

# Mark Scheme (Results)

Summer 2015

Pearson Edexcel  
GCE Design and Technology  
Product Design: Resistant Materials  
Technology (6RM03)

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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
<b>1(a) i</b>	<ol style="list-style-type: none"> <li>1. Reduced travelling cost (1)</li> <li>2. Not limited to two-way conversation (1)</li> <li>3. Global communication (1)</li> <li>4. Increased speed of set up/call/meeting/decision making/easy to use/no travel time (1)</li> <li>5. Visual images can be communicated (1)</li> <li>6. Remote diagnostics (1)</li> <li>7. More sustainable than travel (1)</li> <li>8. Eye contact/enhanced / personal / face to face communication (1)</li> <li>9. Free/no/very low cost to communicate (1)</li> <li>10.Meeting can be recorded (1)</li> <li>11.Easily rescheduled (1)</li> </ol> <p style="text-align: right;">(4 x 1)</p>	<b>(4)</b>
<b>1(a) ii</b>	<ol style="list-style-type: none"> <li>1. Difficulties of synchronising time zones (1)</li> <li>2. Electronic 'drop-out'/delay/frozen images/no signal/poor connection (1)</li> <li>3. No direct eye-to-eye/face-to-face contact/interaction (1)</li> <li>4. Camera shyness (1)</li> <li>5. System set-up/compatibility issues/internet access (1)</li> <li>6. Fixed time for attendance (1)</li> <li>7. May require training (1)</li> </ol> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>1(b)</b>	<ol style="list-style-type: none"> <li>1. Parts/materials are ordered when needed/automatically (1)</li> <li>2. Less money tied up in raw materials/parts/waste/ manufactured stock (1)</li> <li>3. Less storage space / cost / warehousing needed (1)</li> <li>4. Higher returns/profit margins for the company / competitive / market share (1)</li> <li>5. Resources in the right place at the right time (1)</li> <li>6. Reduces the movement of materials and components (1)</li> <li>7. Lean manufacturing/smoothes the flow of production / more efficient / reduced production times (1)</li> <li>8. React to market/client request / demand / increase flexibility/customisation/range of products / keep up with trends (1)</li> <li>9. Higher levels of quality/quality assurance / fault finding (1)</li> <li>10.Increased job satisfaction (1)</li> <li>11.Reduces labour costs (1)</li> </ol> <p style="text-align: right;">(8 x 1)</p>	<b>(8)</b>
<b>Total for question</b>		<b>14</b>

Question Number	Answer	Mark
<b>2(a)</b>	<ol style="list-style-type: none"> <li>1. Taller/bigger/wider growing (1)</li> <li>2. Fewer faults (knots/splits/shakes/cracks/ twisting/warping/cupping) (1)</li> <li>3. Resistance to rot/decay (1)</li> <li>4. Resistance to infestation/animals (1)</li> <li>5. Resistance to disease/bacteria (1)</li> <li>6. Less need to treat timber with preservative (1)</li> <li>7. Quicker growing/speed of growth (1)</li> <li>8. Timber is available for use/sale more quickly/meet demand (1)</li> <li>9. Increased flexibility of the timber (1)</li> <li>10. Increased strength/hardness/compression resistance (1)</li> <li>11. Pre-coloured timber (1)</li> <li>12. Reduced lignin (1)</li> <li>13. Less chemicals needed for the removal of lignin / easier paper manufacture (1)</li> <li>14. Timber lasts longer before it needs replacing/durability (1)</li> <li>15. Timber is easier to work/even /straight grain (1)</li> <li>16. Better forest management/reforestation (1)</li> <li>17. Can be grown in new/poor/different climates (1)</li> </ol> <p style="text-align: right;">(6 X 1)</p>	<b>(6)</b>
<b>2(b)i</b>	<ol style="list-style-type: none"> <li>1. Increased volume (1)</li> <li>2. Increased elasticity/returns to original shape/impact resistance (1)</li> <li>3. Increased strength (1)</li> <li>4. Increased insulation (1)</li> <li>5. Increased buoyancy (1)</li> <li>6. Lightweight/decreased density (1)</li> <li>7. Brittleness reduced (1)</li> </ol> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>2(b)ii</b>	<ul style="list-style-type: none"> <li>• The interwoven/layered pattern reinforces the structure of the polymer (1) thus increasing strength/stiffness/rigidity (1)</li> </ul> <p style="text-align: right;">(1 x 2)</p>	<b>(2)</b>
<b>Total for question</b>		<b>10</b>

