

Mark Scheme

Summer 2014 (Results)

Pearson Edexcel  
GCSE in Engineering and Manufacturing  
5EM03 3B  
(Paper 3B: Food and Drink, Biological and  
Chemical)

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at [www.edexcel.com](http://www.edexcel.com) or [www.btec.co.uk](http://www.btec.co.uk). Alternatively, you can get in touch with us using the details on our contact us page at [www.edexcel.com/contactus](http://www.edexcel.com/contactus).

## **Pearson: helping people progress, everywhere**

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: [www.pearson.com/uk](http://www.pearson.com/uk)

Summer 2014

Publications Code UG038626

All the material in this publication is copyright

© Pearson Education Ltd 2014

## General Marking Guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Learners must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the learner's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a learner's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the learner has replaced it with an alternative response.
- Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:
  - i) Ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
  - ii) Select and use a form and style of writing appropriate to purpose and to complex subject matter*
  - iii) Organise information clearly and coherently, using specialist vocabulary when appropriate.*

Question	Answer	Mark
<b>1(a)</b>	<ul style="list-style-type: none"> <li>• Stock cube</li> <li>• Lemonade</li> </ul> <p><i>If 3 boxes or more crossed - no marks.</i></p> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>1(b)</b>	<ul style="list-style-type: none"> <li>• Antibacterial soap</li> <li>• Flu Vaccine</li> </ul> <p><i>If 3 boxes or more crossed - no marks.</i></p> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>(Total 4 marks)</b>		

Question	Answer	Mark
<b>2(a)</b>	Accept any of the following answers: <ul style="list-style-type: none"> <li>• Keep Britain Tidy</li> <li>• Environmentally friendly</li> <li>• Don't drop litter</li> <li>• Put litter in bin</li> </ul> <p><i>Accept any recognisable spelling (phonetic) of the answer above</i></p> <p style="text-align: right;">(1 x 1)</p>	
	Accept any of the following answers: <ul style="list-style-type: none"> <li>• Green Dot</li> <li>• German scheme for recycling</li> </ul> <p><i>Do not accept 'recycle' or 'recycling' on its own</i></p> <p><i>Accept any recognisable spelling (phonetic) of the answer above</i></p> <p style="text-align: right;">(1 x 1)</p>	<b>(2)</b>
<b>2(b)</b>	An answer that makes reference to two of the following points: <ul style="list-style-type: none"> <li>• The contents of package have been produced in the developing world</li> <li>• The producer has received a fair price for his/her goods</li> <li>• Fairtrade standards have been met</li> </ul> <p><i>Accept name of a specific product or ingredient for the second mark, e.g. chocolate, cocoa beans, coffee beans, bananas</i></p> <p><i>Accept any other appropriate response</i></p> <p>e.g. The contents have been grown in Sub-Saharan Africa (1) and the farmer has received a fair price for them (1)</p> <p style="text-align: right;">(1 x 2)</p>	
	An answer that makes reference to two of the following points: <ul style="list-style-type: none"> <li>• How long the product is fit for purpose after opening</li> <li>• How long the product can be safely used after opening</li> <li>• The lifespan of the product in months</li> </ul> <p><i>Accept name of a specific product for the second mark, e.g. shampoo, face cream</i></p> <p><i>Accept any other appropriate response</i></p> <p>e.g. It shows how long the contents of the package are fit for purpose (1) in months (1)</p> <p style="text-align: right;">(1 x 2)</p>	<b>(4)</b>
<b>(Total 6 marks)</b>		



Question	Answer	Mark
<b>4(a)</b>	<p>Appropriate <b>products</b> such as e.g.</p> <ul style="list-style-type: none"> <li>• Bread</li> <li>• Cakes</li> <li>• Biscuits</li> <li>• Milk</li> <li>• Yoghurt</li> <li>• Pies</li> <li>• Toffee</li> <li>• Soup</li> <li>• Jam</li> <li>• Crisps</li> <li>• Doughnuts</li> <li>• A brand name of any other specific product</li> </ul> <p><i>Do not accept 'dairy products'</i></p> <p><i>This list is not exhaustive; accept any product associated with the food and drink, biological and chemical that uses control technology and a heating process in its manufacture.</i></p> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>4(b)(i)</b>	<ul style="list-style-type: none"> <li>• Process control</li> <li>• Computer Integrated Manufacturing (CIM)</li> <li>• Robotics</li> <li>• Programmable logic controllers (PLCs)</li> <li>• Automation</li> <li>• Continuous operation</li> <li>• Embedded computers</li> <li>• Thermostat</li> <li>• Computer Aided Manufacture (CAM)</li> <li>• Automated conveyors</li> <li>• Temperature control</li> <li>• Time control</li> <li>• Humidity control</li> <li>• Weight control</li> </ul> <p><i>Accept any appropriate response</i></p> <p><i>Accept specific machines such as 'extruder', 'depositer', 'ultrasonic cutting', 'robots', 'conveyor belts'.</i></p> <p><i>Do not accept 'CAD' without CAM links.</i></p> <p style="text-align: right;">(1 x 1)</p>	<b>(1)</b>

