Rewarding Learning

General Certificate of Secondary Education
2016

Manufacturing

Paper 1

Assessment Unit 3

assessing

Manufacturing Technology

[GMA31]

TUESDAY 21 JUNE, MORNING

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
1	**(a)**	Mobile phone PS4 controller (2 × [1]) [2]	
	(b)	Gears Motorbike engine (2 × [1]) [2]	4
2	**(a)**	Mallet Used to tap the handle of a chisel to assist with the removal of wood; to be used to tap wood to fit wood into a wood joint; (2 × [1]) [2]	
	(b)	Pliers Any **one** from list below: Used to grip wire; Can be used to cut wire (2 × [1]) [2]	
	(c)	Chuck key Used to open or close a chuck for a drill, enabling the user to insert or remove a drill bit (2 × [1]) [2]	
	(d)	Nail punch/centre punch Any **one** from list below: Used to indent a piece of metal for drilling; To sink or nail flush or below the surface (2 × [1]) [2] Alternative answers for each part of the question will be considered	8
3	**(a)**	**(i)** Any **three** from list below: Sheet; Bar; I beam; Tube; Box section; Angle (3 × [1]) [3]	
		(ii) Any **two** from list below: It could be used as an insulator; It could be used to prolong the life of the wire; It is protective coating for the wire; Add colour coding to electric wires (2 × [1]) [2] All alternative answers will be considered.	
	(b)	A shape memory alloy is an alloy that remembers its original shape [1] and that when deformed returns to its pre-deformed shape when heated. [1] (2 × [1]) [2] All alternative answers will be considered.	7

					AVAILABLE MARKS
4	(a)	(i)	Any **three** from list below: Bathroom ware; Sinks; Crockery; Vases; Ornamental features; Heat/electrical insulating; Electrical resistors (3 × [1])	[3]	
		(ii)	Any **two** from list below: Electrical insulator; Brittle; Hardness; (2 × [1]) All alternative answers will be considered.	[2]	
	(b)		Any **three** from list below: Foundations; Window sills; Beams; (3 × [1]) All alternative answers will be considered.	[3]	8
5	(a)		Any **two** from the list below: Rapid speed; Ability to move heavy goods Avoid personal injury Automatic counting of products Enhancing hygiene for medical products (2 × [1]) All alternative answers will be considered.	[2]	
	(b)		Any **two** from list below: Car parts; Bottling plants; Food production, e.g. prepare food (2 × [1]) All alternative answers will be considered.	[2]	
	(c)		Any **three** from list below: Remotely operated vehicles; Automated guided vehicles; Fork lifts; Lorries; Crane/pulley system; Industrial robots (3 × [1]) All alternative answers will be considered.	[3]	7

			AVAILABLE MARKS
6	**(a)**	Any **three** from list below: Customer's details; Supplier's details; Employer's details; Stock information (3 × [1]) [3] All alternative answers will be considered.	3
	(b)	Used to design products. Used to simulate design before manufacture. Used by companies to manufacture products by linking up CNC machinery. (3 × [1]) for points [3] (3 × [1]) for discussion [3]	6

AVAILABLE MARKS

7 Indicative content

- From design to print is a quicker process
- Typesetting is no longer used by the publishing companies
- The quality of the printed product has improved
- The use of colour in print has added to the visual impact/aesthetics
- High quality paper can be used for batch runs, e.g. leaflets
- Design and editorial work can be carried out at remote locations which require smaller facilities
- Printing may be carried out at remote cheaper locations
- One printing facility can serve multiple publications/publishing centres
- Higher resolution of images as printing facilities improve
- Software allows for easier editing of design work.

All alternative answers will be considered.

Quality of written communication is assessed in this question.

Response type	Description	Mark Band
When a response is not worthy of credit, a [0] should be awarded.		
Limited	Students make an attempt to discuss some or all of the 4 points. The discussion is limited and conveys a limited understanding of the question areas. The accuracy of spelling, punctuation and grammar is limited.	[1]–[2]
Satisfactory	Students make an attempt to discuss some or all of the 4 points. The discussion is satisfactory and contains a satisfactory understanding of the question areas. The accuracy of spelling, punctuation and grammar is satisfactory.	[3]–[5]
Very good	Students discuss all points/areas. The points discussed are clear and relevant. The accuracy of spelling, punctuation and grammar is very good.	[6]–[8]

[8] 8

8 **(a)** So that plastic can be softened and be reshaped. [1] So that it can be manufactured into a component/part. [1]

(1 × [2]) [2]

All alternative answers will be considered.

(b) It is a non-conductor
Good heat resistance once formed
High surface hardness
Resistance to static

(2 × [1]) [2] 4

All alternative answers will be considered.

				AVAILABLE MARKS
9	(a)	(i)	Extrusion;	
		(ii)	Compression moulding;	
		(iii)	Line bending;	
		(iv)	Vacuum forming;	
		(v)	Injection moulding. (5 × [1]) [5]	
	(b)	(i)	To allow for fitting of the PCB/circuitry board, buttons. (1 × [2]) [2] All alternative answers will be considered.	
		(ii)	Any **two** from list below: Suitable for mass production to justify cost of mould; Intricate details; Reduce cost per unit. (2 × [1]) [2] All alternative answers will be considered.	9
10	(a)		Indicative content • Greater possibility to telecommute or work from home or remote offices • More flexibility in work hours meaning more suitable for workers with families • Greater use of video conferencing to create virtual meetings (6 × [1]) [6] [1] for each point and [1] for discussion of each point. All alternative answers will be considered.	
	(b)		Indicative content • Shift work because of continuous production • Multinational companies require some staff to work unsociable hours to suit differences in time zones • Some staff are required to travel and spend time away from home at different sites/countries • Increased work demands often require staff to work additional hours when they return home • Flexi hours (6 × [1]) [6] [1] for each point and [1] for discussion of each point. All alternative answers will be considered.	

			AVAILABLE MARKS
(c)	Indicative content • Use of alternative fuels leads to lower emissions • Less waste leading to less landfill • Greater possibility of recycling • Waste from factory used as a heating source for the factory • Improved recycling • More global legislation to ensure correct disposal of toxic waste • Improved health conditions associated with reduction of pollution • Toxic waste (4 × [1]) [1] for each point and [1] for discussion of each point. All alternative answers will be considered.	[4]	16
		Total:	**80**