



## **GCSE**

## **Manufacturing**

Unit **B232**: Manufacturing Processes

General Certificate of Secondary Education

**Mark Scheme for June 2018**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

Annotation	Meaning
0	Award 0 mark
1	Award 1 mark
?	Unclear
BOD	Benefit of doubt
X	Cross
ECF	Error carried forward
○	Extendable ellipse
L	Good language
REP	Repetition
SEEN	Noted but no credit given
TV	Too vague
✓	Tick

Question		Answer	Marks	Guidance																
1	(a)	<p>One mark for each correctly joined manufacturing sector and product.</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>Manufacturing Sector</td><td>Product</td></tr> <tr><td>Chemical and pharmaceutical</td><td>Freeze-dried vegetables</td></tr> <tr><td>Clothing and textiles</td><td>Portable generator</td></tr> <tr><td>Electrical</td><td>Carrier bag</td></tr> <tr><td>Machinery and equipment</td><td>Car Windscreen</td></tr> <tr><td>Packaging</td><td>Alarm clock</td></tr> <tr><td>Food and drink</td><td>Ski jacket</td></tr> <tr><td>Motor manufacturing</td><td>Washing power</td></tr> </table> <p style="text-align: center;">(6x1)</p>	Manufacturing Sector	Product	Chemical and pharmaceutical	Freeze-dried vegetables	Clothing and textiles	Portable generator	Electrical	Carrier bag	Machinery and equipment	Car Windscreen	Packaging	Alarm clock	Food and drink	Ski jacket	Motor manufacturing	Washing power	6	No marks for more than one line to one product.
Manufacturing Sector	Product																			
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Clothing and textiles	Portable generator																			
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	(b) (i)	<p>Appropriate product made in the Machinery and equipment sector other than Portable generator.</p> <p>e.g. Crane, lathe</p>	1																	
	(b) (ii)	<p>One mark for identification of a valid manufacturing process; e.g. Any CNC machining/cutting or laser process. Moulding Fabrication Assembly</p>	1	Allow ecf mark for a process relevant to an inappropriate example in (i)																

Question	Answer	Marks	Guidance
2 a (i)	<p>One mark for each valid materials used in the manufacture of the product. e.g.</p> <p>Silk, cotton Specific food ingredients Specific Plastic Specific Metal Card/paper types Wood types/man-made boards</p>	2 (2x1)	<p>No mark for example of a manufactured product studied or made.</p> <p>Do not accept consumables eg..glue; screws; nails; etc</p> <p>Metals and plastics – must be specifically named</p>

Question		Answer	Marks	Guidance
2	(a) (ii)	<p>Up to two marks for valid health and safety precautions taken.</p> <p>e.g.</p> <p>Wear a mask to avoid breathing in dust, fumes Safe lifting Wear gloves to avoid cuts Goggles to avoid particles in eyes Precautions against chemical and heat burns. Get assistance/2 people to lift if it is heavy</p> <p>(2x1)</p>	2	<p>Precautions must relate to material(s) from part (i)</p> <p>Reference(s) to PPE must be specific</p>
	(b)	<p>One mark for each valid factor and one mark for importance.</p> <p>e.g.</p> <p>Cost If the material is too expensive(1) the profit of the product will be less(1) The material is readily available (1) to support mass/continuous production (1) The material is safe to use (1) so that workers are not at risk (1) The material/ingredients have a long shelf life (1) so that large quantities can be stored (1) Sustainable or recyclable materials (1) to minimise impact on resources and environment (1) The form that the materials are available in (1) to reduce the number of production processes (1) Material properties e.g. if it is too heavy (1), the product will be too (1)</p> <p>(2x2)</p>	4	<p>Accept other relevant factors</p> <p>Factors must be suitably justified for full marks</p>
3	(a)	<p>One mark for each valid factor and one mark for justification.</p> <p>e.g.</p> <p>Location of the supplier (1) so that materials can be supplied quickly/ good/reliable transport to the manufacturer/ minimise impact on the environment (1)</p>		

