

**GCSE**

**Manufacturing**

Unit **B232**: Manufacturing Processes

General Certificate of Secondary Education

**Mark Scheme for June 2017**

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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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## Annotations

Annotation	Meaning
<b>BP</b>	Blank page
<b>VG</b>	Vague
	Tick
<b>SEEN</b>	Noted but no credit given
<b>REP</b>	Repeat
<b>K</b>	Knowledge
<b>EG</b>	Example/Reference
<b>DEV</b>	Development
	Cross
<b>BOD</b>	Benefit of doubt
	Unclear
<b>L3</b>	Level 3
<b>L2</b>	Level 2
<b>L1</b>	Level 1

## MARK SCHEME

Question			Answer / Indicative Content	Mark	Guidance
1	(a)	(i)	One mark for each valid sector  Chemical and pharmaceutical Clothing and textiles Electrical Food and drink Furniture Machinery and equipment Packaging Electronic and communications Motor manufacturing Paper and print  (2x1)	2	Accept viable alternative sector names without significant deviation.
		(ii)	One mark for each appropriate product.  Examples: Chemical and pharmaceutical - <b>Soap</b> Clothing and textiles – <b>Denim jeans</b> Electrical – <b>Alarm clock</b> Food and drink – <b>Tea bags</b> Furniture – <b>Dining table</b> Machinery and equipment – <b>Wheelbarrow</b> Packaging – <b>Lemonade bottle</b> Electronic and communications – <b>Computer mouse</b> Motor manufacturing – <b>Wheels</b> Paper and print - <b>Magazine</b>  (2x1)	2	Accept alternative relevant examples.

Question		Answer / Indicative Content	Mark	Guidance
1	(b)	<p>One mark for an example and up to two further marks for a description of how the modern technology is used.</p> <p>Examples:</p> <ul style="list-style-type: none"> <li>• Water transfer printing (1) allows printing to be done on 3D surfaces (1) of paper or card products(1)</li> <li>• Thermochromatic pigment (1) is mixed with acrylic paint. At room temperature it shows its usual colour (1), but when heated the colour changes to black (1).</li> </ul> <p style="text-align: right;">(3x1)</p>	3	<p>Example may be of product or technology</p> <p>ecf if example is not considered a 'modern' technology (e.g. 'vacuum forming') - 1 mark only</p>
2	(a)	(i) <p>No mark for the product example.</p> <p>One mark for the modern material example.</p> <p>Examples:</p> <p>Teflon Fibre Optics Neoprene Paperfoam Cornstarch Polymers Lyocell Nano Technology Synthetic micro fibres Lycra blends Polartec Composite materials Carbon &amp; Kevlar fibre Maplex</p>	1	Accept other valid examples
		(ii) <p>Up to two marks for a description of how the material is used as a feature of the product.</p> <p>E.g. Carbon fibre is moulded into shapes to make car body (1)</p>		ecf if example in part (i) is not considered a 'modern'

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		panels lighter and be able to withstand impact (1) better than some metals.  Cornstarch polymers are used in food packaging (1) as they do not react with the food but help the packaging breakdown (1) and biodegrade when disposed of.  (2x1)	<b>2</b>	material - 1 mark only
<b>(b)</b>	<b>(i)</b>	One mark for an appropriate material/ingredient  Examples: Sugar Soybean Plastic pellets (thermoplastics) Sand	<b>1</b>	Accept suitable alternatives
	<b>(ii)</b>	One mark for each appropriate material/ingredient.  Examples: Dyes Inks Food colouring Food flavouring Glues/adhesives Retardants Acids Paints Water Juices  (2x1)	<b>2</b>	Accept suitable alternatives  Do not accept manufactured products e.g. Coke, Lager, Fizzy drinks etc
	<b>(c)</b>	Up to two marks for a description of an appropriate safety factor  Example: Large sheet materials may be heavy and be difficult to handle safely (1), therefore the workforce will be provided		Justified description required for full marks Simplistic response e.g. 'wear gloves' 1 mark only

Question		Answer / Indicative Content	Mark	Guidance
		with PPE and or lifting equipment (1). (2x1)	2	Accept other relevant factors
3	(a)	One mark for each valid reason  Examples: Allows multiple products to be made at one time using multi-impression mould (1) Consistency and quality, all products will be exactly the same (1) The mould can be used over and over again (1). The mould will allow the same product to be made in different colours (1) Easy to make complex shapes (1) (2x1)	2	
	(b) (i)	One mark for each relevant example.  Scales Thermometer Vernier, Micrometer Gauge Laser measuring devices/Scanners.	1	Accept other relevant examples
	(ii)	Up to two marks for an adequate description of use  Examples: Products are passed over the electronic scales (1), over or underweight products are rejected.(1) A light box is used to check for undyed spots on the fabric (1) fabrics outside of the design threshold (1) are rejected. A thermometer is used to monitor the temperature of the cooked ingredients (1). (2x1)	2	Response must relate to the tool/piece of equipment given in part (i)  ecf if inappropriate example given in part (i) - 1 mark only

