



Pearson

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE
In Design and Technology (6RM03)
Paper 1

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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)	<p>Any two of the following points.</p> <p>1.Science of designing (products/systems/environments) for human use/human body/part of body (1) 2.The relationship/link between the product/environment and the user/ targeted customer/target market (1) 3. Making the product easy to use / a comfortable size/safe. (1)</p> <p style="text-align: right;">(2x1)</p>	(2)
1(b)	<p>Any two of the following with its linked explanation.</p> <p>1a. A single product (1) 1b. Used by everyone/5th to 95th percentile range (1) 2a. Product comes in a range of sizes (1) 2b. Various sizes are available to suit everyone (1) 3a. An adaptable/adjustable product (1) 3b To fit everyone/large range of user needs (1) 4a. Accessory/adaptation to an original/existing design (1) 4b. Improves/enhances the use (1) 5a. Bespoke/one-off product (1) 5b. Meets individual needs/shape/size</p> <p>Use of terms like percentile range should be taken as meaning the majority</p> <p style="text-align: right;">(2x2)</p>	(4)
Total for question		6

Question Number	Answer	Mark
2(a)	<p>Any three of the following with a linked relevant explanation.</p> <ol style="list-style-type: none"> 1. Cheap running costs/improved cash flow (1) 2. Eliminates paper documents 3. Less paper/consumables used/reduced waste(1) 4. Saves time/fast/improved transfer of data/access to files 5. Centralised electronic data storage/database/reduced storage space/central access for users/enhanced sharing (1) 6. Reduces lead time (1) 7. Information is digital/sent in a range of formats (1) 8. More accurate/reliable/fewer errors/human errors (1) 9. Increased efficiency/higher productivity (1) 10.Improved customer service/satisfaction (1) 11.Enhanced customer base (1) 12.Improved security/privacy/control of spam/hacking/theft 13.Encoded/encrypted information (1) 14.Standardised format/documentation (1) <p>Do Not award easier</p> <p style="text-align: right;">(3x2)</p>	(6)

2(b)	<p>Any two of the following points.</p> <ol style="list-style-type: none"> 1. Incompatibility issues/updates can cause problems with different versions (1) 2. Trading limited to those with EDI capability (1) 3. Potential security breaches could have greater impact/hacking (1) 4. Set-up costs/IT training/retraining (1) 5. Possible data corruption/loss/crash/power outage/poor internet connection (1) <p style="text-align: right;">(2x1)</p>	(2)
		8

Question Number		Mark
3(a)	<p>Max 5 marks if only advantages or disadvantages mentioned.</p> <p>Advantages</p> <ol style="list-style-type: none"> 1. Large amount available/sustainable/renewable source of energy (1) 2. Reduces the need to consume other finite fuel resources (1) 3. Reduced emissions/environmentally friendly (1) 4. Carbon neutral (1) 5. 2nd 3rd and 4th generation bio-crops are more efficient for fuel production (1) 6. Biofuel gives increased power over comparable vehicle fuel (1) 7. Dual fuel/combined usage (1) <p>Disadvantages</p> <ol style="list-style-type: none"> 8. Ecological damage (1) 9. Expensive to convert into fuels/price at the pump/expensive to buy/high cost (1) 10. Relatively low yield (1) 11. Carbon emissions created by agricultural machinery producing the crop / energy used in processing it (1) 12. Reduced land available for growing food crops (1) 13. Biofuels are not as efficient/fewer MPG/L/100Km as petroleum based fuels/more frequent refuelling (1) 14. Limited availability/refuelling may be a problem (1) 15. Additional water is needed for irrigation and processing of biofuels/ unsustainable burden on available supplies (1) 16. System modifications needed to use fuel (1) 17. Biofuels still in relative infancy/early stages of development/not reached maximum potential yet (1) <p style="text-align: right;">(6x1)</p>	(6)

3(b)	<p>Any six of the following points.</p> <ol style="list-style-type: none"> 1. Refusal to buy from countries who are supplying timber by unsustainable methods (1) 2. Buy/import only from countries with an ecological surplus (1) 3. Use the whole tree/don't waste any part of the tree/use waste timber (1) 4. Implement certification system to ensure timber is from sustainably managed source/timber tracing systems/import and export restrictions (1) 5. Increase cost of wood based products/taxation (1) 6. Laws/quotas/fines/limited amount sold per year to stop unsustainable/rare/slow growing timber being sold/cut/harvested (1) 7. Give aid/support/education/grants/provide incentives/fair price to poor countries/farmers involved in deforestation activities/methods (1) 8. Implement biotechnology/GM/faster growing trees (1) 9. Cut ONE down plant TWO / more than one / plant more than you harvest (1) 10. Education/promotion of sustainable timber production (1) <p style="text-align: right;">(6x1)</p>	(6)
Total for question		12

Question Number	Answer	Mark
4 (a)	<p>Any four of the following with a linked relevant explanation.</p> <p>Credit reference to either a product AND/OR its packaging</p> <ol style="list-style-type: none"> 1. Simpler/smaller designs/less material used/fewer parts/components (1) 2. Reduce material range/fewer materials used for product (1) 3. Reduce production time/quicker to produce(1) 4. Use different materials/materials that are easier to work (1) 5. Reduce quantity of harmful by-products/emissions produced/finishes used (1) 6. Less ENERGY used/wasted during manufacture /solar/green/renewable power (1) 7. Less WASTE produced/reduce waste/less waste to landfill/reuse waste (1) 8. Design for automated/rapid production/ (1) 9. Simplify work flow/Just In Time/lean manufacturing/Flexible manufacturing (1) 10. Manufacturing is made less complex/reduce number of processes (1) <p style="text-align: right;">(4x2)</p>	(8)