Question	Answer	Mark
<p><b>4(b)(ii)</b></p>	<p>1 mark for identifying reason (x2), 1 mark for why (x2), e.g.</p> <p>Process control</p> <ul style="list-style-type: none"> <li>• Waste control (1) – as monitors processes and quality control of processes (1)</li> <li>• Product consistency (1) – as better control of processes (1)</li> <li>• Energy conservation (1) – as tighter control of energy into process (1)</li> </ul> <p>Robotics</p> <ul style="list-style-type: none"> <li>• Product consistency (1) – as better control of processes (1)</li> <li>• Efficiency (1) - as less waste/faulty parts/products/ingredients (1)</li> <li>• Competitiveness (1) – as faster rates of production (1)</li> </ul> <p>Automation</p> <ul style="list-style-type: none"> <li>• Speed (1) – as faster than human application (1)</li> <li>• Cost control (1) – as less waste/faulty parts/products/ingredients (1)</li> <li>• Product consistency (1) – as better control of processes (1)</li> </ul> <p>Computer Aided Manufacture (CAM)</p> <ul style="list-style-type: none"> <li>• Competitiveness (1) – as faster rates of production through application of CAM techniques (1)</li> <li>• Efficiency (1) – as less waste/faulty parts/products/ingredients (1)</li> <li>• Product consistency (1) – as better control of processes (1)</li> </ul> <p><i>Accept any appropriate response</i></p> <p><i>No answer or incorrect answer to 4(b)(i) no marks for 4(b)(ii)</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2), for each of the 2 reasons</i></p> <p style="text-align: right;">(2 x 2)</p>	<p style="text-align: right;"><b>(4)</b></p>
<p><b>4(c)(i)</b></p>	<p>Appropriate heating process suitable for Product 1, e.g.</p> <ul style="list-style-type: none"> <li>• Baking (Ovens)- bread, cakes, biscuits, pies</li> <li>• Pasteurization – milk, fruit juices</li> <li>• Frying – crisps, doughnuts</li> <li>• Boiling – soup, jam, toffee</li> <li>• Steaming – meats, puddings</li> </ul> <p><i>Accept any appropriate response</i></p> <p><i>Do not accept 'cooking' without explanation.</i></p> <p style="text-align: right;">(1 x 1)</p>	<p style="text-align: right;"><b>(1)</b></p>
<p><b>4(c)(ii)</b></p>	<p>Any 2 appropriate points stated:</p> <ul style="list-style-type: none"> <li>• Baking – ovens are used to transfer heat to the raw products to make them edible(1), the heat can be transferred in different ways such as conduction, convection and radiation (1), the ovens vary in design and size e.g. deck, tunnel (1), the baking times and temperatures are controlled (1), using thermometers/thermostats/sensors (1) and timers (1)</li> <li>• Pasteurization – the product is passed through a pasteurization</li> </ul>	



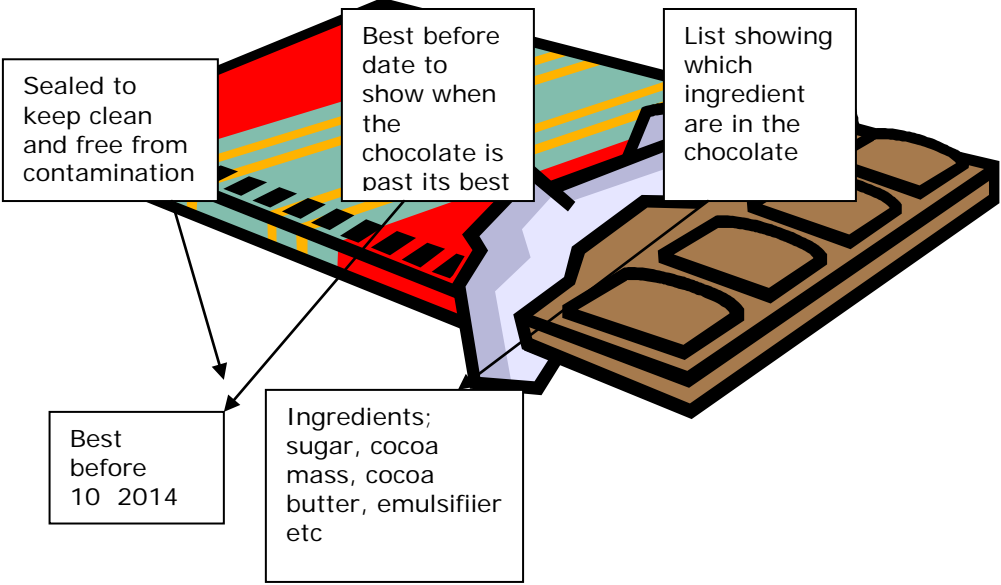
Question	Answer	Mark
	<p>process which uses heat to kill harmful bacteria(1)the temperature (1) and time (1)is carefully controlled(1) so it doesn't change the characteristics e.g. taste, colour, effect proteins, etc of the product too much(1) it is usually a continuous process where the product flows through stainless steel pipes(1)</p> <ul style="list-style-type: none"> <li>• Frying – the products are carefully placed in the fryer (1)which is usually a large vat of heated vegetable oil (1) is often a continuous process (1) the products are moved along the length of the fryer (1) the temperature (1) and time is carefully controlled (1)</li> <li>• Boiling – the ingredients are placed in the boiler which can be open pan (1), vacuum pan (1)etc depending on the product, the boilers can be heated directly i.e. with flame in an open pan(1), with steam in a jacketed pan (1)or continuous system (1)etc, the boiling times(1)and temperatures (1) and where used vacuum (1) are strictly controlled(1),the boiling process can be a batch system(1) or a continuous system(1)</li> <li>• Steaming – the puddings are placed in enclosed steamers(1), often using pressure (1) the times (1) and temperature (1) can be set (1)and are strictly controlled (1) an alarm will sound when steaming/cooking is complete (1)</li> </ul> <p><i>Accept any appropriate response; no marks for repeating the process named</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i></p> <p style="text-align: right;">(1 x 2)</p>	(2)
(Total 10 marks)		