Question		Answer / Indicative Content	Mark	Guidance
	(c)	<p>One mark for each appropriate effect.</p> <p>Materials will be wasted            Cost of materials, labour, processes will be wasted            Production schedule may not be met            Company could get a bad reputation (2x1)</p>	2	Accept other viable response
4	(a)	<p>Up to two marks for each description of a manufacturing consideration requiring a change to the design specification.</p> <p>Examples:</p> <p>The materials (1) in the design specification may be too expensive for the product target market, so the specification is amended to use an alternative material with a lower cost (1)</p> <p>The choice of materials (1) are not robust enough for the demands of the product (1)</p> <p>The production methods (1) required to meet the specification, will not produce the finish required (1)</p> <p>(2x2)</p>	4	<p>Justified responses required for full marks</p> <p>Accept other relevant considerations</p>
	(b)	<p>One mark for example of the technology used and up to two further marks for a clear description of its use.</p> <p>Example:            An email (1) could be sent to the client containing an encrypted file CAD drawing (1) which provides electronic security, so only the intended audience can access the file contents (1).</p> <p>(3x1)</p>	3	Accept appropriate examples of ICT, including digital aspects.



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	(c) (i)	<p>One mark for an appropriate example.</p> <p>Examples:            Additive manufacturing/rapid prototyping/3D printing            CAM machining            Simulation using digital technologies</p> <p style="text-align: right;">(1x1)</p>	<b>1</b>	
	(ii)	<p>Up to two marks for a description of technology used.</p> <p>Example:            The prototype design is produced using additive manufacturing to produce a 3D model (1) of the 'product' from STL file.(1)            Digital technologies in textile manufacture (1) can be used for pattern generation (1) and virtual try-ons (1).</p> <p style="text-align: right;">(2x1)</p>	<b>2</b>	<p>Response must relate to the modern technology given in part (i)</p> <p>ecf if example in part (i) is not considered a 'modern' technology (e.g. 'vacuum forming') - 1 mark only</p>
	(d)	<p>Up to three marks for a clear explanation to include references to methods of producing products in quantity.</p> <p>Example:            The prototype was made as a one-off by hand to test the design (1). 50 moulds/patterns (1) will be made for each product. Some automated processes will be used to produce the product in quantity (1).</p> <p style="text-align: right;">(3x1)</p>	<b>3</b>	<p>Clear reference to quantity production required for full marks</p>
<b>5</b>	(a)	<p>One mark for each appropriate factor</p> <p>Examples:            Additional staff may need to be employed to manufacture the product (1)            New machines/technology may be required (1)</p>		<p>Accept simple but relevant responses such as:            'more workers'            'new machines'            'the cost of new technology'</p>

Question	Answer / Indicative Content	Mark	Guidance
	<p>The cost of new staff/machinery/technology required to manufacture the new line of products (1)</p> <p>The processes used for the materials may be different /new to existing methods used (1).</p> <p style="text-align: right;">(2x1)</p>	<b>2</b>	Accept other appropriate factors
<b>(b)</b>	<p>One mark for giving an appropriate example of training</p> <p>Examples:            Training for safe handling of the material            Training for handling hazardous substances            Training on hygienic use of the ingredients            Manual handling/Safe lifting            Correct storage procedure.</p> <p style="text-align: right;">(1x1)</p>	<b>1</b>	
<b>(c)</b>	<p><b>(i)</b> Up two marks for a clear description.</p> <p>Examples:            PPE equipment (1) may be required to minimise the risk of dust/chemical inhalation produced in the mixing/finishing processes (1)</p> <p>The workforce may need to be isolated (1) from the process of cutting/forming (1) to protect the workforce.</p> <p>Two workers (1) are needed to be used to carry out the process due to restricted access supervision/the need to guide the load involved (1)</p> <p>A water-based finish (1) is used to protect the workers (1) in the finishing processes.</p> <p style="text-align: right;">(2x1)</p>	<b>2</b>	

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	(ii)	<p>Up two marks for a clear description.</p> <p>Examples: A product in high demand (1) may require continuous/large scale production methods (1)</p> <p>Products in low/infrequent demand (1) can be produced in batches (1)</p> <p>Products in high demand (1) will require higher quality tooling to withstand increased usage/ several production lines producing the same products (1)</p> <p style="text-align: right;">(2x1)</p>	<b>2</b>	
<b>6</b>	<b>(a)</b>	<p>(i)</p> <p>One mark for each of two correct factors.</p> <p>Examples: Cost of material Availability – supply, quantity Quality of materials Delivery time/frequency</p> <p style="text-align: right;">(2x1)</p>	<b>2</b>	Accept other appropriate factors
	(ii)	<p>Up to two marks for a description of an impact</p> <p>Examples: Some materials need to be stored isolated from sources of heat, and ignition (1) due to being flammable (1)</p> <p>Ingredients need to be refrigerated (1) to keep them at a temperature that keeps them fresh / stops them going off (1)</p> <p>Materials need to be kept dry (1) and free from sources of moisture to stop the texture/chemical properties/shape/surface finish from being damaged (1)</p>		Accept other suitable examples.

