

Mark Scheme (Results)

Summer 2014

Pearson Edexcel
GCSE in Principal Learning
Engineering
EG208 01
(Paper 01: Innovation and Enterprise)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1(a)(i)	<ul style="list-style-type: none"> • Copyright • Design / Design Right <p>Must be in this order Accept any recognisable spelling (phonetic) of the above answer.</p>	(2 x 1) (2)

Question Number	Answer	Mark
1(a)(ii)	<ul style="list-style-type: none"> • Trademark – Protects signs/symbols (1) that can distinguish the goods (1) • Patent – Protect the technical/functional aspects (1) of products and processes (1) 	(2 x 2) (4)

Question Number	Answer	Mark
1(b)	<ul style="list-style-type: none"> • The Intellectual Property Office • IPO • IPO.gov.uk • Patent office 	(1 x 1) (1)

Question Number	Answer	Mark
1(c)	<ul style="list-style-type: none"> • TM • tm <p>Do not accept R or T or Trademark</p>	(1 x 1) (1)

Question Number	Answer	Mark
1(d)	<p>One mark for each advantage – up to 2 marks</p> <ul style="list-style-type: none"> • Gives you the rights for the look of the product (1) • Stop someone copying the design (1) • You can sell your design (1) • You can licence your design (1) • Acknowledged for good idea (1) • Legally stop others from using idea (1) without permission (1) • Able to sell product for financial gain (1) • Charge others to use idea (1) <p>Accept any reasonable response</p>	(2 x 1) (2)

Question Number	Answer	Mark
1(e)	B – It must have an inventive step of some kind E – It must be capable of industrial application <i>If 3 boxes or more crossed - no marks.</i> (2 x 1)	(2)

Question Number	Answer	Mark
2(a)	<p>One mark for disadvantage One mark for how</p> <ul style="list-style-type: none"> • Time consuming (1) – need to contact a wide range of people (1) • Cost implications (1) – as materials have to be produced/calls required/contact required during office hours (1) • Unreliable information (1) – may not be targeting the correct people (1) • Bias information (1) – responses ignored by staff who have a vested interest in the product (1) • Limited response (1) – due to lack of interest in the product (1) <p>Accept any reasonable description.</p> <p style="text-align: right;">(1 x 2) (1 x 2)</p>	(4)













Question Number	Answer	Mark
2(b)	<p>One mark for advantage One mark for how</p> <ul style="list-style-type: none"> • For accurate drawings (1) – through entry of accurate data on sizes (coordinates) (1) • Quicker development time (1) – through simulation (1) • Easier to communicate, i.e. ICT (1) – for transfer of data (1) • Easy to make modifications/edit/change (1) – no paper hard copies (1)/ computer data (1) • Lower initial development costs (1) – concurrent design processes (1) • Easier storage of data/information and retrieval (1) – interaction with databases (1) • Ability to convert from 2D to 3D (1) for modelling (1) <p>Accept any reasonable description.</p> <p><i>Low response (1) or 2 low responses (1) e.g. its quicker and more accurate – only one mark or detailed response (2)</i> <i>Do not accept 'easier' without explanation</i></p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)

Question Number	Answer	Mark
2(c)	<p>One mark for each correct response (max 4)</p> <ul style="list-style-type: none">• Banks / online (1)• Building Societies (1)• Government (Grants) (1)• Venture capitalists (1)• Sponsors (1)• Grants / Prince's Trust (1)• Friend and family (1)• Stakeholders/Shareholders (1) <p>Accept any reasonable response</p> <p>Do not accept <i>Dragons' Den</i>, loan shark</p> <p style="text-align: right;">(4 x 1)</p>	<p style="text-align: right;">(4)</p>

