

Mark Scheme Summer 2009

Principal Learning

Engineering

Level 1 EG101/01

Level 2 EG208/01

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Engineering
Level 1 & 2 Principal Learning
Summer 09 Mark Scheme

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.

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EG101/01
Introducing the Engineering World

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Question Number	Answer	Mark
2	C	(1)

Question Number	Answer	Mark
3	A	(1)

Question Number	Answer	Mark
4	B	(1)

Question Number	Answer	Mark
5	D	(1)

Question Number	Answer	Mark
6	C	(1)

Question Number	Answer	Mark
7	D	(1)

Question Number	Answer	Mark
8	A	(1)

Question Number	Answer	Mark
9(a)	C	(1)

Question Number	Answer	Mark
9(b)	A	(1)

Question Number	Answer	Mark
10	B	(1)

Question Number	Answer	Mark
11	A	(1)

Question Number	Answer	Mark
12	A	(1)

Question Number	Answer	Mark
13	B	(1)

Question Number	Answer	Mark
14	D	(1)

Question Number	Answer	Mark
15(a)	C	(1)

Question Number	Answer	Mark
15(b)	D	(1)

Question Number	Answer	Mark
15(c)	C	(1)

Question Number	Answer	Mark
15(d)	A	(1)

Question Number	Answer	Mark
16(a)	A	(1)

Question Number	Answer	Mark
16(b)	C	(1)

Question Number	Answer	Mark
16(c)	A	(1)

Question Number	Answer	Mark
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Question Number	Answer	Mark
17(b)	A	(1)

Question Number	Answer	Mark
18(a)	B	(1)

Question Number	Answer	Mark
18(b)	B	(1)

Question Number	Answer	Mark
18(c)	A	(1)

Question Number	Answer	Mark
19(a)	C	(1)

Question Number	Answer	Mark
19(b)	A	(1)

Question Number	Answer	Mark
19(c)	B	(1)

Question Number	Answer	Mark
19(d)	D	(1)

Question Number	Answer	Mark
20(a)	A	(1)

Question Number	Answer	Mark
20(b)	D	(1)

Question Number	Answer	Mark
20(c)	D	(1)

Question Number	Answer	Mark
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Question Number	Answer	Mark
21 (b)	A	(1)

Question Number	Answer	Mark
22	C	(1)

Question Number	Answer	Mark
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25	D	(1)

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27	D	(1)

Question Number	Answer	Mark
28	C	(1)

Question Number	Answer	Mark
29	A	(1)

Question Number	Answer	Mark
30	A	(1)

EG208/01
Exploring Engineering Innovation, Enterprise and Technological Advancements

Question Number	Answer	Mark
1 (a)	<p>One mark for each correct line.</p> <p>Left</p> <p>1 2 3 4</p> <p>Right</p> <p>3 1 4 2</p> <p>No mark for any type linked to more than one description</p>	(4)

Question Number	Answer	Mark
1 (b)(i)	Design	(1)

Question Number	Answer	Mark
1 (b)(ii)	<p>Explanation could include:</p> <ul style="list-style-type: none"> • Because its not a novel idea (1) • Because its not substantially new (1) • Because its not a unique product (1) • Because its not technically new (1) • Because its not functionally new (1) • Because its not literature (1) • Because its not art (1) • Because its not film (1) • Because its not music (1) • Because its not a symbol (1) <p>Any reasonable explanation.</p> <p>Allow follow through MAX 1 mark if answer to 1(b)(i) is incorrect but reason is correct</p> <p>If answer is copied from 1(a) MAX 1 mark</p>	(2)

Question Number	Answer	Mark
1 (c)	<p>One mark for identifying any advantage Up to two marks for explaining</p> <ul style="list-style-type: none"> • Wants to protect product appearance (1) • Legally protected look of product (1) • Stop the look being stolen (1) • Stop the look being copied (1) • Placed on a national database (1) • Stop the look from being commercially exploited (1) • Protect the selling point or market appeal (1) • Earn royalties (1) • Franchise the look (1) • Prove she came up with the look first (1) • Claim legal ownership of the look (1) <p>Any combination of the answers above as long as they are appropriately linked.</p>	(3)

