



Rewarding Learning

**General Certificate of Secondary Education
2014**

Engineering

Paper 1

Assessment Unit 3

assessing

Engineering Technology

[GEE31]

FRIDAY 23 MAY, AFTERNOON

**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 Engineering.

Candidates must:

- recall, select and communicate their knowledge and understanding of engineering 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 candidates 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 candidates 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 candidates 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)	Padlock [1] Chain for a bike [1]	[2]	4
	(b)	Metal hinge [1] Wheelbarrow [1]	[2]	
2	(a)	Try Square [1] Accurately mark 90° angles [1]	[2]	10
	(b)	Bearing [1] To enable a shaft to rotate freely, e.g a steering mechanism [1]	[2]	
	(c)	Countersink drill bit [1] To allow screws to fit flush with the surface being drilled [1]	[2]	
	(d)	Split pin [1] To lock a nut onto an axle [1]	[2]	
	(e)	Tin snips [1] Used to cut sheet metal [1]	[2]	
3	(a)	Difference stated between any of the stated three with corresponding examples. Hardwood is a deciduous tree, e.g. oak Softwood is coniferous, e.g. fir tree Ferrous contains iron and can rust, e.g. steel Non-ferrous contains no iron, e.g. aluminium Thermoplastics have plastic memory, e.g. acrylic Thermosetting doesn't have plastic memory, e.g. urea formaldehyde Definition [1] × 2 Example [1] × 2	[4]	10
	(b)	Ductility: Is a solid material's ability to deform under tensile stress. Other answers considered	[2]	
		Malleability: Capable of being shaped or formed as by hammering or pressure. Being able to be drawn out/stretched. Other answers considered	[2]	
		Toughness: The ability of a material to absorb energy and plastically deform without fracturing. Ability to resist shocks/sudden blows. Other answers considered	[2]	
4	(a)	Toolpost Tailstock Three jaw chuck Knurling tool Any three (3 × [1])	[3]	

			AVAILABLE MARKS
	<p>(b) Chuck key: Used to tighten the three jaw chuck so that item can be held securely when being worked on. A spring is often fitted to ensure that the key is removed from the lathe before operating [2]</p> <p>Swarf: Unwanted material which can be discarded when drilling or facing off/turning down etc. Waste material. Other answers considered [2]</p> <p>Feed: Feed refers to the distance the cutting tool moves during each revolution of the workpiece. It is expressed in millimetres per revolution. The smaller the feed the better the finish. Other answers considered [2]</p> <p>Clearance angle: The clearance angle ensures that only the cutting tool comes into contact with the work. Without clearance, the tool would just rub against the work without cutting. Other answers considered [2] (2 × [2])</p>	[4]	7
5	<p>(a) Computer Aided Manufacture</p>	[1]	
	<p>(b) Designs can be viewed in 3D Quicker lead times Mistakes can be modified easily Other answers considered (2 × [2])</p>	[4]	
	<p>(c) Advantage: Accuracy of the finished piece Other answers considered [2]</p> <p>Disadvantage: High set-up cost Staff need trained Other answers considered [2]</p>	[4]	9
6	<p>(a) Quality Assurance does check the quality of the final product, the quality of all systems on the production line, staff training and quality monitoring. If this is to the highest standard, the quality of the final product should also be high. Quality Control checks the quality of the product at different stages of production. Other answers considered (2 × [1])</p>	[2]	
	<p>(b) To ensure that no products are returned due to being faulty To ensure that the products are safe to use Other answers considered</p>	[2]	
	<p>(c) Appropriate product stated Impact of Quality Assurance stated related to the product highlighted</p>	[2]	6

			AVAILABLE MARKS
7	<p>(a) Design: Ideas and designs which a few years ago would have seemed impossible are now able to be manufactured. Other answers considered [2]</p> <p>Development: Products are able to be made much more compact Other answers considered [2] [4]</p> <p>(b) Better market share More robust better quality products are able to be made enabling them to keep up with their competitors. Other answers considered (2 × [2]) [4]</p>		8
8	<p>(a) (i) Appropriate definition of etching – cut design on metal surface or engraving [2]</p> <p>(ii) Appropriate definition of plating – coating with another metal for protection or decoration [2]</p> <p>(b) (i) The point is damaged by constant contact with other metals. [2]</p> <p>(ii) Part X of the centre punch is hardened by heating the point to a cherry red and then rapidly cooling it in clean water. The point must be dipped vertically and moved about in the water to achieve proper cooling. Other answers considered [2]</p> <p>(iii) Hold the component securely Wear protective clothing in case of steam or oil flashback. Other answers considered [2]</p>		10
9	<p>(a) Products can be manufactured much quicker More consistency across manufactured products Other answers considered (2 × [2]) [4]</p> <p>(b) High set-up cost. If they break down they can stall the whole production run Other answers considered (2 × [2]) [4]</p>		8
10	<p>(a) Two relevant examples highlighted of how health and safety has impacted on the manufacturing of engineered products. (2 × [2]) [4]</p> <p>(b) Wearing proper clothing Wearing appropriate face/hand protection Clear and tidy work area Other answers considered (2 × [2]) [4]</p>		8
Total			80