manufacturing mass-produced bite alarms, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced bite alarms
- Explain shaping and manipulation processes, and know about a range of other processes, used in the production of mass-produced bite alarms
- Understand how CAM is used, and its impact, when manufacturing mass-produced bite alarms
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced bite alarms

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.

Sector 3F: Mechanical/Automotive

The written examination paper is split into two sections.
Section A is worth 50 marks and Section B is worth 60 marks.

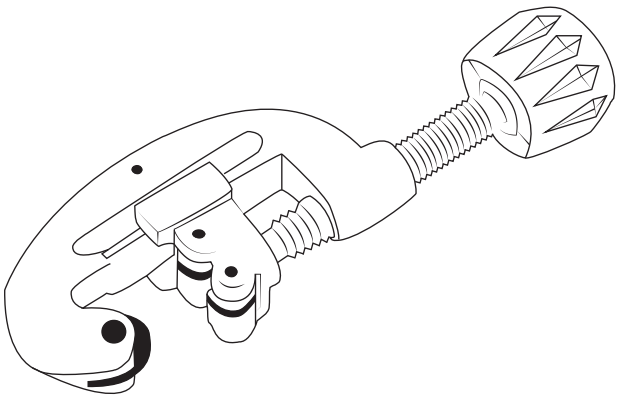
In **Section A** you will need to answer a range of general questions.

To prepare for Section A, you should study and understand the design and manufacture of a range of mass-produced products belonging to and used in the *Mechanical/Automotive* sector.

You should be able to:

- Name and identify products from this sector including appropriate uses and applications
- Identify a range of tools and equipment, and understand their use, which are used in the manufacture of mechanical/automotive products
- Name and understand control technologies and production processes used in the manufacture of products in this sector
- Identify, apply and describe/explain modern materials and new technologies, such as CIM and CAD, and information and communication technologies (ICT)
- Know and understand the implications of new technologies

For **Section B** you should carry out research into the stages in manufacturing **mass-produced 3 to 32mm diameter tube cutters**.



You should be able to:

- Identify the different components used in the manufacture of mass-produced 3 to 32mm diameter tube cutters and know about their functions
- Name and describe the stages in manufacturing mass-produced 3 to 32mm diameter tube cutters, and the activities that happen at these stages
- Name and explain the use of modern materials and their impact for mass-produced 3 to 32mm diameter tube cutters
- Explain shaping and manipulation processes, and know about a range of other processes, used in the production of mass-produced 3 to 32mm diameter tube cutters
- Understand how CAM is used, and its impact, when manufacturing mass-produced 3 to 32mm diameter tube cutters
- State/describe/explain/evaluate how modern technologies and techniques have impacted upon the workforce, workplace and control technology when manufacturing mass-produced 3 to 32mm diameter tube cutters

You should also familiarise yourself with the *Detailed unit content* section of the GCSE specification – Unit 3: Application of Technology in Engineering and Manufacturing.