Question	Answer	Mark
<b>5(a)</b>	<p>1 mark for example, 1 mark for extension</p> <ul style="list-style-type: none"> <li>• Publicising employment opportunities(1) reduces recruitment costs (1)</li> <li>• Easier to research competition (1) reduces design/marketing labour costs (1)</li> <li>• Direct advertising of products (1) minimises need for printed materials, telemarketing etc (1)</li> <li>• Direct sales of products (1) reduces administration costs (1)</li> <li>• Finding suppliers to order materials/ingredients (1) easily accessible audit trail (1)</li> <li>• Access to progress of order [as customer or seller] (1) more accurate scheduling/management of supply chain or reduced post sales costs (1)</li> </ul> <p><i>Accept any appropriate response</i> Accept responses that reference specific types of cost reduction.</p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i> (1 x 2)</p>	<b>(2)</b>
<b>5(b)</b>	<p>1 mark for identifying a benefit (x3), 1 mark for how (x3)</p> <ul style="list-style-type: none"> <li>• reduced ordering times (1) – automatic monitoring (1)</li> <li>• improve quality/accuracy/consistency (1) – control of processes (1)</li> <li>• reduced wastage (1) – optimise production methods (1)</li> <li>• improved efficiency (1) – faster/quicker throughput (1)</li> <li>• better process control (1) – in process monitoring (1)</li> <li>• reduced labour (1) – automated processes (1)</li> <li>• lower costs (1) – reduced wastage/faster/continuous production (1)</li> <li>• safer processes (1) – less manual input (1)</li> </ul> <p><i>Accept any appropriate response</i></p> <p><i>No repetition</i></p> <p><i>Do not accept 'easier', or 'faster/quicker' without description, e.g. its quicker and more accurate (1) –mark awarded for 'more accurate'</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2), for each of 3 benefits</i> (3 x 2)</p>	<b>(6)</b>
<b>(Total 8 marks)</b>		

Question	Answer	Mark
<p><b>6(a)(i)</b></p>	<ul style="list-style-type: none"> <li>• Mobile phone/infrared/bluetooth</li> <li>• Internet/wireless/Wi-Fi</li> <li>• Video conferencing</li> <li>• Video calling</li> <li>• Voice over Internet Protocol (VoIP)</li> <li>• Electronic point of sale (EPOS)</li> <li>• EDI</li> <li>• ISDN</li> <li>• Texting</li> <li>• Phone</li> <li>• Walkie talkie</li> <li>• Fax</li> <li>• Smart TV</li> <li>• Smart phone</li> <li>• Tablet</li> <li>• Computer</li> </ul> <p><i>Accept brand names eg 'Skype' or 'facetime'</i>  <i>Accept any appropriate response</i></p> <p><i>Do not accept:</i>  <i>CAD/database/spreadsheet/telecommunications/search engines eg 'google'</i>  <i>Do not accept 'TV' on its own</i></p> <p style="text-align: right;">(2 x 1)</p>	<p><b>(2)</b></p>
<p><b>6(a)(ii)</b></p>	<p>1 mark for example (x2) and 1 mark for extension (x2)</p> <ul style="list-style-type: none"> <li>• To clarify customer requirements (1) so mistakes are not made (1)</li> <li>• To request a product specification/drawings (1) so tools/equipment can be prepared (1)</li> <li>• To contact suppliers (1) so they can order and supply materials/equipment (1)</li> <li>• To communicate information to schedulers (1) so they can reorder work (1)</li> <li>• To update the customer on progress (1) to ensure they are satisfied (1)</li> <li>• To provide the customer with dispatch information (1) so they are able to prepare for receipt of the products (1)</li> </ul> <p><i>All the answers must relate to the requirement for the products to be made urgently and to the manufacturer</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2), for each of the 2 examples</i></p> <p style="text-align: right;">(2 x 2)</p>	<p><b>(4)</b></p>
<p><b>6(b)(i)</b></p>	<ul style="list-style-type: none"> <li>• Modified starches</li> <li>• Antioxidants</li> <li>• Emulsifiers</li> <li>• Textured vegetable protein (TVP)</li> <li>• Modified enzymes</li> <li>• Stabilisers</li> <li>• Hydrocolloids</li> </ul>	