Question Number	Answer	Mark
2 (a)	<p>One mark for each correct answer</p> <ul style="list-style-type: none"> • Banks (1) • Building societies (1) • Grants (1) • Private finance (1) • Venture capitalists (1) • Friend and family (1) • Stakeholders (1) • Shares in the company (1) • Fundraiser (1) • Sponsorship (1) • Work to earn money (1) • Take out a loan (1) • Charity event (1) • National lottery grant (1) <p>Accept any reasonable answer</p> <p>Do NOT accept only Dragon's Den or Government</p>	(4)

Question Number	Answer	Mark
2 (b)	<p>One mark for identifying the activity</p> <ul style="list-style-type: none"> • Prototyping (1) • Produce a working model (1) • Test for operation (1) • Testing in hot and cold conditions (1) • Pressure test (1) • Watertight tests (1) • Reliability test (1) • Durability tests (1) • Cycle test (1) • Shock test (1) • Soak tests (1) • Usability test (1) • Ergonomic touch and feel test • Test for production defects (1) • Visual examination test (1) <p>Accept any reasonable activity</p>	(3)

Question Number	Answer	Mark
2 (c)	<p>One mark for identifying type of market research Two marks for explanation</p> <ul style="list-style-type: none"> • Find out who will buy Polestar (1) • Find out what customers will pay (1) • Find out what other products are available (1) • Find out what similar products will cost (1) • Find out where similar products are sold (1) • To determine how much demand there is for the product (1) • To establish if similar products successful (1) • To find out what materials similar products are made from (1) • To determine what manufacturing techniques have been used with similar products (1) • To check how far can the product be distributed profitably (1) • To carry out trial test with a group of customers (1) • Complete a customer questionnaire (1) <p>Accept any reasonable market research activity One or more low response one mark only</p>	(3)

Question Number	Answer	Mark
3 (a)	<ul style="list-style-type: none"> • Wood (1) • Galvanised steel (1) • Glass Reinforced Plastic (1) • Aluminium alloy (1) • Stainless steel (1) • PVC/Polymer (1) <p>Accept any appropriate material for a pole</p>	(1)

Question Number	Answer	Mark
3 (b)	<p>One mark for each appropriately linked property to 3(a)</p> <ul style="list-style-type: none"> • Strong (1) • Corrosion Resistance (1) • Light (weight) (1) • Waterproof (1) <p>Accept any reasonable property</p> <p>Allow follow through if the response is appropriate to the material given in 3(a) and is suitable to the pole</p>	(2)

Question Number	Answer	Mark
3 (c)	<p>One mark for each</p> <ul style="list-style-type: none"> • Sustainable (1) • Inexpensive (1) • Cheap to produce (1) • Easy to manufacture (1) • Recyclable (1) • Durability (1) • Resistant to corrosion (1) <p>Accept any appropriate answer</p> <p>Allow follow through if the response is appropriate to the material given in 3(a) and is suitable to the pole</p>	(3)

Question Number	Answer	Mark
3 (d)	<p>One mark for describing the process Three marks for the explanation</p> <ul style="list-style-type: none"> • Injection moulding (1) • Compression moulding (1) • Vacuum forming (1) • Transfer moulding (1) • Fibreglass (1) <p>Explanation</p> <p>Warm up plastic in a mould (1) Heat up plastic and pour into mould (1) Put fibreglass and resin in mould (1)</p> <p>Warm up plastic and force into a mould (2) Heat plastic and inject into mould (2)</p> <p>The process of forming a material by forcing it from a heated cylinder, under pressure, through a spur into a cavity of a confined mould. (3)</p> <p>A moulding procedure whereby a heat-softened plastic material is forced from a cylinder into a relatively cool cavity which gives the article the desired shape. (3)</p> <p>Prepare mould by coating with release agent, cut fibreglass mate to shape, layer up mat by soaking with resin and stippling in to remove air bubbles. (3)</p> <p>Accept any reasonable explanation One or more low response reduce marks</p>	(4)

Question Number	Answer	Mark
4 (a)	<p>Advantages</p> <ul style="list-style-type: none"> • Solar/Wind - No need to run wires to the streetlight (1) • Solar/Wind - Reduced installation cost in rural areas (1) • Solar/Wind - No running costs (1) • Solar/Wind - Renewable energy source (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • Wind - Will not work without wind (1) • Solar - Will not work without sunshine (1) • Solar/Wind - More expensive than conventional street lights to produce (1) • Solar/Wind - More complicated technology than conventional (1) <p>Each given advantage and disadvantage must be different.</p> <p>Accept any reasonable answer</p>	(4)

