

**Engineering**

General Certificate of Secondary Education

Unit **A622**: Engineering Processes

**Mark Scheme for January 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)	<p><b>Award 1 mark for each correct link shown:</b></p> <p>Rail &amp; Marine to Level crossing barriers  Automotive to Airbags  Medical and pharmaceutical to Wheel chair  Aerospace to guided missiles.</p>	4	
1	(b)	<p><b>Award 1 mark for each of three sectors from those listed below.</b></p> <p><b>Award 1 mark for a given product for each sector.</b></p> <p><b>NB Product must link with correct sector for the mark.</b></p> <p><b>Chemical &amp; Process</b></p> <ul style="list-style-type: none"> <li>• paint</li> <li>• shampoo</li> <li>• toothpaste</li> <li>• PVC.</li> </ul> <p><b>Computer, Communication and IT</b></p> <ul style="list-style-type: none"> <li>• flash drive</li> <li>• iPod</li> <li>• webcam</li> <li>• wind-up radio.</li> </ul> <p><b>Electrical and Electronics</b></p> <ul style="list-style-type: none"> <li>• electric toothbrush</li> <li>• smoke alarm</li> <li>• radio-controlled car.</li> </ul>		Do not reward repetition of products

Question		Answer	Marks	Guidance
		<b>Structural and Civil.</b> <ul style="list-style-type: none"> <li>• road tunnels</li> <li>• motorway service stations</li> <li>• bridges</li> <li>• wind power generators.</li> </ul>	3 x [2]	(reward any other appropriate product).
2	(a)	<ul style="list-style-type: none"> <li>• safety glasses</li> <li>• overalls/apron.</li> </ul>	2	
2	(b)	<p><b><i>Award two marks for each of two correctly named safety precautions when using a centre lathe including why or how.</i></b></p> <p>Make sure you know the location of the main cut off switch/main isolator before you start work ;            Ensure that you have been correctly trained to use the equipment so that you work safely ;            Make sure the tool and work piece are clamped tightly ;            Ensure the chuck key has been removed and the guard is in place;            Make sure that work area is clear/ no-one else in the work zone;            Tie back hair /cover-up loose clothing to prevent entanglement</p>	2 x [2]	
2	(c)	<p><b><i>Award one mark for a correctly named piece of equipment and one mark for the description.</i></b></p> <p><b><i>e.g. a vernier calliper would be used by sliding the jaws together around the component and reading the measurement.</i></b></p> <p>Micrometer; ruler; vernier calliper; go/no-go gauge            inside calliper; outside calliper; digital calliper.</p>		

Question	Answer	Marks	Guidance
	Reward weighing scales/digital scales of any type.	2	

Question			Answer	Marks	Guidance
3	(a)	(i)	PVC is a polymer	1	
3	(a)	(ii)	tungsten carbide is a ceramic.	1	
3	(a)	(iii)	mild steel is a ferrous material.	1	
3	(a)	(iv)	brass is an alloy.	1	Allow mild steel as an alloy
3	(b)	(i)	Explanation referring to weight, buoyancy, rusting, cost, manufacturing processes	3	1 mark for stating and up to 2 further marks for justification
3	(b)	(ii)	GRP(fibre glass), carbon fibre, ABS, aluminium, HIPS, (marine) plywood, stainless steel, hardwood (teak; mahogany)	2 x [1]	Award 1 mark for each correctly named suitable material.
4	(a)	(i)	<b>Marketing</b> – use of email to contact more people in shorter space of time. Online adverts, website	2	One mark for technology used One mark for description of use
4	(a)	(ii)	<b>Production planning</b> – using spreadsheets to collate figures, complex calculations, email to other departments, auto-ordering systems, links to supplies to order materials.	2	One mark for technology used One mark for description of use
4	(b)		Savings in time, more efficient, save storage space, worldwide trading, and video conferencing. Answer must make comparison to traditional method.	2	One mark for benefit one further mark for expanded response

Question		Answer	Marks	Guidance
5	(a)	To protect/preserve the material being plated; its cheaper than being made of completely of the plating material; gives the material different properties; change the appearance of the material	3	One mark for example Up to two marks for an explanation
5	(b)	(i) Check that the material was clean; check that the materials had been prepared for plating; check the temperature of tank	2	
5	(b)	(ii) Ensure even coverage of the material; check thickness of coating; ensure adhesion of plate material; check process is operating within parameters	2	
6		<p>No marks for choosing the components but award up to two marks for correct explanation:</p> <p><b>Spring</b> used to provide damping; returns to shape</p> <p><b>Pulley</b> transmits radial motion to belt; can be used to change ratio; driven by a shaft</p> <p><b>Relay</b> switches when an electric current passes through it</p> <p><b>Fuse</b> used to protect circuits; blows when high current passes through it</p> <p><b>Switch</b> used to break and connect the flow of current; it turns a circuit on and off</p> <p><b>Single acting cylinder</b> converts air pressure into motion; spring used to return cylinder; piston moves in direction of least resistance.</p>	6	



Question			Answer	Marks	Content	Guidance
						Levels of response
8*			Up to six marks for a discussion or detailed analysis of the impact of modern technology on the environment.		<p>Examples and points could include:</p> <ul style="list-style-type: none"> <li>reducing the emissions of products or making them of more environmentally friendly materials</li> <li>improving transport to reduce impact</li> <li>reducing energy requirements.</li> </ul> <p>The above list is, of course, not exhaustive.</p>	<p><b>QWC</b></p> <p>Level 3 (5 – 6 marks) Candidates provide a thorough analysis and show a clear understanding of the required question material. Specialist language and terms would be used in the appropriate areas being discussed and the required information will be well structured in its presentation. Candidates will demonstrate an accurate level of spelling, punctuation and grammar.</p> <p>Level 2 (3 – 4 marks) Candidate provides an adequate discussion which shows a reasonable level of understanding of the question material. There will be some evidence of the use of specialist language although not always in the appropriate areas being discussed. Information, for the most part, will be reasonably structured but, again, may contain occasional errors in spelling, punctuation and grammar.</p> <p>Level 1 (0 – 2 marks) Candidate provides a basic discussion which shows some understanding of the question material but uses little or no specialist language. Answers may well be ambiguous or disjointed. Contains obvious errors in spelling, punctuation and grammar.</p>
			Total marks for paper	6 60		

**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