Question	Answer	Mark
	<ul style="list-style-type: none"> <li>• Surfactant</li> <li>• Bleaching agents</li> <li>• Flour treatments</li> <li>• Preservatives</li> <li>• Dough / bread improvers</li> <li>• Chemical aerators</li> <li>• Humectants</li> </ul> <p><i>Accept any appropriate response</i></p> <p><i>Accept materials from other sectors when related to packaging or processes used</i></p> <p style="text-align: right;">(1 x 1)</p>	<b>(1)</b>
<b>6(b)(ii)</b>	<p>1 mark for reason, 1 mark for why</p> <ul style="list-style-type: none"> <li>• To improve appearance of the product (1) in order to attract customers (1)</li> <li>• To seal the product (1) in order to reduce damage (1)</li> <li>• To protect the product (1) in order to improve product lifespan (1)</li> <li>• To change/enhance the eating properties of the product (1) in order to add value (1)</li> <li>• To add taste/flavour (1) to enhance customer appeal (1)</li> <li>• To increase sales of the product (1) and improve profit (1)</li> <li>• To meet customer requirements/standards/specification (1) to ensure it is fit for purpose (1)</li> </ul> <p>Do not accept a type of finish without a suitable explanation.</p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i>  <i>(1 x 2)Low response (1) or two low responses (2) or detailed response (2)</i></p> <p style="text-align: right;">(1 x 2)</p>	<b>(2)</b>
<b>(Total 9 marks)</b>		

Question	Answer	Mark
<b>7(a)</b>	<p>1 mark for identifying benefit, up to 2 marks for extension</p> <ul style="list-style-type: none"> <li>• Accurate information (1) – instant feedback (1) so more responsive to customer needs (1)</li> <li>• Detailed customer information (1) – tailoring product to target market (1) in order to match customer requirements (1)</li> <li>• Information for strategies/campaigns (1) – choosing correct media (1) for target customer (1)</li> <li>• Information for advertising campaigns (1) – modelling sales versus demand (1) allowing the use of correct parameters (1)</li> <li>• Profit/loss information available (1) – can be shown in graphical form (1) therefore easy to see where sales efforts should be targeted (1)</li> <li>• Ordering to meet sales faster (1) – repeat purchases (1) and production set up based on sales data (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or detailed statement (3)</i></p> <p style="text-align: right;">(1 x 3)</p>	<b>(3)</b>
<b>7(b)</b>	<p>1 mark for identifying benefit, up to 2 marks for extension</p> <ul style="list-style-type: none"> <li>• Accurate information (1) – updated regularly (1) so production status clear (1)</li> <li>• Detailed information (1) – high storage space (1) so production data can be interrogated over a variety of time periods (1)</li> <li>• Fast access to data (1) – search/sort/query (1) enables ability to isolate production issues (1)</li> <li>• Improved planning (1) – shorter lead times (1) therefore faster throughput (1)</li> <li>• Forecasting (1) – collects volumes of data/modelling (1) so forward planning is more accurate (1)</li> <li>• Cost of control (1) – better scheduling (1) enabling lower overheads (1)</li> <li>• Waste control (1) – process monitoring/control (1) highlighting QC issues (1)</li> <li>• Reduced stock holding (1) – tracks trends/JIT [Just-In-Time] (1) improving efficiency in the supply chain (1)</li> <li>• Training records (1) – skills monitoring (1) so deployment more efficient (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or detailed statement (3)</i></p> <p style="text-align: right;">(1 x 3)</p>	<b>(3)</b>
<b>(Total 6 marks)</b>		
<b>Total Marks for Section A</b>		<b>50</b>

Question	Answer	Mark
<p><b>8(a)</b></p>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> <li>• To protect the chocolate bar (1)</li> <li>• To minimise risk of contamination –physical or microbiological (1)</li> <li>• To keep bar in place - sealed (1)</li> <li>• To increase shelf life (1)</li> <li>• To minimise risk of deterioration from heat (1)</li> <li>• To minimise risk of deterioration from humidity/moisture (1)</li> <li>• Reduces the risk from tampering (1)</li> <li>• Easier to handle (1)</li> <li>• Easier to display (1)</li> <li>• To promote and advertise the chocolate at the point of sale (1)</li> <li>• Displays information relating to the product (1)</li> <li>• Displays ingredients information (1)</li> <li>• Displays allergy warnings (1)</li> <li>• Displays best before information (1)</li> <li>• Displays storage information (1)</li> <li>• Displays nutritional information (1)</li> <li>• Displays weight information (1)</li> <li>• Displays manufacturer details (1)</li> <li>• Displays re-cycling guidance (1)</li> <li>• Displays bar code (1)</li> <li>• Displays product codes (1)</li> <li>• Displays Fair Trade information (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Answer must contain both notes and sketches.</i>  <i>Max <b>two</b> marks if only notes or only sketches used.</i></p> <p>(3)</p> 	<p>(3 x 1)</p> <p><b>(3)</b></p>

