

# **Design and Technology**

General Certificate of Secondary Education

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

## **Mark Scheme for June 2012**

---

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

© OCR 2012

Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

Question		Answer	Marks	Guidance
1	(a)	J & E Marking line at right angles to edge (1+1) G & K Cutting thread in hole (1+1) B & D Accurately measuring slot or hole (1+1) M & H Cutting thread on round bar (1+1)	8	Allow mark for reference to measurement
	(b)	Use of layout / marking fluid/blue Permanent marker Centre / dot punch outline. Laser 'etched' outline (2x1)	2	
	(c)	Saves time marking out (templates and jigs); quicker machining (jigs); all products the same (templates and jigs); less skill needed (2x1)	2	
<b>Total</b>			<b>12</b>	

Question		Answer	Marks	Guidance
2	(a)	Heat to required temperature Apply powder – roll/ dip/ spray/ fluidiser Leave to cool/cure (3x1)	3	Must have reference to heat for <u>any</u> marks. This may come after application of powder if electrostatic spraying is correctly referenced.
	(b)	Case harden mild steel; change material used to tool/carbon steel; make less sharp initially (2x1)	2	Allow reference to making tool thicker Alternative material must be specified/justified
	(c)	Description must have reference to finger grooves (1) to fit the fingers of the user's hand (1) (2x1)	2	
	(d)	(i) Less waste material (laser beam narrow); less cost, no special tool-sets required; cleaner cut without burrs; once programmed no skilled labour needed ; details stored on computer (2x1)	2	
		(ii) Once tools are made, can make any number needed; repeat orders easy to manufacture; can use machinery for different products / less machine 'down time'; less expensive equipment than 'mass production'; suitable for use with JIT; reduced unit production cost per unit/ more profit made ; quick response to changes in demand (3x1)	3	Benefits must relate to the manufacturer.  Points given need to be justified.  Reference to speed of manufacture - 1 mark only unless fully justified
<b>Total</b>			<b>12</b>	

Question			Answer	Marks	Guidance
3	(a)	(i)	Correct shape of net (1) Correct orientation / fill blank (1) (2x1)	2	
		(ii)	Hacksaw / Junior hacksaw / Coping Saw / Abrafile (2x1)	2	Reference to saw must be specific
	(b)		Requirements : fixed securely to a wall – eg two screws easily removed for cleaning – eg 'keyhole' slots or hanging bar (2x1)	2	

Question		Answer	Marks	Content	Guidance
3	(c)*	Up to six marks for a discussion or critical evaluation of the benefits to a manufacturer of using CAD/CAM when designing and making prototypes for new products.	6	<p>Discussion may include consideration of the following points:</p> <ul style="list-style-type: none"> <li>Ease of changing designs on CAD</li> <li>Importing features into CAD</li> <li>Able to produce 3D images / animations easily</li> <li>Can save and share designs electronically</li> <li>CAD designs imported into CAM directly</li> <li>CAM machines produce prototypes quicker than 'modelling'</li> <li>Rapid prototyping can produce prototypes in any material</li> <li>Many different prototypes can be made quickly for comparison</li> </ul>	<p><b>Level 3 (5-6 marks)</b> Shows clear understanding of the benefits to a manufacturer of using CAD/CAM when designing and making prototypes 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><b>Level 2 (3-4 marks)</b> Shows some understanding of the benefits to a manufacturer of using CAD/CAM when designing and making prototypes. 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><b>Level 1 (1-2 marks)</b> Shows only limited understanding of any benefits to a manufacturer of using CAD/CAM when designing and making prototypes. 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>0 = a response not worthy of a mark. Add 'Seen' at end of response</p>

Question			Answer	Marks	Content	Guidance
						<b>Levels of response</b>
						<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 , 1 or 2 dependent on quality of list.</p> <p>Do not apply ticks or annotations to 'Level of response' questions.</p> <p>Mark these by reading all the answer, decide on an appropriate level then a specific mark.</p>
			<b>Total</b>	<b>12</b>		

Question		Answer	Marks	Guidance
4	(a)	Steel is readily obtainable; less 'mining' needed so less environmental damage; steel is recyclable so less raw material usage; less energy needed for extraction/processing than some metals (2x1)	2	
	(b)	(i) Clamp in vice for drilling; Drill suitable hole ( $\varnothing 5$ ); Apply cutting grease; Thread with taper tap; Use plug (or second) tap; Clean out thread (swarf and cutting grease)  Any four stages in logical sequence producing threaded hole (4x1)	4	Max. number of taps = 2  Allow reference to 'cleaning/removing burrs' once only
		(ii) Use of locknut/castle nut; use of self-locking/nyloc nut; use of locking /spring/tab washer; use of thread sealant (loctite) (2x1)	2	Do not accept 'welding/brazing/soldering'
	(c)	Requirements: prevent theft of the hanging baskets. allow the hanging baskets to be removed when required. details of processes and components used.  One mark for each spec. point clearly covered (2); processes / components (2) (4x1)	4	
<b>Total</b>			<b>12</b>	



Question		Answer	Marks	Guidance
5	(a)	<p>One mark for each relevant spec. point</p> <p>Examples:            Mechanism / parts must be strong enough for repeated use            Bin must be easy to clean            Lid must seal to prevent smells            Bin must be suitable size for standard 'bin liners'            Design must be suitable for batch / mass production            Bin must not rust            Lid must open wide enough to put rubbish in            Lid must stay open when lifted</p> <p>Any other <i>relevant</i> specification point (2x1)</p>	2	
	(b)	Injection moulding	1	
	(c)	Clear/annotated diagram of workable solution (1) showing a suitably pivoted (1) linkage joining the pedal to the lid (1) (3x1)	3	

Question		Answer	Marks	Content	Guidance
					Levels of response
5	(d)*	Up to six marks for a discussion or critical evaluation of the issues to consider when making products from different materials	6	<p>Discussion may include consideration of the following points:</p> <p>Cost of setting-up for production in different materials</p> <p>End of life disposal of products/materials</p> <p>Different skills / processes needed</p> <p>Retraining staff on new equipment / materials</p> <p>Whether to 'buy-in' parts from other (specialist) manufacturers</p> <p>Application of JIT to manufacturing /assembly of products</p> <p>Quality control (assurance) of bought-in items</p> <p>Storage / manufacturing space required</p> <p>Compatibility of materials used together</p>	<p><b>Level 3 (5-6 marks)</b> Shows clear understanding of the issues involved when making products from a number of different materials 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><b>Level 2 (3-4 marks)</b> Shows some understanding of the issues involved when making products from a number of different materials. 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><b>Level 1 (0-2 marks)</b> Shows only limited understanding of any issues involved when making products from a number of different materials. 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>0 = a response not worthy of a mark. Add 'Seen' at end of response</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, 1 or 2 dependent on quality of list.</p> <p>Do not apply ticks or annotations to 'Level of response' questions.</p> <p>Mark these by reading all the answer, decide on an appropriate level then a specific mark.</p>
			<b>Total</b>	<b>12</b>		
			<b>Total for paper</b>	<b>60</b>		

**OCR (Oxford Cambridge and RSA Examinations)**  
**1 Hills Road**  
**Cambridge**  
**CB1 2EU**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

**[www.ocr.org.uk](http://www.ocr.org.uk)**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity

**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

© OCR 2012

