



# **GCSE**

## **Engineering**

**Unit A622/02: Engineering Processes**  
General Certificate of Secondary Education

**Mark Scheme for June 2014**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Question		Answer	Mark	Guidance
1	(a)	<p>One mark for each relevant product relating to sector</p> <p>Examples;</p> <p>Computers, Communication &amp; IT - monitor; mouse; laser printer; scanner; radio</p> <p>Automotive - car wheel; petrol engine; gearbox; headlight</p> <p>Structural &amp; Civil - bridges; office blocks; roads</p> <p>Rail &amp; Marine - signalling system; navigation system; locomotive</p>	4 (4x1)	Accept other relevant examples of products
	(b)	<p>Aerospace; Electrical &amp; Electronic; Medical &amp; Pharmaceutical; Chemical &amp; process</p>	2 (2x1)	
2	(a)	<p><b>A</b> - Chuck</p> <p><b>B</b> - Toolholder/ <b>toolpost</b></p> <p><b>C</b> - Tailstock</p>	3 (3x1)	Do not accept headstock
	(b)	<p>One mark for precaution plus one mark for justification</p> <p>Examples:</p> <p>Secure work securely in chuck</p> <p>Use guards to protect from flying swarf</p> <p>Remove chuck key after tightening work</p> <p>Keep work area clear of obstructions/people</p> <p>Use correct speed/feed to prevent breakages</p> <p>Use of LV light over machine</p> <p>Know position of emergency stop button in the event of emergency</p> <p>No loose clothing / hair / jewellery that could get caught in the chuck / leadscrew</p>	4 2 x (1+1)	No marks for PPE

Question		Answer	Mark	Guidance
	(c)	Micrometer; digital/vernier caliper; outside calipers; rule (2x1)	2	Not Go-NoGo gauge / jig /dividers – must be measuring device Allow tape measure as BOD
3	(a)	One mark for each correctly named example of material types  Examples: Ferrous metal - cast iron; wrought iron; steel; any other type of steel Alloy - brass; bronze; duralumin; steel; any other type of steel Polymer - ABS; HIPS; PVC; PP; Nylon (6x1)	6	Not just 'Iron'  Accept any other suitable examples
	(b)	One mark for suitable example and up to two marks for explanation of use of 'smart' material  Example: Thermochromic pigment applied to the plastics material of a child's mug. Mug changes colour to show when the contents are too hot Use of SMA in fire alarm systems. When the alloy gets hot the change in shape can operate the alarm and/or the sprinkler system (3x1)	3	Fully detailed response required for full marks

Question		Answer	Mark	Guidance
4	(a)	<p>Up to two marks for a description of any part of the chosen stage of manufacture</p> <p>Examples:</p> <p>Assembly and finishing - parts are assembled together to make a finished product</p> <p>Design - Design ideas are produced and developed into a final design</p> <p>Processing and production - Processes are used to produce a finished item</p> <p>Production planning - All the materials and components are bought and the processes worked out to make the item</p> <p style="text-align: right;">2 x (1+1)</p>	4	Simplistic statements one mark only if relevant to stage
	(b)	<p>One mark for reference to the technology used and up to two further marks for a reasoned explanation of its use</p> <p>Examples:</p> <p>The Internet can be used for marketing by putting details of products on a webpage</p> <p>Customers can be sent information about new products by email</p> <p>Digital 3D/animations showing products to potential customers</p> <p style="text-align: right;">(3x1)</p>	3	Response must relate to 'marketing'
5	(a)	<p>One mark for example plus up to two marks for description of use</p> <p>Example:</p> <p>Automated/CNC machines can be used to make products in large quantities without need for workers</p> <p>Robot arms can remove mouldings from injection moulding</p>		Do not accept reference to design process / CAD

Question		Answer	Mark	Guidance
		machines and pass them across scanners to check them PLCs can be used to control processes and movement of work (3x1)	3	
	(b)	One mark for example plus up to two marks for description of use  Example: Sensors monitor air quality in factories and automatically switch on air conditioning/purifying systems to protect workers; machines are more enclosed to keep workers safe from cutters and moving parts (3x1)	3	Response must relate to 'working conditions'
6	(a)	One mark for each process named  Drilling; turning; sawing; filing; threading; routing; chiselling; planing; grinding; plasma / laser cutting (3x1)	3	Not simply 'cutting' or 'sanding'
	(b)	No mark for process selected  Examples: Turning - lathe; chuck; cutting tool Threading - tap; tap wrench/holder; vice Chiselling - chisel; hammer; vice (3x1)	3	ecf if process other than material removal given in (a) Do not accept repetition of tool types Not reference to PPE Do not accept consumables as equipment
	(c)	No mark for type of process  Examples: Shaping & manipulation - vacuum forming; casting;		

Question		Answer	Mark	Guidance
		forging; injection moulding; extrusion Joining & assembly - riveting; welding; soldering Heat & chemical treatment - hardening; annealing; pickling Surface finishing - painting; anodising; electro-plating; galvanising; plastic/powder coating; polishing; etching (2x1)	2	
7	(a)	One mark for each correctly named component plus one mark for correctly identified type  Pressure gauge - Pneumatic/hydraulic Circlip / C-clip - Mechanical LDR (Light dependant resistor) - Electrical/electronic (6x1)	6	
	(b)	One mark for example of use and up to two marks for description  Example: Pressure Gauge - used to measure the pressure of air in a pneumatic circuit. Is usually fitted to a (pressure) regulator valve.  Circlip - used to stop things from moving along a shaft. The clips are put into grooves on each side of the object so that it can't move along,  LDR- used to make electronic circuits light sensitive. Can switch on light when its dark. (3x1)	3	Response must relate to actual component in the table, even if incorrectly named  Reasoned description required for full marks

Question		Answer	Marks	Guidance	
				Content	Levels of response
8*		Up to six marks for a discussion or critical evaluation of issues relating to the advantages and disadvantages to a manufacturer of introducing modern technologies.	6	<p>Response may include reference to the following points:</p> <p>Production is speeded up so more products can be made</p> <p>More consistent quality/accuracy of products</p> <p>Changes to products can be made more easily</p> <p>Less labour required to operate machines</p> <p>Manufacturer gets good reputation for products</p> <p>Better working environment for workers</p> <p>Initial cost of systems is high</p> <p>Need to ensure increase in sales to pay for new technologies</p> <p>Staff need to be trained/paid more to work in new ways</p>	<p><b>Level 3 (5 - 6 marks)</b> Thorough analysis showing a clear understanding of the advantages and disadvantages to a manufacturer of introducing modern technologies. Specialist terms will be used appropriately and correctly. The information will be presented in a structured format. The candidate can demonstrate the accurate use of spelling, punctuation and grammar.</p> <p><b>Level 2 (3 - 4 marks)</b> Adequate discussion showing an understanding of the advantages and disadvantages to a manufacturer of introducing modern technologies. There will be some use of specialist terms, although these may not always be used appropriately. The information will be presented for the most part in a structured format. There may be occasional errors in spelling, punctuation and grammar.</p> <p><b>Level 1 (0 - 2 marks)</b> Basic discussion showing limited understanding of the advantages and disadvantages to a manufacturer of introducing modern technologies. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of spelling, punctuation and grammar may be intrusive.</p> <p>List of bullet points – 2 marks Max.</p>
		<b>Total for paper</b>	<b>60</b>		

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