Question	Answer	Mark
<b>8(b)</b>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> <li>• Alters the consistency of the milk chocolate (1)</li> <li>• Changes the viscosity of the milk chocolate (1)</li> <li>• Makes the milk chocolate easier to mould into bars (1)</li> <li>• Allows less cocoa butter to be used (1)</li> <li>• To reduces costs (1)</li> <li>• Can delay the affects of heat related 'bloom' (1)</li> <li>• Can increase shelf life (1)</li> <li>• Improves dispersion of other ingredients (1)</li> <li>• Aids the combining of other ingredients e.g. fat/oil and water (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Do not accept 'improves quality/appearance' without clarification.</i></p> <p style="text-align: right;">(3 x 1)</p>	<b>(3)</b>
<b>8(c)</b>	<p>An answer that makes reference to any of the following points:</p> <ul style="list-style-type: none"> <li>• Adds colour (1)</li> <li>• Improves taste / flavour (1)</li> <li>• Enhances aroma/smell (1)</li> <li>• Alters texture (1)</li> <li>• Improves eating characteristics (1)</li> <li>• Improves appearance (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p style="text-align: right;">(3 x 1)</p>	<b>(3)</b>
<b>(Total 9 marks)</b>		

Question	Answer	Mark
<b>9(a)(i)1</b>	<ul style="list-style-type: none"> <li>• Marketing</li> </ul> <p style="text-align: right;">(1 x 1)</p>	
<b>9(a)(i)2</b>	<ul style="list-style-type: none"> <li>• Assembly and finishing</li> <li>• Finishing and assembly</li> <li>• Assembly</li> <li>• Finishing</li> </ul> <p style="text-align: right;">(1 x 1)</p>	<b>(2)</b>
<b>9(a)(ii)</b>	<ul style="list-style-type: none"> <li>• Design</li> <li>• Stage 1/stage one</li> <li>• One/1</li> <li>• First/ First stage</li> </ul> <p style="text-align: right;">(1 x 1)</p>	<b>(1)</b>



Question	Answer	Mark
9(b)	<ul style="list-style-type: none"> <li>• Checking availability of suitable materials/bought-in consumables(1)</li> <li>• Purchase of suitable materials/ bought-in consumables( 1)</li> <li>• Sourcing of materials/ bought-in consumables (1)</li> <li>• Price negotiation (1)</li> <li>• Good inwards inspection/testing/checking quantity (1)</li> <li>• Quality control checks (1)</li> <li>• Coding checks (1)</li> <li>• Storage of materials/consumables (1)</li> <li>• Progress chasing (1)</li> <li>• Conditioning / preparation of materials (1)</li> <li>• Stock taking / keeping (1)</li> </ul> <p><i>Accept any other appropriate response</i> (3 x 1)</p>	(3)

Question	Answer	Mark
9(c)	<p>Appropriate descriptions including three of the following points (statements must be applicable to the milk chocolate bars):</p> <ul style="list-style-type: none"> <li>• Scheduling production (1)</li> <li>• Converting order to production (1)</li> <li>• Materials requirements (1)</li> <li>• Labour requirements (1)</li> <li>• Deadlines (1)</li> <li>• Throughputs (1)</li> <li>• Machinery/equipment requirements (1)</li> <li>• Quality check requirements (1)</li> <li>• Specifying control points (1)</li> <li>• Health and safety requirements (1)</li> <li>• Storage requirements (1)</li> <li>• Distribution requirements (1)</li> </ul> <p>Accept any other appropriate response</p> <p>e.g. The stage where the manufacturer decides how the product is going to be made (1), what materials are needed (1) and what processes will be used during manufacturing (1).</p> <p>e.g. The stage where the specification for the milk chocolate bars is used by the planning team to set out all operations (1) and to schedule (1) the milk chocolate bars through the production/processing department to meet the required delivery deadlines (1). This could include specifying any special materials or consumables (1) and stating machinery requirements (1).</p> <p>3 x 1 mark for 3 low responses or up to 3 for a detailed response (1 x 3)</p>	(3)

**(Total 9 marks)**

Question	Answer	Mark
<b>10(a)</b>	<ul style="list-style-type: none"> <li>• Icing sugar</li> <li>• Pulverised sugar</li> <li>• Sugar</li> </ul> <p><i>Any other appropriate response</i></p> <p><i>Do not accept 'sweetener' or 'sucrose' on its own</i></p> <p style="text-align: right;">(1 x 1)</p>	<b>(1)</b>
<b>10(b) (i)</b>	<p>Any three of the following:</p> <ul style="list-style-type: none"> <li>• Fermenting (curing)the cocoa beans</li> <li>• Drying the cocoa beans</li> <li>• Sorting and cleaning the cocoa beans</li> <li>• Roasting the beans</li> <li>• Kibbling (making into nibs)the cocoa beans</li> <li>• Winnowing (removing the shells) form the cocoa beans</li> <li>• Grinding (into cocoa mass)</li> <li>• Ingredient addition i.e. milk crumb, sugar to make into milk crumb</li> <li>• Grinding milk crumb with cocoa butter and flavourings</li> <li>• Refining (to make smooth)</li> <li>• Conching (mixing and beating semi liquid chocolate to make smoother, develop flavour, reduce viscosity, reduce particle size, remove unwanted flavours)</li> <li>• Moulding into bars</li> <li>• Cooling bars (setting)</li> <li>• Removing bars from moulds</li> </ul> <p><i>Any other appropriate response</i></p> <p><i>Do not accept 'tempering' or the generic term 'heating/cooking'</i></p> <p><i>Accept any recognisable spelling (phonetic) of the answers above</i></p> <p style="text-align: right;">(3 x 1)</p>	<b>(3)</b>