Question		Answer	Marks	Guidance								
		<p>High quality materials (1) so that the manufacturer can trust the quality of materials/ingredients (1)</p> <p>Adequate quantities are available (1) to allow production to be increased (1)</p> <p>Regular supply available (1) to meet manufacturers production demand (1)</p>	(2x2)    <b>4</b>	<p>Accept other relevant factors</p> <p>Factors must be suitably justified for full marks</p>								
	(b)	<p>Up to three marks for a clear explanation.</p> <p>e.g.</p> <p>Computerised stock control/ spreadsheets (1) are used to keep records of quantity of stock (1)</p> <p>The internet is used can be used to check the availability of stock from suppliers (2) available for manufacturing products.</p> <p>Email other branches or suppliers to check stock available. (2)</p> <p>Barcodes/RFID are used to scan quantities used (1) and confirm stock available (1)</p>	(3x1)    <b>3</b>	<p>Technology used must be referenced for full marks.</p> <p>1 mark for valid use of ICT or application and up to 2 further marks for explanation of use.</p>								
4	(a)	<p>1 mark for each manufacturing stages in the correct order.</p> <table border="1"> <thead> <tr> <th>Design Stage</th> </tr> </thead> <tbody> <tr> <td>1 <b>Producing design specifications</b></td> </tr> <tr> <td>2 Considering material details and constraints</td> </tr> <tr> <td>3 Considering production details and constraints</td> </tr> <tr> <td>4 Applying quality standards</td> </tr> <tr> <td>5 <b>Developing design ideas</b></td> </tr> <tr> <td>6 <b>Presenting a design solution</b></td> </tr> <tr> <td>7 <b>Modifying design solutions</b></td> </tr> </tbody> </table>	Design Stage	1 <b>Producing design specifications</b>	2 Considering material details and constraints	3 Considering production details and constraints	4 Applying quality standards	5 <b>Developing design ideas</b>	6 <b>Presenting a design solution</b>	7 <b>Modifying design solutions</b>	(4x1)    <b>4</b>	<p>ecf for stages in appropriate order but not correctly placed – max 2 marks</p>
Design Stage												
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Question		Answer	Marks	Guidance
	(b)	<p>Up to 3 marks for a clear explanation of modern technologies used.</p> <p>e.g.</p> <p>The internet could be used to research materials / production methods/existing products</p> <p>3D printing/ rapid prototyping/SLS/SLA used to create a model</p> <p>CAD used to model and create design ideas</p> <p>Laser cutting used to shape materials</p> <p>3D modelling Modern printing, mixing methods</p>	(3x1) <b>3</b>	<p>Reference to modern technology used must be specific</p> <p>Maximum two marks if no clear explanation offered</p>
5	(a)	<p>Appropriate description of identifying requirements.</p> <p>e.g.</p> <p>Research existing products (1) and consider how to modify the design(1) and improve product performance (1)</p> <p>Look at competitors designs (1) to find a gap in the market (1) to introduce new features/functions (1)</p> <p>Research new materials (1) new manufacturing processes(1) available to reduce cost (1)</p> <p>Reduced demand (1)for existing products manufactured (1) showing gap in market (1)</p> <p>New materials/ processes available (1) to improve quality (1) and increase demand (1)</p> <p>Contact client (1) to ask for a brief (1) and details of product features (1)</p>	(3x1) <b>3</b>	<p>Simplistic answer - 1 mark only</p> <p>Response must be well justified for full marks</p>

Question			Answer	Marks	Guidance
	(b)	(i)	<p>Valid modern technology used to make a prototype</p> <p>e.g.</p> <p>Computer controlled machines</p> <p>3D printing/ rapid prototyping/SLS/SLA (1) is used to create a model (1)</p> <p>3D modelling used to make the prototype</p>	(1x1)	<p>Do not accept CAD drawings.</p>
	(b)	(ii)	<p>Up to 3 marks for explanation.</p> <p>e.g.</p> <p>Prototype could be used to test the materials (1) of the design to see if they are robust (1) so the products will last long/withstand normal usage (1)</p> <p>To test the taste/texture/ (1) of the ingredients (1) so that customers will like the product (1)</p> <p>To test if the processes (1) are suitable to manufacture the product (1) and if production time/materials can be saved (1).</p>	(3x1)	<p>Do not accept repeated answers from 5(b) (i)</p> <p>1 mark for testing an aspect of the design, 1 mark for testing a factor of suitability/function and 3<sup>rd</sup> mark for reasoning.</p>
6	(a)	(i)	<p>Input device:</p> <ul style="list-style-type: none"> <li>• Electronic scales</li> <li>• Scanner</li> <li>• Sensors</li> <li>• Micro switch</li> <li>• Temperature probe</li> <li>• Start button/switch</li> </ul>	1	<p>Accept other appropriate examples</p>