<p>4 (b)</p>	<p>Any four of the following points.</p> <ol style="list-style-type: none"> 1. Automated tills/accurate account of transactions/reading of product data/price (1) 2. Information is electronic / reduced storage space/increased speed/ faster transactions/saves time/easy location of information/easily shared (1) 3. Reduced human error (1) 4. Ability to monitor performance/popularity/demand of all products/market analysis/ trends/database which can be automatically loaded into financial analysis spread sheets/graphs (1) 5. Automated stock check /ensure stock is reordered before it runs out/ensure over stocking does not happen/prevents unnecessary capital being tied up (1) 6. Easy to evaluate employee work rate/performance (1) 7. Reduced costs /labour costs / fewer personnel required (1) 8. Real time updates/feedback/tracking of deliveries/where it is in the world (1) 9. More detailed information focuses / targets loyalty programs / improved marketing/increased market(1) <p style="text-align: right;">(4x1)</p>	<p style="text-align: center;">(4)</p>
	<p>Total for question</p>	<p>12</p>

Question Number	Answer	Mark
5 (a)	<p>Max 5 marks if only advantages or disadvantages mentioned.</p> <p>Do not award reference to complex as this is in the stem</p> <p>Advantages</p> <ol style="list-style-type: none"> 1. Accuracy/high standards/reduced waste/human error (1) 2. Repetitive accuracy/reliability/consistency (1) 3. The ability to save and reload the CAD drawings to suit demand (1) 4. High speed of production/increased productivity/24/7 (1) 5. Reduced labour cost / reduced employment of traditional tradesmen (1) 6. Increased health & safety (1) <p>Disadvantages</p> <ol style="list-style-type: none"> 7. High set-up/update costs (1) 8. Training/retraining costs (1) 9. Low worker morale/mood/resistance to change/machine minding (1) 10.Highly/multi skilled workers / technicians/engineers needed (1) 11.Can't detect faults/errors/can't think/improvise (1) <p style="text-align: right;">(6x1)</p>	(6)
5 (b)	<p>Any six of the following points.</p> <ol style="list-style-type: none"> 1. CAQ machines are programmed/pre-programmed/ (1) 2. perform tests/checks/inspections/measure the work is the correct size/shape / dimensions /standard/tolerance/specification (1) 3. Method of testing (accept any relevant test – CMM/probe, laser, infra-red, scale, scanner/camera/optical) (1) 4. Rapid rate of testing (1) 5. Rates/frequency of testing/checking can be: sampling/all/different stages / constant /real-time/repetitive (1) 6. Testing/checking is used to predict error/failure rate 7. Feedback/detect faults/problems (1) 8. Stopping/halting/delaying of the system/ acceptance/rejection of component (1) 9. Automatic component/process alterations implemented (1) 10. Automatic recalibration by machine (1) <p style="text-align: right;">(6x1)</p>	(6)
	Total for question	12

Question Number	Answer	Mark
<p>6</p>	<p>Max 9 marks if only advantages or disadvantages mentioned.</p> <p>Advantages</p> <ol style="list-style-type: none"> 1. Manufacturers can plan lifespan/change/warranties more effectively (1) 2. Cheaper parts can be used due to limited lifespan (1) 3. New products/designs/technology/updates/features will become available more regularly (1) 4. Companies are in greater competition/have more money/custom/profits to deliver new products (1) 5. Consumers have a wider choice (1) 6. Designs become more innovative/improved (1) 7. Creates employment (1) 8. Stimulates economy/wealthy society (1) 9. Encourages second-hand market/'hand me downs' (1) <p>Disadvantages</p> <ol style="list-style-type: none"> 10. Products become out-dated/slow/unsupported/no replacement parts/not repairable/too expensive to repair (1) 11. Customers will want/have to/must buy the latest product/device/ keep up to date/trends/in fashion (1) 12. Throw-away society/culture/ environmental impact / discarded /thrown away/landfill/hard to recycle (1) 13. Company reputation may fall/not be trusted (1) 14. Bullying/teasing/low self-esteem (if don't have latest) (1) 15. Increasingly complex technology can be difficult to learn/keep up with (mentally)/resistance to change (1) 16. Repair service jobs are lost (1) <p style="text-align: right;">(10x1)</p>	<p style="text-align: right;">(10)</p>
		10

Question Number		Mark
7	<p>Max 9 marks if only advantages or disadvantages mentioned.</p> <p>Advantages</p> <ol style="list-style-type: none"> 1. Fast response to market changes/demand/batch size can be altered quickly/ shorter lead times/quicker to market/reduced down time (1) 2. Increased market share/higher profit/competitive edge. (1) 3. Manufacturers can coordinate with their suppliers / reduces capital tied up in stock/reduces storage space/JIT. (1) 4. Products can be customized (1) 5. Effective/fast/quick/accurate quality control (1) 6. FMS systems are able to check the quality of their own work. (1) 7. Machine flexibility/low cost/rapid production/system changes/no need for new equipment/machinery /not tied to producing a single product (1). 8. Routing flexibility/monitoring, scheduling and routing/rerouting workflow to maximize efficiency (1) 9. Reduced employment /lower labour costs(1) <p>Disadvantages</p> <ol style="list-style-type: none"> 10.High initial set up cost/capital investment (1) 11.Potential reduction of output due to large batches/fluctuations (1) 12.Staff would need training/retraining (1) 13.Need skilled/flexible technicians/specialist staff (1) 14.Planning is needed/hard to predict market (1) <p style="text-align: right;">(10x1)</p>	(10)
	Total for question	10