Question Number	Answer	Mark
3(a)(i)	<p>Any two of the following answers</p> <ul style="list-style-type: none"> • Good strength to weight ratio (2) • Lightweight (1) • Strong (1) • Corrosion / weather resistant (1) • Easily shaped/moulded (1) • Non-slip (1) • Impact resistant/toughness (1) • Flexible (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
3(a)(ii)	<p>Any one of the following answers</p> <ul style="list-style-type: none"> • Carbon Fibre • Fibre Glass • GRP / GFRP/ Glass reinforced polymer / Glass reinforced plastic <p>Accept any reasonable response. Do not accept 'plastic' on its own.</p> <p style="text-align: right;">(1 x 1)</p>	(1)

Question Number	Answer	Mark
3(b)	<p>Any one of the following answers</p> <ul style="list-style-type: none"> ▪ Steel ▪ Mild steel ▪ Low carbon steel ▪ Stainless steel ▪ Aluminium ▪ Aluminium alloy ▪ Titanium <p style="text-align: right;">(1 x 1)</p>	(1)

Question Number	Answer	Mark								
3(c)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>T Section (1)</td> <td>Pipe/ tube/ tubular (1)</td> <td>Round/ rod/ bar (1)</td> <td>Hexagon bar (1)</td> </tr> </table> <p style="text-align: right;">(4)</p>					T Section (1)	Pipe/ tube/ tubular (1)	Round/ rod/ bar (1)	Hexagon bar (1)	
										
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Question Number	Answer	Mark
3(d)(i)	Thermoset material <ul style="list-style-type: none"> ▪ Once moulded it cannot be reshaped (1) even through heat (1) ▪ Will not soften/flow/distort (1) even when subject to pressure (1) ▪ It's a polymer (1) that has strong/many cross links/random structure (1) (1 x 2)	(2)

Question Number	Answer	Mark
3(d)(ii)	Thermoplastic material <ul style="list-style-type: none"> ▪ Can be reshaped (1) when heat is applied to soften it (1) ▪ Can be moulded repeatedly (1) and return to its original shape (1) ▪ Can be recycled (1) by regrinding or melting (1) ▪ It's a polymer (1) that has weak/no cross links/linear structure (1) (1 x 2)	(2)

Question Number	Answer	Mark
4(a)	One mark for each by product identified <ul style="list-style-type: none"> • Heat • Water / vapour / steam 	(2)

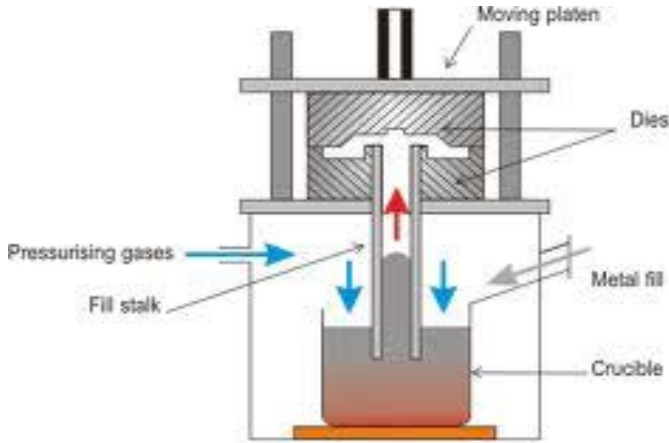
(2 x 1)

Question Number	Answer	Mark
4(b)	One mark for advantage, one mark for how <ul style="list-style-type: none"> • Reduces emissions of greenhouse gases (1) because the only by product is heat or water (1) • Reduce the dependence on fossil fuels (1) much more efficient way of generating electricity (1) • Reduces carbon footprint (1) that helps reduce global warming (1) • Reduced noise level (1) due to less moving parts (1) • Potential to recover heat energy (1) to be used for other purposes in the environment (1) Accept any reasonable answer	(2)

(2 x 1)