Question			Answer	Marks	Guidance
6	(a)	(ii)	<p>Output device:</p> <ul style="list-style-type: none"> <li>• Digital output device</li> <li>• Arm to remove rejected products</li> <li>• Printout</li> <li>• Lamp/LED display</li> <li>• Buzzer/sounder/audible output device</li> <li>• Solenoid/relay</li> <li>• Computer display/screen</li> </ul>	1	Accept other appropriate examples
6	(a)	(iii)	<p>Up to three marks for clear explanation of a process with example of feedback system.</p> <p>e.g.</p> <p>Sensors are used to monitor (1) position and any differences (1) are measured and sensors provide feedback to the operator/PLC (1).</p> <p>Feedback is used to vary (1) the input/process (1) to maintain programmed tolerances (1).</p>	3	Reference to feedback must relate to control systems, not client feedback.
6	(b)	(i)	<p>Up to three marks for a clear description of a system to monitor weight.</p> <p>Finished products are moved along on a conveyor and weighed (1) on an electronic scale which is programmed to the required weight (1). Products are checked that they within set tolerances (1).</p> <p>Products over or under the tolerances are rejected (1) before packaging stage (1).</p>		Response must be well justified for full marks

Question		Answer	Marks	Guidance
		<p>Packaging is filled with the product which passes over scales (1). Products outside tolerances are rejected and moved off the conveyor (1).</p> <p>Description of an automated test system. (3x1)</p>	3	
6	(b) (ii)	<p>Valid description of impact on manufacturer</p> <p>Manufacturer will incur loss of production time (1) and wasted materials (1)</p> <p>Increased production costs (1) Orders not met and loss of custom (1)</p> <p>Requirement to investigate problem (1) in order to eliminate waste (1)</p>	2	<p>Do not award marks if simply related to customer experience</p> <p>Justified response required for full marks</p>
7	(a)	<p>Up to two marks for a clear description of each benefit.</p> <p>Speed of assembly (1) meaning increased production output (1)</p> <p>Reducing cost of making product (1) more efficient /lean processes/time /energy</p> <p>Improved quality of finish/product (1) to reduce processes required/waste/faulty products.(1)</p> <p>Reduce production staffing (1) less need for specialist skilled workers (1).</p>	4	<p>Justified response required for full marks</p>
7	(b)	<p>Up to three marks for a clear explanation.</p> <p>Poor quality products (1) which results in wasted materials (1) increased costs to production (1).</p> <p>Poor quality goods (1) causing loss of reputation with customer (1) and loss of trade against competitors (1).</p>		<p>Explanation to be clear and justified for full marks</p>

Question		Answer	Marks	Guidance
		<p>Cost of time and money for wasted products (1) more products need producing (1) to meet demand (1)</p> <p style="text-align: right;">(3x1)</p>	3	
8*		<p>Award up to six marks for a discussion of the impact on the manufacturer of introducing new production methods.</p> <p><b>Level 3 (5–6 Marks)</b> Detailed discussion showing a clear understanding of the impact on the manufacturer of introducing new production methods. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p><b>Level 2 (3–4 Marks)</b> Adequate discussion showing some understanding of the impact on the manufacturer of introducing new production methods. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p><b>Level 1 (1–2 Marks)</b> Basic discussion showing a limited understanding of the impact on the manufacturer of introducing new production methods. There may be little or no specialist language. The information and structure will be limited. There will be obvious errors in spelling, punctuation and grammar.</p> <p>Annotate with 'SEEN' at end of response. No ticks in the text.</p>	3	<p><b>Examples and relevant points could include:</b></p> <p>Staff and Safety;</p> <ul style="list-style-type: none"> <li>- staff will need to be trained to use the new machines/methods</li> <li>- machines may require programming, requiring specialist staff</li> <li>- new production methods mean safer working conditions for staff</li> <li>- more/additional staff may need to be employed to meet demand.</li> </ul> <p>Materials:</p> <ul style="list-style-type: none"> <li>- Improved use of materials/technologies/recyclable</li> <li>- Reduced storage of materials due to more advanced processes used</li> <li>- New methods should lead to production efficiency, less pollution.</li> <li>- Lower waste, saving costs of waste management.</li> </ul> <p>Production:</p> <ul style="list-style-type: none"> <li>- Cost of new machinery / methods needs to be offset by increased production /output</li> <li>- Time taken to produce products can be reduced with the introduction of new machines or processes.</li> <li>- Technology in manufacture may result in the need for more manufacturing space.</li> </ul> <p>Quality</p> <ul style="list-style-type: none"> <li>- New quality processes improve overall standard of products.</li> </ul>

Question		Answer	Marks	Guidance
		0 marks = no response or no response worthy of credit.	6	<ul style="list-style-type: none"> <li>- Reduction in human error problems</li> <li>Energy: <ul style="list-style-type: none"> <li>- Cleaner/alternative production processes could give the company a lower carbon footprint</li> </ul> </li> <li>PR <ul style="list-style-type: none"> <li>-Consumers may pay more for sustainably designed products</li> <li>-Manufacturer seeking alternatives to non-renewable materials, finding other sustainable materials give good public image</li> <li>-Using sustainable methods is good PR for companies which produce products</li> </ul> </li> </ul>

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