Question	Answer	Mark
<p><b>10(b) (ii)</b></p>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• To ensure a glossy appearance</li> <li>• To ensure a smooth surface</li> <li>• To ensure a hard surface</li> <li>• Creates a brittle 'snap'</li> <li>• Minimise 'bloom' (fat)</li> <li>• Maximise shelf life</li> <li>• To achieve correct cocoa butter crystallisation</li> <li>• Correct flow / viscosity of melted chocolate</li> <li>• Correct moulding into bars</li> <li>• Quality standards are met</li> <li>• Reduced re-work</li> <li>• Less waste</li> <li>• Customer satisfaction</li> <li>• Fewer complaints</li> <li>• Increased sales</li> </ul> <p>e.g. Tempering is used to ensure the milk chocolate has the correct cocoa butter crystallisation structure (1) so that the bars snap correctly (1) and have no fat bloom (1)</p> <p><i>Accept any other appropriate response</i>  <i>Do not accept 'easier', or 'faster/quicker' without qualification</i></p> <p><i>3 x 1 mark for 3 low responses or up to 3 for a detailed response</i>  (1 x 3)</p>	<p><b>(3)</b></p>
<p><b>10(c)</b></p>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• materials are less likely to be made from non-renewable/finite resources</li> <li>• materials can be bio-degradable/compostable</li> <li>• materials take less processing in manufacture</li> <li>• materials consume less energy in manufacture</li> <li>• smaller volume of material is used</li> <li>• materials protect food for longer so less wastage</li> <li>• materials can be recycled</li> <li>• improved shelf life so less waste</li> </ul> <p>Accept references to packaging materials</p> <p><i>Do not accept generic responses such as 'less global warming' or 'less CO<sub>2</sub>' without qualification</i></p> <p><i>3 x 1 mark for 3 low responses or up to 3 for a detailed response</i>  (1 x 3)</p>	<p><b>(3)</b></p>
<p><b>(Total 10 marks)</b></p>		

Question	Answer	Mark
<b>11(a)(i)</b>	<p>Any two of the following:</p> <ul style="list-style-type: none"> <li>• Drafting possible solutions / final design drawings</li> <li>• Modelling/editing possible solutions/final designs</li> <li>• Conversion from 2D to 3D</li> <li>• Use of websites/internet to investigate existing designs</li> <li>• To source materials/supplies/consumables</li> <li>• Costing resource requirements</li> <li>• To communicate with client/customer</li> <li>• Easy storage and retrieval of data/information</li> <li>• Interaction with databases</li> <li>• To calculate nutritional values</li> </ul> <p><i>Accept any other appropriate response including references to design of packaging</i></p> <p>Do not accept software package names eg '2D design', 'autocad', 'sketch up' on its own.</p> <p>Do not accept a type of ICT without an appropriate link to one of the above points.</p> <p><i>No repetition</i></p> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>11(a)(ii)</b>	<p>1 mark for identifying the use (x2), 1 mark for how (x2)</p> <ul style="list-style-type: none"> <li>• Development of labelling (1) and/by electronic tagging protocol (1)</li> <li>• Electronic monitoring (1) of some packaging processes (1)</li> <li>• Use of bar codes (1) to monitor packaging/dispatch of milk chocolate bars(1)</li> <li>• Interrogating customer orders (1) so deliveries can be batched together (1)</li> <li>• Use of software (1) to record/log output of milk chocolate bars (1)</li> <li>• Real time dispatch and delivery information (1) in order to raise invoices (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i></p> <p style="text-align: right;">(2 x 2)</p>	<b>(4)</b>
<b>11(b)</b>	<p>1 mark for identifying the benefit, 1 mark for how</p> <ul style="list-style-type: none"> <li>• Establishes a market database (1) shared with the manufacturer (1)</li> <li>• Has accurate costing information (1) shared with the manufacturer (1)/that can be manipulated easily (1)</li> <li>• Gives retailers the opportunity to match customer needs (1) with production of milk chocolate bars (1)</li> </ul>	<b>(2)</b>