Question Number	Answer	Mark
4(c)	One mark for disadvantage, one mark for how <ul style="list-style-type: none"> • Storage problems of hydrogen (1) requires high pressure/cold temperature to turn it to liquid (1) • Extremely flammable (1) burns with a pale blue flame that it almost invisible (1) • High cost (1) in terms of delivery and production (1) • Difficult to maintain when faulty (1) requires specially trained and knowledgeable engineers (1) Accept any reasonable answer	(2)

(2 x 1)

Question Number	Answer	Mark
5	<p>A description that makes reference to any of the following points or sketches</p> <p>Description of process – max 5 marks</p> <ul style="list-style-type: none"> • Consists of a furnace and die/mould (1) • Die/mould housed on top of furnace (1) • Furnace contains molten aluminium alloy (1) • Ceramic tube beneath die/mould pressurised (1) • Molten metal flows into die/mould cavity (1) • Pressure removed (1) • Molten metal flows back into furnace (1) • Die/mould separated (1) • Casting removed and allowed to cool (1) • Secondary machining processes needed to finish the casting (1)  <p>Example</p> <p>The die/mould is placed over the furnace (1) holding the molten material (1). The mould cavity is filled by pressurising a ceramic tube (1) causing the molten alloy to rise (1). Once the cavity is filled, the over pressure is removed (1) and the residual molten alloy flows back down the tube to the furnace (1). The mould is then separated (1) and the casting is removed (1).</p> <p>Key Features – max 5 marks</p> <ul style="list-style-type: none"> • Lightweight products can be made (1) • Good corrosion resistance achieved (1) • Excellent quality products made (1) • Excellent mechanical properties (1) • Complex products can be made (1) 	(8)

	Up to a maximum of 8	(1 x 8)
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Question Number	Answer	Mark
6(a)	<p>One mark for identifying, one mark for description x 2 (max 4)</p> <ul style="list-style-type: none"> • Biodegradable polymers are renewable (1) as they are made from biomass (1). Biomass is organic matter that breaks down (1), and there is an abundant supply of it all around the world (1) • Biodegradable Polymers Break Down Faster (1) so that there is less going into landfill sites which takes decades to break down (1) • Biodegradable Polymers are more environmentally friendly (1) because there is no destruction to the earth recovering fossil fuels (1) and in part because there are very few harmful carbon emissions and other greenhouse gases being released (1) • Biodegradable polymers can be recycled easier (1) as they are made from biodegradable materials, which will break down faster than petroleum based polymers that are not biodegradable (1) • Producing Biodegradable polymers requires less energy (1) During production they require less than half of the energy that non biodegradable polymers require to produce (1) • Biodegradable polymers reduce foreign oil dependence (1) Much of the oil used to make traditional polymers comes from Middle Eastern countries, and these countries are not always environmentally friendly (1) Biodegradable polymers are not toxic (1) • Biodegradable polymers are very safe, and they contain no toxins at all (1). With traditional polymers harmful chemicals and by products can be released during the breakdown and decay period (1) <p>Accept any other appropriate response</p>	<p>(2 x 2) (4)</p>

Question Number	Indicative Content
6(b)	<p>Positive Impacts</p> <ul style="list-style-type: none"> • Individual transport device • Easy, convenient low cost travel • Fun to ride individually or in groups • Low maintenance as hydrogen fuel cells are relatively simple technology • Can be personalised to suit riders tastes/needs • Body provides some protection in the event of an accident • Could be used in competitive sports arena • Very quiet and smooth ride <p>Negative Impacts</p> <ul style="list-style-type: none"> • Could become dangerous if used in a crowded area • Easy to fall off • Could run out of hydrogen and end up pushing the scooter • Could create antisocial behaviour • Irresponsible riding could cause accidents

Level	Mark	Descriptor
	0	No rewardable material
1	1–2	Identification of at least two impacts or justification of at least one social impact of using this form of transport.
2	3–4	Brief description of at least two impacts or detailed description of one impact of using this form of transport.
3	5–6	Detailed description of two or more impacts of using this form of transport.

