



Pearson

# Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE  
In Design and Technology (6RM02)  
Paper 1

edexcel 

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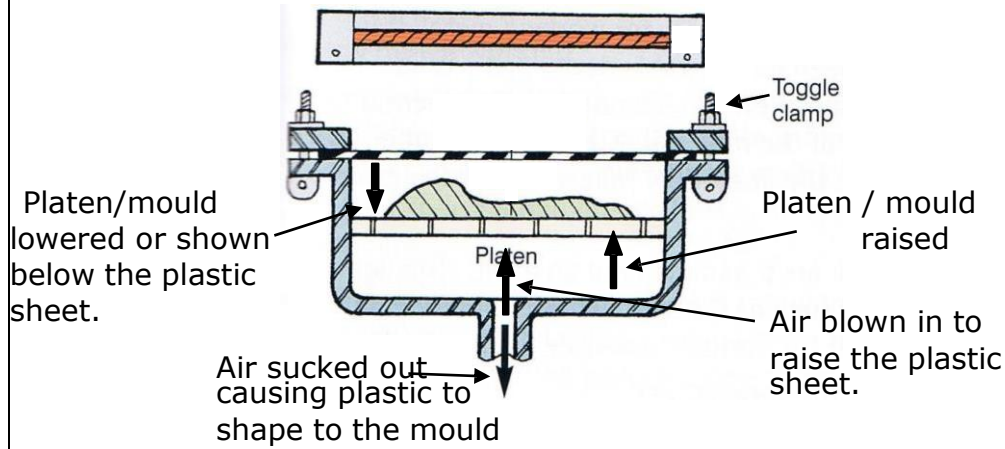
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## General Marking Guidance

- 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)</b>	<p>Any one of the following polymers:</p> <ol style="list-style-type: none"> <li>1. Polystyrene / PS / HIPS (1)</li> <li>2. Polyvinyl Chloride / PVC (1)</li> <li>3. Polypropylene / PP (1)</li> <li>4. Low/High density polyethylene / LDPE/HDPE /Polythene (1)</li> </ol> <p style="text-align: right;">(1 x 1)</p>	<b>1</b>
<b>1(b)</b>	<p>Any four of the following points:</p> <ol style="list-style-type: none"> <li>1. All sides have a draw angle / slope (1)</li> <li>2. No undercuts (1)</li> <li>3. All corners are rounded / no sharp edges (1)</li> <li>4. Sufficiently shallow to prevent excessive wall thinning (1)</li> <li>5. Smooth surfaces (1)</li> <li>6. Sufficient gap between pots to prevent webbing (1)</li> <li>7. Shapes are hollow / have no internal structure/open ended (1)</li> <li>8. Pot shape requires a broadly even thickness of material (1)</li> <li>9. The shape can be made from a single piece of material (1)</li> <li>10.Flat surface across pot openings sits cleanly on the platen / requires little trimming (1).</li> </ol> <p style="text-align: right;">(4 x 1)</p>	<b>4</b>

**1(c)** Any six of the following points or features clearly shown in the diagram or described with notes:



1. Platen/mould is lowered / platen/mould is shown below the polymer sheet (1)
2. Sheet clamped (1)
3. Air is blown in to raise the plastic (1)
4. Platen is raised (1)
5. Air is drawn out to form plastic over mould (1)
6. Allowed to cool/harden(1)
7. Air blown back in to release the mould (1)
8. Platen lowered to remove the mould / mould removed (1)

Do not award any reference to the heater, mould or polymer sheet as they are given in the stem.

(6 x 1)

**6**

**Total for question**

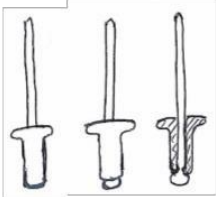
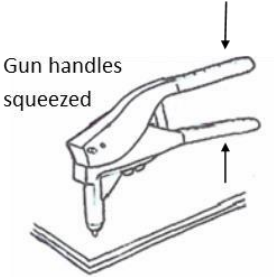
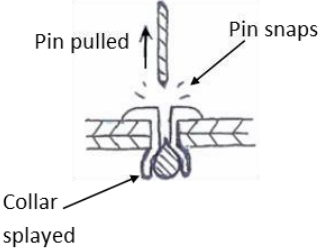
**11**

