Rewarding Learning

General Certificate of Secondary Education
2015

Manufacturing

Paper 1

Assessment Unit 3

assessing

Manufacturing Technology

[GMA31]

TUESDAY 16 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)	Sewing machine Rail of clothes (2 × [1]) [2]	
	(b)	Drawing pad Cardboard (2 × [1]) [2]	4
2	(a)	Electric drill Used to make holes in a material by attaching a drill bit and making it turn, wasting the material; used to drive screws with appropriate bit. (2 × [1]) [2]	
	(b)	Hacksaw Used to cut metal. (2 × [1]) [2]	
	(c)	Vernier calipers Used for measuring; fine measurements, less than 1 mm or fractions of inches. (2 × [1]) [2]	
	(d)	G-clamp Used to hold two or more pieces of material or objects together; used to clamp work for drilling/joining. (2 × [1]) [2]	
	(e)	Nut and bolt Used as a semi-permanent or temporary method of joining two or more pieces of material. (2 × [1]) [2]	10
3	(a) (i)	Groups – thermoplastics (examples – acrylic; polystyrene; PVC; polythene; others considered) and thermosetting plastics (examples – Polyester; phenol formaldehyde; urea formaldehyde; epoxy resin; others considered) (4 × [1]) [4]	
	(ii)	Thermoplastics can be heated, softened and formed as many times as required. Thermosetting plastics will set the first time that they are heated, softened and formed. They cannot be moulded again. [2]	
	(b) (i)	Line bender or strip heater. [1]	
	(ii)	Sketch showing a jig or block with a 60° angle. [2]	9

		AVAILABLE MARKS
4	**(a)** Any **two** from: Computer Aided Design; Computer Aided Manufacture; CIM; Designs can be emailed to clients/distributors; stock control; receiving orders over the Internet; advertising; other answers considered. (2 × [1]) [2]	
	(b) Any **two** from: Machines can perform the jobs of several workers; fewer workers needed to operate machines; machines reduce the risk of human error; greater accuracy; other answers considered. (2 × [2]) [4]	
	(c) Drawing – convert to STL file – open STL file in CNC software – set up CNC machine and billet – set datums and run machine – remove finished part. (5 × [1]) [5]	11
5	**(a)** **(i)** Computer Integrated Manufacture. [1]	
	(ii) Any **two** from: Stock control; control conveyor systems; desktop publishing; using CAD and CAM; control of robotics; recording of orders; keep records of materials/components; other answers considered. (2 x [1]) [2]	
	(b) Any **two** answers from: Stock control – Increase efficiency of a company by ensuring that materials are ordered only when required; production lines can run for 24 hours per day without the need for shift work or paying overtime rates; programming of NC machines, avoiding humans writing lines of code; inspection for quality assurance related tasks; other answers considered. (2 × [2]) [4]	
	(c) High set-up cost; staff need retraining; others considered [2]	9
6	**(a)** Ferrous [1] Non-ferrous [1] Ferrous example – Iron [1] Non-ferrous example – Aluminium [1] Other answers considered	
	(b) **(i)** An alloy is a mixture of two metals to improve the characteristics of the metal. [2]	
	(ii) Brass Solder Pewter (2 × [1]) [2]	8

				AVAILABLE MARKS
7	(a)		Advantages include: newer materials/fuels designed to give off less polluting gases; lower emissions; more products are made with materials that can be recycled; other answers considered. [1] Disadvantages include: introduction of plastics has led to waste that takes many years to break down; more complex power supplies in modern technological appliances can lead to pollution when they need to be disposed of; other answers considered [1]	
	(b)	(i)	Saves energy; reduces need of natural resources; reduces pollution; economic benefits; saves space for waste disposal; other answers considered. (2 × [1]) [2]	
		(ii)	Examples of environmental harm such as wildlife/flora/fauna being damaged; water table being polluted by chemicals being disposed of; burning of refuse contributing to global warming; other answers considered. [2]	6
8	(a)	(i)	Introduction of new technology or more highly developed automated systems to increase efficiency/productivity/quality of products. [2]	
		(ii)	Disadvantages include – reduction in numbers of employees; high set-up costs; possible increase in pollution; other answers considered. Disadvantage explained. (2 × [1]) [2]	
	(b)	(i)	Newer printing systems have increased feed and production of print; other answers considered. [1]	
		(ii)	The design and layout of newspapers are produced quicker by newer software; as newer printing machines are produced, the rate of feed and rate of print production increase; newer machines improve print quality; other answers considered. [1]	
		(iii)	With the increased use of automated systems, printing can continue 24 hours a day. [1]	
	(c)		Expensive software; cost of installing conveyor system and press is high; automated systems have replaced workers causing greater unemployment; workers need to be highly skilled; other answers considered. (2 × [1]) [2]	9

			AVAILABLE MARKS
9	(i)	Customer satisfaction ensuring they are happy with their product (returns cause a reduction in profits); maintain reputation of supplying quality products; other answers considered. [2]	
	(ii)	Function; weight; size; ergonomics; reliability; position of features; ease of operation; other answers considered. (2 × [1]) [2]	
	(b)	Tolerance is the acceptable level of inaccuracy in a dimension. [2] e.g. ± 1 mm	6
10	(a)	Marketing and advertising of available materials and ability to compare prices of suppliers; information available for ordering and speed of delivery of materials; specifications of materials are readily available, providing critical information for textile/clothing producers regarding the performance of specific materials; marketing of products and comparing with rival companies; the Internet can be used to work out prices of products that will be sold so that they are competitive with rival companies; emailing of design to prospective clients; other answers considered. (2 × [2]) [4]	
	(b)	Advantages – useful for marketing products; researching raw materials; sending designs to potential clients; other answers considered. [1]	
		Disadvantages – potential for designs to be copied; viruses; expenses; web security; other answers considered [1]	
	(c)	Communicating designs through web marketing and advertising; demonstrate how specific clothing can appear on different people; conveying how designs can be used; promote products by having them used by celebrities who appear on many web publications; online ordering; online auction sites; other answers considered. (2 × [1]) [2]	8
		Total	**80**