Question			Answer / Indicative Content	Mark	Guidance
			(2x1)	2	
	(b)		<p>Up to two marks for a clear description</p> <p>Examples:            If the material is readily available, the manufacture does not need to store large quantities on site (1) and can use JIT, as he knows he can get more, quickly/ easily(1)</p> <p>If the material is being transported from another continent, the manufacture will hold enough materials on stock to meet the orders (1) so they do not run out causing production to stop (1).</p>	2	
7	(a)	(i)	<p>One mark for an appropriate input signal/device</p> <p>Computer mouse/keyboard/ Start computer programme            Push button/switch, lever.</p>	1	Accept any suitable input device/component
		(ii)	<p>One mark for each of two appropriate output signals/devices</p> <p>Examples:            Buzzer, bell, alarm, signal lamp            Robotic arm            Printer            Solenoid valve</p>	2	Accept other relevant devices
	(b)		<p>Up to three marks for a detailed description with an example of material forms and related processes.</p> <p>Examples:            Plastic supplied in pellet form (1) can be supplied in the correct colour (1) but will need to be heated into a liquid as</p>		Clear reference to the specific form of supply required for full

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	<p>part of the moulding process (1).</p> <p>Large sheet materials are cut using a laser cutter (1) to maximise the material usage per sheet to be more cost effective,(1) before being formed into shaped panels (1). (3x1)</p>	<b>3</b>	marks

Question	Answer	Marks	Content	Guidance
				Levels of response
<b>8*</b>	Up to six marks for a discussion or detailed explanation of the impact, including advantages and disadvantages, that the use of modern technology has on the design of new products.		<p>Response may include reference to:</p> <p>Modern technologies allow design ideas to be created relatively easily using CAD programmes and can be linked to additive manufacturing techniques.</p> <p>Modern technologies allow modelling of design ideas to calculate the results of changes in ingredients and materials to produce different product outcomes, such as different appearances, tastes, textures, function and comfort.</p> <p>Modern technologies can be used to make small changes or modifications to the design existing products to make newer versions.</p> <p>Modern technologies can be used</p>	<p><b>Level 3 (5-6 marks)</b> Thorough explanation, showing a clear understanding of the impact, including the advantages and disadvantages, that the use of modern technology has on the design of new products. Specialist terms and examples will be used appropriately and correctly. The information will be presented in a structured format. The candidate will demonstrate the accurate use of spelling, punctuation and grammar.</p> <p><b>Level 2 (3-4 marks)</b> Adequate explanation, showing an average understanding of the impact that the use of modern technology has on the design of new products. There will be some use of specialist terms and examples, 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, grammar and punctuation.</p> <p><b>Level 1 (1-2 marks)</b> Basic explanation, showing a limited understanding of</p>

Question			Answer	Marks	Content	Guidance
						Levels of response
					<p>to produce designs that reduce the cost of manufacturing using more efficient use of processes and materials.</p> <p>Designs that incorporate new technologies, modern and smart materials can increase production and product costs, making it difficult for manufacturers to remain competitive.</p> <p>Design ideas can be easily shared with developers and clients, and potential customers.</p> <p>Modern technologies results in existing product designs to quickly become outdated by market demands and competitor's products.</p> <p>Manufacturers need to continually innovate to keep up with market demands to remain competitive, which is expensive in terms of time, staff training, resources and technology.</p>	<p>the impact that the use of modern technology has on the design of new products.</p> <p>There will be little or no use of specialist terms or examples. Answers may be ambiguous, disorganised or 'list like'. Errors of grammar, punctuation and spelling may be intrusive.</p> <p>0 - a response not worthy of a mark. Add 'Seen' at end of response.</p> <p>When marking 'Levels of response' questions, if answers are presented as a list of bullet points then award Level 1 maximum and specific mark, 1 or 2, dependent on quality of list.</p> <p>Do not apply ticks or annotations to 'Levels of response' questions.</p> <p>Mark these by reading all of the response, then decide on an appropriate level and a specific mark.</p>
			<b>Total mark for paper</b>	<b>60</b>		

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

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**OCR (Oxford Cambridge and RSA Examinations)**  
**Head office**  
**Telephone: 01223 552552**  
**Facsimile: 01223 552553**

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