

GCSE **ENGINEERING**

48503 Mark scheme

4850 June 2014

Version: 1.0 Final

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

		Expected answ	wers					Mark	notes
1		name			What it	is used for		5	
		scriber				What it is used for marking out on metal or plastic (1)			
		Odd leg call	ipers (1)			marking lines parallel to an edge on			
						metal or plastic (1)			
		Callipers or Dividers (1)				scribing arcs/circles or checking measurement (1)			
									Total (5 marks)
2	(a)		Length	Width/DIA	Thickness	Material	Quantity	5	
		Legs	3000	50	50	low carbon steel angle	4		
		Rail	1000	50	50	low carbon steel angle	2		
		Seat	600	220	20	polypropylene	1		
		Seat Support Bracket	690	30	2	low carbon steel	2		
		Seat Rods	1500	Ø12		low carbon steel	2		

2	(b)	A = Metric - accept mm (1)	4	
	()	B = Diameter - accept width of bolt (1)	'	
		C = Length (1)		
		D = Hexagon head - accept Hex bolt or bolt type (1)		
2	(c)	Any one of:	1	
	(-)	Cadmium plating		
		Zinc plating – galvanising		
				Total (10 marks)
				1 our (10 mante)
3	(a)	Exploded drawing accept Assembly drawing and Isometric drawing	1	
3	(b)(i)	One mark for any of the following points:	4	
		Correct shape		
		Located on centre line		
		Cross hatching		
		End of spigot correctly located on leg		
3	(b)(ii)	Correct 3 rd angle symbol	1	
3	(c)	The tolerance allowed (1)	2	
		Machined within 0.02 larger/smaller than 4mm (1)		
		Acceptable variation in diameter part can be between 3.98 – 4.02 mm (1)		
		State the symbol means diameter (1)		
3	(d)	Read out does not require interpretation (1)	2	
		Less chance of human error (1)		
		Accuracy (1)		
		Faster to use than a device with scale (1)		
				Total (10 marks)
4	(a)	Award One mark for each of the following points:	4	
		All three correct dimensions on drawing		
		Header line		
		Solid arrow heads		
		Dimensions central above line		

		Diameter symbol		
4	(b)	Award One mark for any of the following points:	2	
		Stamping		
		Press formed		
		Plasma cut		
		CNC milling machine		
		Detail of the operation of the process		

4	(c)	Circuit with wires at right angles (1) Symbol for cell or battery (1) Switch (1) LED (1)		
				Total (10 marks)
_	()			
5	(a)	Award One mark for any of the following points:	3	
		Ease of use Complexity of manufacture		
		Complexity of manufacture		
		Ergonomic considerations		
		• Cost		
		Sustainability/material usage Sefety		
		Safety QWC		
		Up to 3 marks available for command of English.	3	
		Some attempt made (1)		
		 Logical, structured answer possibly with some punctuation and grammar 		
		inaccuracies. (2)		
		Technically correct and well punctuated in good flowing English (3)		
5	(b)	Award One mark for any of the following points:	4	
		Most plastics are made from oil. Oil is a none renewable resource.		
		Thermoplastics can be recycled		
		Some modern plastics can be made from plant products such as Potato		
		starch which is sustainable		
		Thermosetting plastics cannot be remoulded or recycled		
		Most plastics are not biodegradable		
		A large proportion of plastics end up in landfill		
		Burning plastics can produce toxic fumes		
		Any other relevant or additional detail describing the impact on the		
		environment		
				Total (10 marks)

Award **One** mark for any of the following points: (a) 2 • Draft angle No sharp corners Smooth surface No features which would inhibit the removal of the mould Any other relevant point 6 (b) Advantage: • Lighter weight than steel Self finishing • Not prone to corrosion • Potentially stronger more rigid than plastic Disadvantage: • Can be more expensive • Time consuming to manufacture

Award **One** mark for any of the following points: (c) 2 Toxic fumes Irritation from fibres Explosion/fire risk Storage leaks/contamination Award **One** mark for any of the following points: 6 (d) 4 • Use of a jig to ensure accuracy of alignment each time Use of underside support to reduce risk of damage Use of ring saw Use of simple clamping system Use of CNC drill Appropriate form of protection to stop damage to the batch Total (10 marks) 7 (a) Award **One** mark for any of the following points: 2 Can import data Electronic post Rotate/enlarge view from a variety of angles Quick and easy to modify drawings More accurate than manual drawing Can be linked to a CAM machine 7 (b) Award **One** mark for any of the following points: 2 reduce over heads less stock storage Less time required to locate parts Any other suitable point Award **One** mark for any of the following points: (c) 2 Needs a highly coordinated work force Sharing of data Dependant on reliable supply chains Production may stop due to stock shortages Less flexibility if customers require customized items

• May reduce ability to respond quickly to new orders Additional mark for extended detail or describing the impact Award One mark for any of the following points: 7 (d) 2 • Robots can be programmed directly from the CAD system • To carry out tasks such as; material handling, spot welding, machine loading, paint spraying, product assembly and quality control • Providing an example of an industrial application (e) Award **One** mark for any of the following points: • Carrying out tasks in environments that are hazardous to humans examples of specific tasks include radioactive or paint spraying Reduce risks of repetitive strain injuries • Support lifting of heavy weights Total (10 marks)

8	(a)	A metallic material consisting of two or more metals.	1	
8	(b)	Award One mark for any of the following points:		
		Corrosion resistance		
		Improving material properties		
		fluidity		
		Improving machining characteristics		
		Hardness		
		Elasticity		
		Change melting point		
8	(c)	Machining	1	
8	(d)	Award One mark for any of the following points:	2	
		1. Set up costs		
		2. Machinery		
		3. Rates/rents for a year		
		Labour rates agreed for fixed periods of time		
8	(e)	Award One mark for any of the following points:	3	
		Change in materials based on supply and demand		
		Energy costs		
		Transport costs		
		Unforeseen maintenance costs		
		Unforeseen quality control issues		
		Improved performance due to experience		
		Describing the impact of any of the above points		
				Total (10 marks)
				Total marks for paper (75 marks)