Question Number	Answer	Mark
<b>3(a)</b>	<ol style="list-style-type: none"> <li>1. Lower labour/manufacturing costs (1)</li> <li>2. Greater availability of labour (1)</li> <li>3. Greater access to overseas market (1)</li> <li>4. Cheaper/more available land/space (1)</li> <li>5. Land/factories closer to resources/reduced material transport distance/cost (1)</li> <li>6. Fewer/less stringent H&amp;S restrictions (1)</li> <li>7. Fewer/less stringent environmental restrictions (1)</li> <li>8. Lower/less stringent tax/financial laws (1)</li> <li>9. Lower material/energy costs</li> <li>10. Being an important employer means they have influence / bargaining power over government legislation (1)</li> <li>11. Draw on expertise of host country/skills of workforce (1)</li> </ol> <p style="text-align: right;">(6 x 1)</p>	<b>(6)</b>
<b>3(b)</b>	<ol style="list-style-type: none"> <li>1. Increased employment opportunities (1)</li> <li>2. Improved/wider expertise brought into the country (1)</li> <li>3. Increased training/skill levels of population (1)</li> <li>4. Improved/advanced facilities/technology/infrastructure (1)</li> <li>5. Increased reputation (1)</li> <li>6. More investment/money is available to the individual / local community / country/stronger economy (1)</li> <li>7. A better standard of living is possible (1)</li> </ol> <p style="text-align: right;">(4 x 1)</p>	<b>(4)</b>
<b>Total for question</b>		<b>10</b>

Question Number	Answer	Mark
<b>4(a)</b>	<ol style="list-style-type: none"> <li>1. Use materials that can be/have been recycled/use as few non-recyclable materials as possible (1)</li> <li>2. Products are easy to dismantle / easy to separate different materials (1)</li> <li>3. Use as few different materials as possible (1)</li> <li>4. Use as few parts/little material as possible (1)</li> <li>5. Coding/markings materials so they can easily be identified (1)</li> <li>6. Avoid surface treatments which will need to be removed before recycling (1)</li> <li>7. Make products from materials which require low energy for recycling (1)</li> </ol> <p style="text-align: right;">(4 x 1)</p>	<b>(4)</b>

4(b)	<ol style="list-style-type: none"> <li>1. Symmetry (1)</li> <li>2. Materials - man made/new/modern/industrial (1)</li> <li>3. Repetition/Consistency/Accuracy (1)</li> <li>4. Function follows form/form over function/ (1)</li> <li>5. Designed for mass/volume/batch production (1)</li> <li>6. Designed for automated assembly (1)</li> <li>7. Machine made/ modern/advanced/mechanical/mass production methods/techniques/high volume (1)</li> <li>8. Contemporary/modern/minimalist/simplistic/clean/industrial / machine appearance (1)</li> </ol> <p style="text-align: right;">(4 x 1 )</p>	<b>(4)</b>
<b>Total for question</b>		<b>8</b>

Question Number	Answer	Mark
5	<p><b>Advantages</b></p> <ol style="list-style-type: none"> <li>1. Will not run out/renewable/sustainable/abundant (1)</li> <li>2. Environmentally friendly/no production of greenhouse gases/Co2 / (1)</li> <li>3. Minimum running costs/efficient/no fuel costs (1)</li> <li>4. Long life-span of plant (1)</li> <li>5. Set-up costs are quickly recouped (1)</li> <li>6. Creation of reservoirs provide – water sports/places of beauty/tourism (1)</li> <li>7. Dams can be used to control damage caused by flooding (1)</li> <li>8. Mostly available when needed (i.e. winter) (1)</li> <li>9. Relatively controllable / reliable power supply (1)</li> <li>10. Produces power 24-7 / constantly (1)</li> </ol> <p><b>Disadvantages</b></p> <ol style="list-style-type: none"> <li>11. High initial costs (1)</li> <li>12. Weather dependent/not totally reliable (1)</li> <li>13. Geographically dependent (1)</li> <li>14. Relatively small amount of power produced (1)</li> <li>15. Flooding of areas to create reservoirs means loss of land/homes/relocation/changed/scarred environment (1)</li> <li>16. Rivers may be diverted causing problems for those who are dependent on the river (1)</li> <li>17. Dam failures can be catastrophic (1)</li> <li>18. Greenhouse gases can be high from decaying plant life in reservoirs (1)</li> <li>19. Can be detrimental to wildlife/aquatic ecosystems (1)</li> <li>20. Can cause downstream problems of erosion/low dissolved oxygen levels (1)</li> <li>21. Un-ECO friendly to build (1)</li> <li>22. Dam can be unsightly (1)</li> </ol> <p style="text-align: right;">(8 x 1)</p> <p>A <b>maximum</b> of 7 marks if only advantages or disadvantages are mentioned</p>	<b>(8)</b>

