



*Rewarding Learning*

General Certificate of Secondary Education  
2015

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**Manufacturing**

Paper 1

Assessment Unit 3

*assessing*

Manufacturing Technology

**[GMA31]**

**MONDAY 12 JANUARY, AFTERNOON**

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**MARK  
SCHEME**

## General Marking Instructions

### **Introduction**

Mark schemes are intended to ensure that the GCSE examinations are marked consistently and fairly. The mark schemes provide markers with an indication of the nature and range of candidates' responses likely to be worthy of credit. They also set out the criteria which they should apply in allocating marks to candidates' responses. The mark schemes should be read in conjunction with these general marking instructions.

### **Assessment Objectives**

Below are the assessment objectives for Manufacturing.

Candidates must:

- recall, select and communicate their knowledge and understanding of manufacturing in a range of contexts (AO1);
- apply skills, knowledge and understanding, including quality standards, in a variety of contexts, and plan and carry out investigations and tasks involving a range of tools, equipment, materials and components (AO2); and
- analyse and evaluate evidence, make reasoned judgements and present conclusions (AO3).

### **Quality of candidates' responses**

In marking the examination papers, examiners should be looking for a quality of response reflecting the level of maturity which may reasonably be expected of a 16-year-old which is the age at which the majority of candidates sit their GCSE examinations.

### **Flexibility in marking**

Mark schemes are not intended to be totally prescriptive. No mark scheme can cover all the responses which candidates may produce. In the event of unanticipated answers, examiners are expected to use their professional judgement to assess the validity of answers. If an answer is particularly problematic, then examiners should seek the guidance of the Supervising Examiner.

### **Positive marking**

Examiners are encouraged to be positive in their marking, giving appropriate credit for what candidates know, understand and can do rather than penalising candidates for errors or omissions. Examiners should make use of the whole of the available mark range for any particular question and be prepared to award full marks for a response which is as good as might reasonably be expected of a 16-year-old GCSE candidate.

### **Awarding zero marks**

Marks should only be awarded for valid responses and no marks should be awarded for an answer which is completely incorrect or inappropriate.

### **Type of mark schemes**

Mark schemes for tasks or questions which require candidates to respond in extended written form are marked on the basis of levels of response which take account of the quality of written communication.

Other questions which require only short answers are marked on a point for point basis with marks awarded for each valid piece of information provided.

**Levels of response**

Tasks and questions requiring candidates to respond in extended writing are marked in terms of levels of response. In deciding which level of response to award, examiners should look for the “best fit” bearing in mind that weakness in one area may be compensated for by strength in another. In deciding which mark within a particular level to award to any response, examiners are expected to use their professional judgement. The following guidance is provided to assist examiners.

- **Threshold performance:** Response which just merits inclusion in the level and should be awarded a mark at or near the bottom of the range.
- **Intermediate performance:** Response which clearly merits inclusion in the level and should be awarded a mark at or near the middle of the range.
- **High performance:** Response which fully satisfies the level description and should be awarded a mark at or near the top of the range.

**Marking calculations**

In marking answers involving calculations, examiners should apply the “own figure rule” so that candidates are not penalised more than once for a computational error.

**Quality of written communication**

Quality of written communication is taken into account in assessing candidates’ responses to all tasks and questions that require them to respond in extended written form. These tasks and questions are marked on the basis of levels of response. The description for each level of response includes reference to the quality of written communication.

For conciseness, quality of written communication is distinguished within levels of response as follows:

Level 1: Quality of written communication is limited.

Level 2: Quality of written communication is satisfactory.

Level 3: Quality of written communication is excellent.

In interpreting these level descriptions, examiners should refer to the more detailed guidance provided below:

**Level 1 (Limited):** The level of accuracy of the candidate’s spelling, grammar and punctuation is limited. The candidate makes a limited selection and use of an appropriate form and style of writing. The organisation of material may lack clarity and coherence. There is little use of specialist vocabulary.

**Level 2 (Satisfactory):** The level of accuracy of the candidate’s spelling, grammar and punctuation is satisfactory. The candidate makes a satisfactory selection and use of an appropriate form and style of writing supported with appropriate use of diagrams as required. Relevant material is organised with some clarity and coherence. There is some use of specialist vocabulary.

**Level 3 (Excellent):** The level of accuracy of the candidate’s spelling, grammar and punctuation is excellent. The candidate successfully selects and uses the most appropriate form and style of writing, supported with precise and accurate use of diagrams where appropriate. Organisation of relevant material is excellent. There is excellent use of appropriate specialist vocabulary.

			AVAILABLE MARKS	
<b>1</b>	<b>(a)</b>	Printer Newspapers (2 × [1])	[2]	4
	<b>(b)</b>	Lab equipment Hazard Barrels (2 × [1])	[2]	
<b>2</b>	<b>(a)</b>	Try-square Used to mark 90 degree lines on wood/mark lines perpendicular to straight edges. Used to mark squareness/check squareness (2 × [1])	[2]	10
	<b>(b)</b>	Dowel rod Used to join 2 pieces of wood. To produce a wooden joint (2 × [1])	[2]	
	<b>(c)</b>	Coping saw Used for cutting curves or intricate shapes in wood or plastics. Cutting thin wood (2 × [1])	[2]	
	<b>(d)</b>	Wood plane/Jack plane Used to remove fine shavings of wood to increase the quality of surface finish. Used to reduce the dimension of a wood (2 × [1])	[2]	
	<b>(e)</b>	Screwdriver Used to turn screws, enabling them to grip and be drawn into a material. To insert screws into and out of wood, metal, and plastic (2 × [1])	[2]	
	<b>(a)</b>	<b>(i)</b> 1. Ferrous; 2. Non-ferrous. Alloy not accepted (2 × [1])	[2]	
<b>3</b>		<b>(ii)</b> Ferrous contains iron, non-ferrous do not	[2]	11
		<b>(iii)</b> Contains 2 or more metals/a mixture of metals	[2]	
		<b>(iv)</b> Contains 2 or more materials/a mixture of materials	[2]	
	<b>(b)</b>	<b>(i)</b> Riveting/accept pop rivets	[1]	
		<b>(ii)</b> Brazing/welding/soft soldering	[1]	
		<b>(iii)</b> Nut and bolts/machine screws/self tapping screws	[1]	