Question	Answer	Mark
	<ul style="list-style-type: none"> <li>• Gives retailer fast sales data (1) possibly leading increased sales/profits (1)</li> <li>• Accurate sales data (1) leads to accurate pricing (1)</li> <li>• Advertising/selling online (1) leads to wider market (1)</li> <li>• Assists with stock rotation (1) leading to less waste (1)</li> <li>• Navigation software (1) enables route planning to reduce costs (1)</li> <li>• Efficient tracking/monitoring (1) leads to fewer product losses (1)</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Low response (1) or two low responses (2) or detailed response (2)</i></p> <p style="text-align: right;">(1 x 2)</p>	
<b>11(c)</b>	<p>An answer that makes reference to any of the following points with explanation:</p> <ul style="list-style-type: none"> <li>• Fast time to market for latest types of milk chocolate bars</li> <li>• Use of ICT in market research enables manufacturer to match new types of milk chocolate bars to market want/needs</li> <li>• Function/style information available for whole design team</li> <li>• Speed/efficiency of modelling</li> <li>• Modification of ideas</li> <li>• Improved aesthetics</li> <li>• Ease/speed of creating virtual products</li> <li>• On screen design ideas</li> <li>• Speed of decision making by client</li> <li>• Easy access to design data</li> <li>• Working drawings/manufacturing specifications available for whole team</li> <li>• Easy access to manufacturing information in company database</li> <li>• Manufacturing time not wasted</li> <li>• Efficiency of costing materials</li> <li>• Speed of decision making for design team/client</li> <li>• Allows best materials to be used</li> <li>• Appropriate use of database</li> <li>• Modelling ensures characteristics are fit for purpose</li> <li>• Production processes are controlled better</li> </ul> <p><i>Accept any other appropriate response</i></p> <p><i>Up to 4 low responses (4) or detailed response (up to 4)</i></p> <p><i>e.g. 's</i></p> <p><i>ICT allows for conversion from 2D to 3D (1) which means designs can be modelled virtually (1) and then tested for development purposes onscreen (1). Resource requirements can also be planned from the virtual model (1).</i></p>	<b>(4)</b>

Question	Answer	Mark
	<p><i>Modelling ensures characteristics are fit for purpose (1) as it allows fast product development (1) as a result of creating virtual products (1), speeding up the decision making process between client and design team (1).</i></p> <p><i>Manufacturing time is not wasted (1) as decisions made by the client are quicker (1). This gets products to market faster (1), therefore increasing sales (1).</i></p> <p><i>Responding to the client's modification of ideas (1) allows modelling (1) of change and ensures efficiency of costing materials (1) and manufacturing time not wasted (1).</i></p> <p><i>ICT gives easy access to a range of design data (1) which means updating of drawings can be effectively carried out (1) and when linked to the production department, can change the requirements of operations (1) in production without lengthy delays (1).</i></p> <p><i>ICT has allowed new designs for milk chocolate bars to reach the market more quickly (1) as the design, development and production processes have become faster. Onscreen design ideas (1) can be modified (1) quickly and can easily be converted into a 3D model (1).</i></p> <p style="text-align: right;">(4 x 1)</p>	
<b>(Total 12 marks)</b>		

Question	Answer	Mark
<b>12(a)</b>	<p>1 mark for identifying effect (x2), 1 mark for extension (x2)</p> <ul style="list-style-type: none"> <li>• Workforce will be smaller in size (1) resulting in increased competition for fewer jobs (1)</li> <li>• Workforce will be better educated (1) as higher level of development skills required (1)</li> <li>• Less physically demanding tasks (1) but increased flexibility in work patterns [shifts] (1)</li> <li>• Less employment for unskilled (1) as constant need to retrain (1)</li> <li>• Team working more important(1) due to increased specialisation (1)</li> <li>• Improved promotion prospects for those in post (1) as skills in demand (1)</li> </ul> <p><i>Accept any other appropriate response</i>  <i>Low response (1) or two low responses (2) or detailed response (2)</i></p>	<b>(4)</b>
<b>12(b)</b>	<p>1 mark for identifying benefit (x 2), 1 mark for extension (x2)</p> <ul style="list-style-type: none"> <li>• Cleaner (1) – tidier processing/contained processing (1)</li> <li>• Safer (1) – automation can self regulate/work less likely to be done by humans/machines do not tire and become dangerous (1)</li> <li>• Quieter/reduction in noise pollution (1) – soundproofing possible as processing can be enclosed (1)</li> <li>• Healthier (1) – processes can monitor the environment and react accordingly (1)</li> </ul> <p><i>Accept any other appropriate response</i>  <i>Low response (1) or two low responses (2) or detailed response (2)</i></p>	<b>(4)</b>
<b>12(c)</b>	<p>Any 2 appropriate points stated:</p> <ul style="list-style-type: none"> <li>• Possible production throughput/quantities achievable with increased automation</li> <li>• Probable energy usage with increased automation</li> <li>• Cost of installing new automation</li> <li>• Cost of commissioning new automation</li> <li>• Operational costs of new automation</li> <li>• Maintenance costs due to complexity of automation</li> <li>• Product quality achievable with new automation</li> <li>• Product range achievable with new automation</li> <li>• Customer satisfaction achievable with new automation</li> <li>• Increased emissions/noise pollution due to increased automation</li> </ul> <p><i>Accept any other appropriate response</i>  <i>Do not accept responses associated with the workforce or the working environment</i></p>	<b>(2)</b>
<b>(Total 10 marks)</b>		