	<b>Total for question</b>	<b>8</b>
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Question Number	Answer	Mark
<p><b>6(a)</b></p>	<p>Positives of repair</p> <ol style="list-style-type: none"> <li>1. Product has an extended life time increasing its appeal <b>(1)</b></li> <li>2. Less cost to repair than replace (1)</li> <li>3. Plentiful supply of spares (1)</li> <li>4. <b>Some</b> products are designed for consumer (DIY) repair (1)</li> <li>5. <b>Some</b> companies provide strong after-sales back-up/support/repair (1)</li> <li>6. <b>Some</b> people prefer/want to stick/keep with what they have/are familiar with/sentimentality (1)</li> <li>7. Environmentally aware customers may prefer sustainability/avoid waste/disposal (1)</li> <li>8. Saved data/info (1)</li> </ol> <p>Positives of replacement</p> <ol style="list-style-type: none"> <li>9. New features / upgrades / styles/trends / fashions available (1)</li> <li>10. Sometimes cheaper to buy new (repair difficult/expensive / time consuming/regular) (1)</li> <li>11. New products readily available/convenient, whereas replacement parts are not (1)</li> <li>12. Generally quicker to replace than repair (1)</li> <li>13. Reliability of a new product (1)</li> </ol> <p>Each bullet point can be stated as a positive or negative but can only be used once.</p> <p style="text-align: right;">(6 x 1)</p>	<p style="text-align: center;"><b>(6)</b></p>
<p><b>6(b)</b></p>	<ol style="list-style-type: none"> <li>1. Determine/investigate cradle to grave (mention of any stage of life) carbon footprint/energy use/environmental impact/materials used (1)</li> <li>2. Reduce a carbon footprint/emissions/meet emission targets/environmentally friendly (1)</li> <li>3. Reduce the volume / range / amount of materials required (1)</li> <li>4. Reduce manufacturing/material costs/waste/errors (1)</li> <li>5. Savings made/increased profit (1)</li> <li>6. Reduce the amount of energy required to manufacture /distribute the product / reduce energy costs. (1)</li> <li>7. Promote the product as being environmentally friendly/green/avoid fines (1)</li> <li>8. Setup production nearer to suppliers / markets (1)</li> <li>9. Reduce transportation costs (1)</li> <li>10. Reduce the amount of time required to manufacture the product / Improve manufacturing speed (1)</li> <li>11. Get the product onto the market more quickly (1)</li> <li>12. Predict product lifespan/failure (1)</li> <li>13. Plan/provide improved/longer lasting product/replacement (1)</li> <li>14. Choose/change materials for future products (1)</li> </ol>	

	15.Improved company reputation (1) Any <b>four</b> of the above used as relevant linked points (2 x 2)	<b>(4)</b>
	<b>Total for question</b>	<b>10</b>
Question Number	Answer	Mark
<b>7</b>	<p><b>Advantages</b></p> <ol style="list-style-type: none"> <li>1. Reduction of lead / manufacturing time (lag)/quick completion/customer receives product more quickly (1)</li> <li>2. Be able to quickly react/respond to changes in fashion/trend/when needed/required/make to order/flexible (1)</li> <li>3. Automation/computer systems/robots used – manufacture/stock handling/quality control is more efficient(1)</li> <li>4. Lower labour costs (1)</li> <li>5. Reduced down time (1)</li> <li>6. Increased cash flow/market share/profit/gain sales/repeat business/keeps company ahead of competition/more competitive(1)</li> <li>7. Products can be customised/personalised/limited edition (1)</li> <li>8. JIT/Lower stock holding/storage costs (1)</li> <li>9. Improved quality (1)</li> <li>10.Skilled workforce requires little cost for training</li> </ol> <p><b>Disadvantages</b></p> <ol style="list-style-type: none"> <li>11.High set up costs (1)</li> <li>12.Reduced production rate when compared to dedicated production line (1)</li> <li>13.Increased reliance on suppliers to react to demand (1)</li> <li>14.Large variations in demand would be difficult to manage (1)</li> <li>15.Co-ordinating all aspects, production/planning/purchasing/human resources is difficult (1)</li> <li>16.Downtime when changes are needed (1)</li> <li>17.Cost of skilled workers is high (1)</li> </ol> <p style="text-align: right;">(10 x 1)</p> <p>A <b>maximum</b> of 9 marks if only advantages or disadvantages are mentioned</p>	<b>(10)</b>
	<b>Total for question</b>	<b>10</b>