

Design and Technology

General Certificate of Secondary Education

Unit **A544**: Industrial Technology Technical Aspects of Designing and Making

Mark Scheme for January 2012

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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	Marks	Guidance
1	(a)	(i)	Kitchen knife – stainless steel Washing-up bowl – polypropylene / ABS Electrical wire – copper School coat hook – mild steel/ brass/bronze Racing car bodywork- carbon fibre (5x1)	5	Material must be from list given.
		(ii)	Brass; bronze; copper (2x1)	2	<u>NOT</u> stainless steel
	(b)		Explanation to include reference to different materials(1); combined to give improved properties (1); example given (1) (3x1)	3	
	(c)		Clear description (1) of one specific use (1) Examples: use of shape memory alloy in alarms/ locks/ spectacle frames; use of thermochromic /photochromic dyes/inks in clothing/plastic products (2x1)	2	
			Total	12	

Question		Answer	Marks	Guidance
2	(a)	To prevent the body from rusting; to improve the appearance	1	
	(b)	Wider wheel easier to push; plastic will not rust / can be left out in rain; handles can be removed for storage; easier to clean out; no sharp corners on body (2x1)	2	Accept 'lighter' if justified
	(c)	One piece body easier to produce; expensive tools needed so not for small-scale production; very quick to produce body / shorter production time; simpler assembly (3x1)	3	

Question		Answer	Marks	Content	Guidance
					Levels of response
	(d*)	Up to six marks for a discussion or detailed analysis of the benefits of using plastics to manufacture everyday products	6	<p>Discussion may include consideration of the following points:</p> <p>Ability to form complex shapes easily with correct application of tooling/processes</p> <p>Manufacturing processes are particularly suitable for batch or high-volume production</p> <p>Speed of manufacture / often one-piece construction</p> <p>Often used to make products lighter / safer</p> <p>Most plastics materials are suitable for recycling</p> <p>Wider range of products available</p> <p>Often cheaper to produce than more 'traditional' materials</p>	<p>Level 3 (5-6 marks) Shows clear understanding of the benefits of using plastics in manufacturing and gives suitable examples. 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>Level 2 (3-4 marks) Shows some understanding of the benefits of using plastics in manufacturing. 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, grammar and punctuation.</p> <p>Level 1 (0-2 marks) Shows only limited understanding of any benefits of using plastics in manufacturing. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive.</p> <p>When marking 'Levels of response' questions, if answers are presented as a list of bullet points then award Level 1 maximum and specific mark 0, 1 or 2 dependent on quality of list.</p>

Question			Answer	Marks	Content	Guidance
						Levels of response
						Do not apply ticks or annotations to 'Levels of response' questions. Mark these by reading all the answer, decide on an appropriate level then a specific mark.
			Total	12		

Question			Answer	Marks	Guidance
3	(a)	(i)	Quieter running; cheaper to produce/repair; belts can 'slip' to prevent breakages/injuries if any problems; quick and easy to change speed (2x1)	2	Reference to cheapness only allowed once.
		(ii)	Belt on largest motor pulley (top) and smallest spindle pulley (bottom) (2x1)	2	Award one mark if only one belt position is correct (either one).
	(b)	(i)	Drill and ream on drilling machine (or hand reamer) Drill and ream / bore on centre lathe (1+1)	2	Drilling stage <u>must</u> be included for any marks. No mark for simple reference to drilling
		(ii)	Acceptable difference from required sizes; need to ensure that all parts will fit together as needed; (size + on hole; size – on shaft) Clear(1) explanation (1) with appropriate example (1) (3x1)	3	
	(c)		Clear explanation (1) containing reference to availability / cost savings / quality and consistency (1) compared with making 'in-house' / using different machines / skills / materials / using valuable manufacturing space and time (1) (3x1)	3	Reference to cost must include comparison with 'in-house' manufacture of components.
Total				12	

Question		Answer	Marks	Guidance
4	(a)	Cheaper than other metals; stronger than most other metals; Easy to form into shape (malleable); accepts most finishing methods. (2x1)	2	'Cheap' and 'Strong' must be qualified.
	(b)	Fault - Only one fixing hole; bracket could turn Imprvt. - Add another fixing hole Fault - Not strong enough / metal too thin Imprvt. - Make from thick steel / add strengthener Fault - Difficult to remove extinguisher Imprvt. - Change shape / change hook Fault - Sharp edges on bracket Improv. - Round-off / smooth corners One mark for each relevant fault and appropriate improvement (6x1)	6	
	(c)	The jig must: <ul style="list-style-type: none"> locate the bracket accurately hold the bracket firmly for drilling allow the brackets to be drilled quickly be safe to use. One mark for each point clearly shown / annotated (4x1)	4	
Total			12	

Question		Answer	Marks	Guidance
5	(a)	<p>One mark for each appropriate precaution.</p> <p>Eg Brazing – goggles; gloves; apron; leave work to cool Drilling – Clamped work; machine guard; goggles Turning – remove chuck key; machine guard; goggles Milling – Goggles; machine guard; work clamped in vice Linishing – goggles; dust extraction; fingers well back from belt/disc (3x1)</p>	3	Precautions <u>must</u> be clearly relevant to chosen process eg not 'wear gloves' for drilling
	(b)	<p>Explanation to include reference to identifying potential hazard; assessing amount of risk; suggesting methods of protection. (3x1)</p>	3	Clear, structured response required for full marks.

Question		Answer	Marks	Content	Guidance
					Levels of response
	(c*)	Up to six marks for a discussion or detailed analysis of the advantages and disadvantages to manufacturers of introducing modern manufacturing methods and systems.	6	<p>Discussion may include consideration of the following points:</p> <p>Cost to the company of new equipment / systems</p> <p>Cost savings by using modern methods / systems</p> <p>Possible reduction in workforce</p> <p>Re-training staff for new methods / systems</p> <p>Increase in efficiency</p> <p>Improved quality / quality control</p> <p>Increased output</p> <p>More flexibility for manufacturing</p> <p>Relevant sustainability issues.</p>	<p>Level 3 (5-6 marks) Shows clear understanding of the effects of introducing modern manufacturing methods and systems into manufacturing companies and gives suitable examples. 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>Level 2 (3-4 marks) Shows some understanding of the effects of introducing modern manufacturing methods and systems into manufacturing companies. 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, grammar and punctuation.</p> <p>Level 1 (0-2 marks) Shows only limited understanding of any effects of introducing modern manufacturing methods and systems into manufacturing companies. There will be little or no use of specialist terms. Answers may be ambiguous or disorganised. Errors of grammar, punctuation and spelling may be intrusive.</p>

Question			Answer	Marks	Content	Guidance
						Levels of response
						<p>When marking 'Levels of response' questions, if answers are presented as a list of bullet points then award Level 1 maximum and specific mark 0, 1 or 2 dependent on quality of list.</p> <p>Do not apply ticks or annotations to 'Levels of response' questions.</p> <p>Mark these by reading all the answer, decide on an appropriate level then a specific mark.</p>
			Total	12		
			Total for paper	60		

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