



*Rewarding Learning*

**General Certificate of Secondary Education  
2015**

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**Engineering**

Paper 1

Assessment Unit 3

*assessing*

Engineering Technology

**[GEE31]**

**TUESDAY 19 MAY, MORNING**

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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 GCSE 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 products, 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):** Candidates presentation, spelling, punctuation and grammar 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):** Candidates presentation, spelling, punctuation and grammar 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):** Candidates presentation, spelling, punctuation and grammar 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) Gears G Clamp (2 × [1])	[2]	4
	(b) Ladder Revolving door (2 × [1])	[2]	
2	(a) Welding Use – Used to weld metal box section together for the frame of a gate Others considered	[1] [1]	10
	(b) Allen key Use – A tool of hexagonal cross section used to drive screws bolts that have a hexagonal socket in the head Others considered	[1] [1]	
	(c) Hacksaw Safety precaution – Ensure that the user holds the saw when using it with both hands Others considered	[1] [1]	
	(d) Pop riveting Use – Used to join sheet metal Others considered	[1] [1]	
	(e) Bull nose pliers Use – Used to pull components through a PCB board Others considered	[1] [1]	
	(a) Information Communication Technology	[1]	
	(b) You can get in contact with people more easily via email Others considered	[1]	
	(c) It can crash, stopping productivity High set-up cost Others considered	[1]	
	(d) Remote manufacturing of products can take place much faster Easier transfer of information/data Others considered	[2]	
	(e) <b>Positive impact</b> It is a good marketing tool Others considered	[1]	
<b>Negative Impact</b> You have little control over it. People can say bad things and you have no control over it Others considered	[1]	7	

			AVAILABLE MARKS	
4	<b>(a)</b> Boat hull			
	<b>(i)</b> Modern material – Carbon fibre	[1]		
	<b>(ii)</b> Systems and control technology – Computer aided design of the shape of the boat Others considered	[1]		
	<b>(b)</b> Bulletproof jacket			
	<b>(i)</b> Modern material – Kevlar	[1]		
	<b>(ii)</b> Systems and control technology – Specialist CNC cutting equipment used to cut and shape Others considered	[1]		
	<b>(c)</b> Staff need retrained to use the equipment/process More floor space may be required to implement the equipment (2 × [2]) Others considered	[4]	8	
	5	<b>(a)</b> Make sure the welding wire feed is coming out at the correct speed Wear a welding face shield (2 × [2])	[4]	
		<b>(b)</b> Non-ferrous metal – Aluminium Others considered	[1]	
Low carbon steel was used as it has a good strength to weight ratio Others considered		[2]		
	<b>(c)</b> Template/jig Digital verniers Go gauge no go gauge (2 × [2]) Others considered	[4]	11	
	6	<b>(a)</b> Smooth movement Reduces friction (2 × [1]) Others considered	[2]	
<b>(b)</b> Oil Grease, coolant (2 × [1]) Others considered		[2]		
<b>(c)</b> Stops the machining bit from breaking Leaves a good finish Cooling (2 × [1]) Others considered		[2]	6	

			AVAILABLE MARKS	
7	<b>(a)</b>	Reduced lead times		6
		Less staff to pay (2 × [1])	[2]	
		Others considered		
	<b>(b)</b>	Less human involvement		
		More automation	[2]	
		Others considered		
	<b>(c)</b>	Less wastage		
		More products can be produced in a shorter period of time (2 × [1])	[2]	
		Others considered		
8	<b>(a)</b>	They will work in a safer environment		
		Less of a workforce needed		
		More skilled workforce required Others considered	[2]	
	<b>(b)</b>	Less errors will occur in the manufacture of products therefore less waste		
		Products can be recycled more easily (2 × [2])		
		Others considered	[4]	
	<b>(c)</b>	The cost of the equipment		10
		The cost of retraining staff (2 × [2])	[4]	
		Others considered		
9	<b>(a)</b>	<b>(i)</b> Is the diameter of the turned down rod correct?	[2]	
		Others considered		
		<b>(ii)</b> Is the surface finish left by the mill correct having milled the top layer away from a material?	[2]	
	<b>(iii)</b>	Does the soldered component have a uniform solder joint around it and is is soldered to the solder side of the PCB?	[2]	
		Others considered		
		<b>(b)</b> Products will not be returned as frequently		
Safer for the consumer	[2]			
Others considered				

<b>10 (a)</b>	Design – More complex design can be drawn up using CAD [2] Development – 3D printers have enabled complex units to be fabricated in one piece which previously could not be achieved [2] Others considered	<b>AVAILABLE MARKS</b>
<b>(b)</b>	Production lines have be redesigned due to tooling restraints Staff need to be trained in the use of the equipment to ensure that the assembly and dispatch of products runs smoothly If part of the process breaks down for any reason it can hold up the whole production line (3 × [2]) [6] Others considered	10
<b>Total</b>		<b>80</b>