			AVAILABLE MARKS
<b>4</b>	<b>(a)</b>	<b>(i)</b> CAD is Computer Aided Design; is related to the design of an object CAM is Computer Aided Manufacture; is related to the manufacture of an item/product from a computer based design (2 × [1])	[2]
		<b>(ii)</b> Designs can be emailed to clients/distributors; modelling can show up potential problems; can be used for manufacturing; Other answers considered (2 × [1])	[2]
		<b>(iii)</b> Advantages – can be more accurate; repetitive accuracy; can be faster production method; potential for low cost per unit once initial set-up costs are met; leads to fewer people needing to be employed by manufacturing company; less potential for human error; Other answers considered	[1]
		Disadvantages – potential for increase in unemployment because smaller workforce needed; high set-up costs; extra training needed for workforce to use CAM equipment; Other answers considered	[1]
			6
<b>5</b>	<b>(a)</b>	<b>(i)</b> Plastics such as nylon; PVC; ABS; polystyrene; polythene; Others considered	[1]
		<b>(ii)</b> MDF; mild steel; acrylic; PVC; plywood; copper; brass; rigid polystyrene; tin plate; Others considered	[1]
		<b>(iii)</b> Acrylic; various types of soft and hard woods; brass; aluminium; steel; Others considered	[1]
		<b>(iv)</b> Mild steel; aluminium; acrylic; Others considered	[1]
		<b>(v)</b> Acrylic; mild steel; aluminium; pvc; copper; Others considered	[1]
	<b>(b)</b>	<b>(i)</b> Injection moulding/vacuum forming	[1]
		<b>(ii)</b> Advantage – very fast production method; low cost per unit for mass production; accurate and detailed products; high quality finish; Others considered	[1]
		Disadvantage – less need for manual workers/reduction in workforce; additional training needed for worker to operate machines; expensive to repair; moulds are expensive; moulds are large/very heavy and need to be stored when not in use; others considered	[1]
	<b>(c)</b>	Polymers – PVC; PET; Nylon; Upvc; Others considered	[1]
		Application – window frames; drinks bottles; clothing; toys; machine parts; Others considered	[1]
			10

			AVAILABLE MARKS	
6	(a)	(i) G-clamp/G Cramp	[1]	6
		(ii) Holding work for drilling, hold pieces of material for welding	[1]	
		(iii) To prevent the surfaces of the material being damaged by the force of the G-clamp	[2]	
(b)	(i) Chisel	[1]	6	
	(ii) Marking gauge; try square, ruler	[1]		
7	(a)	Marketing; Production Planning; Production; Assembly (4 × [1])	[4]	
	(b)	(i) Answer should include – details on main frame construction (welding), cutting the worktop, jigs, cutting tools, i.e. saws (2 × [1])	[2]	
		(ii) Answer should include – sourcing and ordering of materials, use of CIM, supply of box section for frame/base, hardwood top, vices for holding work, ordering material so that supply can meet demand. Monitoring of material supply and control (2 × [1])	[2]	
		(iii) Answer should include – hardwood top is cut to size and varnished and attached to the frame. Vices are attached to the frame. Frame can be painted. Plastic inserts put on the bottom of the box section frame to prevent flooring being damaged. Welding of the frame (2 × [1])	[2]	
8	(a)	(i) Computer Integrated Manufacture.	[1]	8
		(ii) Materials only ordered when needed; products are manufactured when orders are made; stock control; producing identical parts; Other answers considered (2 × [1])	[2]	
	(b)	Marketing and advertising of products; research; emailing drawings/designs; providing contact details and technical information; selling products directly to customers; searching for and buying raw materials; Other answers considered (3 × [1])	[3]	
(c)	Develop clothing patterns; cut out clothing using specialist equipment; Other answers considered – movement of material around – measuring of materials (2 × [1])	[2]	8	

		AVAILABLE MARKS
<b>9 (i)</b>	Product – any product from the manufacturing industry will be considered [1]  Quality control checks – checking tolerances of materials or parts; checking for parts that could cause injury; checking the function; repetitive operations/functions to enable the manufacturer to provide a warranty; machine checks (preventative); Other answers considered (2 × [2])  Quality control check 1 [2]  Quality control check 2 [2]	
<b>(ii)</b>	Maintain a reputable name for high quality products; enable the manufacturer to supply a product with a warranty; maintain/maximise profits; fit for item to be used safely by the customer; Other answers considered [2]	7
<b>10 (i)</b>	By use of CIM, manufacturers can order raw materials to meet the supply and demand of products that have been ordered; companies can predict orders based on trends of sales from previous years; stock control and dispatch details kept on record; Other answers considered [3]	
<b>(ii)</b>	Answers can include various sources of information, related to: use of recycling; impact on environment; plastics generally require processing by machines that have led to a reduction in workforce/need for more highly skilled labour; environmental impact on extracting materials to make plastics/polymers; greenhouse gases; landfill; time taken for plastics to naturally break down; reduction in use of plastic carrier bags; Other relevant areas of discussion will be considered [5]	8
<b>Total</b>		<b>80</b>