Question	Answer	Mark
<p><b>13</b></p>	<p>An answer that makes reference to any of the following points with explanation:</p> <ul style="list-style-type: none"> <li>• Collection and reuse of exhaust/vented gasses generated during production</li> <li>• Collection and reuse of conduction/convection/radiation heat generated during production</li> <li>• Collection and reuse of heat collected by cooling/ventilation systems</li> <li>• Use of Combined Heat and Power systems</li> <li>• Use of heat exchangers/heat sinks</li> <li>• Improving the energy efficiency of the heat generating process</li> <li>• Pre-heating to reduce energy usage</li> <li>• Heating other production processes, eg drying /roasting processes</li> <li>• Space heating</li> <li>• Heating water</li> <li>• Selling renewable electricity back to the National Grid</li> <li>• Absorption refrigeration</li> </ul> <p>e.g. The manufacturer of milk chocolate bars could use systems to collect and reuse heat from production processes (1), and these systems could pre-heat the same process (1), or the waste from processes could be used to heat water (1) in the production plant, all to save energy and money (1).</p> <p><i>Any other appropriate response</i></p> <p><i>Up to 4 low responses (4) or detailed response (up to 4)</i></p>	<p>(1 x 4)      <b>(4)</b></p>
<p><b>(Total 4 marks)</b></p>		



Question	Answer	Mark
<p><b>14</b></p> <p><b>QWC i, ii, iii</b></p>	<p><b>Indicative content</b></p> <p>Discussion may address the following issues:</p> <ul style="list-style-type: none"> <li>• <i>Benefit</i> <ul style="list-style-type: none"> <li>▪ Efficient manufacturing system</li> </ul> </li> <li>• <i>Development</i> <ul style="list-style-type: none"> <li>▪ Introduction of a pull system</li> <li>▪ Highly responsive to customer demand, as products can be manufactured as and when required</li> <li>▪ Production controlled by 'kanbans', hence manufacture not regarded as 'fixed' to a certain number</li> <li>▪ Errors dealt with as and when they occur, as issues with 'upstream' processes have a visible effect on 'downstream' processes</li> </ul> </li> <li>• <i>Benefit</i> <ul style="list-style-type: none"> <li>▪ Integrated supply chain</li> </ul> </li> <li>• <i>Development</i> <ul style="list-style-type: none"> <li>▪ Collaboration with suppliers results in productivity improvements along the supply chain</li> <li>▪ Reduced number of 'key' suppliers with a greater interest in ensuring the flow of completed product</li> <li>▪ Improved accountability/traceability, as defective product is easily identifiable</li> </ul> </li> <li>• <i>Benefit</i> <ul style="list-style-type: none"> <li>▪ Reduced inventory</li> </ul> </li> <li>• <i>Development</i> <ul style="list-style-type: none"> <li>▪ Minimises the cost of storing raw materials/'work in progress'/finished goods, as all arrive at the right place when required</li> <li>▪ Reduces the need for storage space, as a higher percentage of floor area can be used for 'value adding' activities</li> <li>▪ Product obsolescence/deterioration is highly unlikely, hence negligible percentage of unsold/waste stock</li> </ul> </li> <li>• <i>Benefit</i> <ul style="list-style-type: none"> <li>▪ Multi-skilled employees</li> </ul> </li> <li>• <i>Development</i> <ul style="list-style-type: none"> <li>▪ Employees are trained to complete a variety of tasks, so they can be deployed to ensure the smooth flow of production</li> <li>▪ Improved motivation, as variety in daily work</li> <li>▪ Workers empowered to suggest/implement improvements</li> </ul> </li> </ul> <p><i>Any other appropriate response</i></p> <p>Example learner answer (Level 3):  Just-in-time saves money by reducing inventory thus reducing the cost of storing raw materials and finished goods, as they should all arrive at the right place when required. This reduces the need for expensive storage space, so a higher percentage of floor area can be used for value adding activities, and simple kanbans can be used to signal when work in progress is ready for the next operation to</p>	<p><b>(6)</b></p>

Question	Answer	Mark
	be carried out. Because everything needs to happen smoothly and just-in-time, problems are very obvious and have to be dealt with there and then, and cannot be hidden. This means workers are generally multi-skilled, so they can go to the place in the factory that they are needed most to ensure the smooth flow of production.	
<b>(Total 6 marks)</b>		

Level	Mark	Descriptor
	<b>0</b>	No material deserving of reward
1	<b>1-2</b>	The learner identifies at least two benefits of using 'just-in-time' techniques or gives a brief description of one benefit, and shows some understanding of the topic. The learner uses everyday language and the response lacks clarity and organisation. Spelling, punctuation and the rules of grammar are used with limited accuracy.
2	<b>3-4</b>	The learner gives a brief description of at least two benefits of using 'just-in-time' techniques or a detailed description of one benefit. The learner uses some manufacturing/technological terms and shows some focus and organisation. Spelling, punctuation and the rules of grammar are used with some accuracy. Some spelling errors may still be found.
3	<b>5-6</b>	The learner gives a detailed explanation of at least two benefits of using 'just-in-time' techniques. The learner uses a range of appropriate manufacturing/technological terms and shows good focus and organisation. Spelling, punctuation and the rules of grammar are used with considerable accuracy.
<b>(Total 6 marks)</b>		
<b>Total Marks for Section B</b>		<b>60</b>
<b>Total Marks for the whole paper for Section A &amp; B</b>		<b>110</b>