Question Number	Answer	Mark
4 (b)	<p>Two marks for each correct explanation containing any of these themes</p> <ul style="list-style-type: none"> • Cheap electricity (1) • Cleaner / sustainable / renewable energy (1) • Use less energy (1) • Free energy (1) • Less pollution (1) • Less in landfill (1) • Recyclable (1) • Reduced carbon emissions from energy generation (2) • This technology reduces the demands placed on our world resources such as coal, gas and oil (2) • Electricity generation carries a heavy carbon footprint to move world resources to the generation plant, these technologies reduce the footprint (2) • Electrical supply demand removed meaning less use of electricity generating fuel (2) <p>Accept any explanation containing reasonable environmental theme</p> <p>One or more low response one mark only</p>	(6)

Question Number	Answer	Mark
5(a)	<p>Two marks for each appropriate question</p> <ul style="list-style-type: none"> • Does the factory turn all lights off at night? (1) • Does the factory put electrical equipment on standby when not in use? (1) • Is waste recycled? (1) • Is the factory roof insulated? (1) • Does factory use low energy heat treatment process during the production process? (2) • Does factory use low energy lighting? (2) • Does the company actively search for methods to improve its carbon footprint? (2) • Is the factory lighting on electronic sensors that turn lights off when not in use? (2) • Does factory use grey water to flush toilets? (2) • Does factory use any wind or solar technology to provide energy? (2) • Does the company have a car share scheme and encourage worker to use it? (2) • Does the company provide incentives for employers to cycle to work? (2) <p>Accept any reasonable answer One or more low response one mark only</p>	(6)

Question Number	Answer	Mark
5 (b)	<p>Two marks for an explanation containing any of these themes</p> <ul style="list-style-type: none"> • Cheaper lighting / lower energy bills (1) • Safer streets (1) • Don't need to dig up road to lay cables (1) • Improved security of street by providing light to dimly lit areas (2) • Light offbeat footpaths and walkways making their use less fearful (2) • The lamp could provide cost effective street lighting solutions for local councils (2) • The streetlight could improve the quality of life for people living in rural areas where the cost of hardwiring light would be prohibitive (2) • Raise awareness / promote renewable energy (2) <p>Accept any reasonable answer One or more low response one mark only</p>	(4)

Question Number	Answer	Mark
6 (a)	<p>Three marks for explanation of impact Two marks for reduction</p> <p>Impacts</p> <ul style="list-style-type: none"> • Plastic protective is non biodegradable (1) • Packing ends up in landfill (1) • Documentation is often discarded (1) • Trees are used to make documentation (1) • Packing adds to transportation, producing more pollution (2) • Some product documentation goes into landfill rather than recycled (2) • Packaging is often plastic and can be more expensive to produce than the product itself (e.g. food) Some of this is difficult to recycle and non-biodegradable plastic ends up in landfill sites / could damage wildlife(3) • Product documentation can be expensive to produce using paper, printing and binding processes. The documentation is often discarded and ends up in landfill sites (3) <p>Reductions</p> <ul style="list-style-type: none"> • Use less packaging (1) • Reduce packaging to a minimum (2) • Use recycled card or paper for packaging (2) • Use recycled packaging wherever possible and purchase new paper packaging material from sustained forests (2) • Use virtual, online or electronic instruction books (2) • Design intuitive products that need little or no instructions (e.g. iPod) (2) <p>Accept any reasonable answer Reduce marks by one or more for low response to either impact or reduction questions</p>	(5)

Question Number	Answer	Mark
6 (b)	<p>Three marks for explanation of impact Two marks for reduction</p> <p>Impacts</p> <ul style="list-style-type: none"> • Expensive to move goods (1) • Extra transport cost to move packaging (1) • Petrol/diesel prices are expensive (1) • Transport produces pollution and increases global warming (2) • Transport costs often outstrip the cost of producing the product (e.g. food). This damages the environment and contributes to global warming (3) • Transport emissions damage environment, these could be from ships, planes, trains or wagons. Finished goods could carry a high carbon footprint (3) <p>Reductions</p> <ul style="list-style-type: none"> • Less distribution (1) • Use of 'green' transport (1) • Minimise movement of goods, explore other forms of transport i.e. waterways (2) • Consider small production centres/plants closer to customers (2) <p>Accept any reasonable answer Reduce marks by one or more for low response to either impact or reduction questions</p>	(5)

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