Question Number	Answer	Mark
<b>2(a)</b>	<p>Any three of the following points with a linked relevant explanation also from the following:</p> <ol style="list-style-type: none"> <li>1. Paints / stains well (1)</li> <li>2. Has a smooth surface / with little preparation (1)</li> <li>3. Stable material (1)</li> <li>4. Will not warp/twist/cup/split/check (1)</li> <li>5. It has no grain (1)</li> <li>6. It has no knots (1)</li> <li>7. Made from wood pulp /reprocessed wood / man-made / is a manufactured board (1)</li> <li>8. Uniform strength / no inherent weaknesses (1)</li> <li>9. Will not split / splinter when being shaped/used (1)</li> <li>10.Safer to machine (1)</li> <li>11.Reduced waste (1)</li> <li>12.Comes in large sheets (1)</li> <li>13.Parts can be made from one piece (1)</li> <li>14.No edge jointing needed (1)</li> <li>15.Manufacturing is quicker (1)</li> <li>16.Hard surface (1)</li> <li>17.Resists scratches and dents better (1)</li> <li>18.More sustainable / environmentally friendly (1)</li> <li>19.Produced from low grade timber / offcuts / waste / recycled wood (1)</li> <li>20.Less trees need cutting (1).</li> <li>21.MDF is heavy/heavier (1)</li> <li>22.Table is less likely to be knocked over (1)</li> </ol> <p style="text-align: right;">(3 x 2)</p> <p>Do not accept '<b>easier</b>' to use /cut /work /machine as this is vague.</p>	<b>6</b>
<b>2(b)</b>	<p>Any five of the following points:</p> <ol style="list-style-type: none"> <li>1. What hazards /risks the paint poses to health: (All references to skin, eyes, nose, lungs through irritation – toxic/ flammable fumes, liquids, vapours), spillage/transportation / carry out risk assessment/ (1)</li> <li>2. Control measures to reduce contact / exposure (by using PPE, ventilation, minimizing usage time) (1)</li> <li>3. Appropriate training for all users (1)</li> <li>4. Maintenance systems for safety equipment (1)</li> <li>5. Monitoring systems to ensure safe procedures are being followed (1)</li> <li>6. Regular health checks on workers / exposure levels (1)</li> <li>7. What first aid / response measures are required in the event of accident /over exposure (1)</li> <li>8. Safe methods of waste disposal (1)</li> <li>9. Appropriate signage / labelling (1)</li> </ol> <p style="text-align: right;">(5 x 1)</p>	<b>5</b>
<b>Total for question</b>		<b>11</b>

Question Number	Answer	Mark
<b>3(a)</b>	Any three of the following: <ol style="list-style-type: none"> <li>1. They can be slow compared to initial sketching of ideas (1)</li> <li>2. Users need to be trained / retrained regularly /skilled (1)</li> <li>3. Drawing tool capabilities can be limiting/difficult to use (1)</li> <li>4. They are not generally portable (1)</li> <li>5. Risk of data loss / corruption / computer crash (1)</li> <li>6. Compatibility issues between different software systems (1)</li> <li>7. Health issues - RSI, headaches, posture issues (1)</li> <li>8. Higher maintenance / updating / running costs (1)</li> </ol> <p style="text-align: right;">(3 x 1)</p>	<b>3</b>
<b>3(b)(i)</b>	The following word in any answer only; <ul style="list-style-type: none"> <li>▪ Milling / mill / milled (1)</li> </ul> <p style="text-align: right;">(1 x 1)</p>	<b>1</b>
<b>3(b)(ii)</b>	Any three of the following: <ol style="list-style-type: none"> <li>1. Dimensional faults / incorrect cuts / tools / datums / missed features (1)</li> <li>2. Structural integrity / cracks / chips (1)</li> <li>3. Burrs (1)</li> <li>4. Poor quality of surface finish / scratches (1)</li> <li>5. Cuttings fused to the component (1)</li> </ol> <p style="text-align: right;">(3 x 1)</p>	<b>3</b>

<p><b>3(b)(iii)</b></p>	<p>Any three answers with a linked relevant justification:</p> <p><b>Points</b></p> <ol style="list-style-type: none"> <li>1. Reduce the range/type of tests a product undergoes during manufacture / test once at the end / less tests (1)</li> <li>2. Use sampling / test one per batch / don't test all the products (1)</li> <li>3. The use of gauges / checking aids (1)</li> <li>4. Use of automated / robotic / computer driven machines (e.g. CMM's, vision systems, lasers) (1)</li> <li>5. Relax the tolerances where accuracy is less essential (1)</li> <li>6. Integrate checks into the production line / empower workers to check their own quality (1)</li> <li>7. Limit the use of destructive testing (1)</li> <li>8. Checking/testing is outsourced (1)</li> <li>9. Increased quality of manufacture/ check equipment more often/right first time (1)</li> </ol> <p><b>Justifications</b></p> <ol style="list-style-type: none"> <li>10.so less equipment needed/ less accurate machinery needed / less labour needed (1)</li> <li>11.because quality of manufacture does not require every component to be checked/average ascertained (1)</li> <li>12.to speed up tests / reduce delays (1)</li> <li>13.which reduce error / are more reliable/so reducing waste / rejection levels (1)</li> </ol> <p>Do not award 'reduces costs' as this is given in the stem. An explanation of how the change will reduce the cost is being looked for.</p> <p style="text-align: right;">(3 x 2)</p>	<p style="text-align: center;"><b>6</b></p>
<b>Total for question</b>		<b>13</b>



Question Number	Answer	Mark
<b>4(a)</b>	<p>Any six of the following points in any order:</p> <ol style="list-style-type: none"> <li>1. File / turn a chamfer on the top edge of the rod (1)</li> <li>2. Die / Die selected / fitted to stock (one or both names correct) (1)</li> <li>3. Writing side of die placed downwards (1)</li> <li>4. Apply downward pressure (1)</li> <li>5. Twist / turn the die (1)</li> <li>6. Check for trueness / level die / straightness / drunken thread/ use of lathe tailstock (1)</li> <li>7. Apply lubricant (1)</li> <li>8. Frequently twist backwards to chop the cuttings (1)</li> <li>9. Continue the cutting / twisting action until thread length is achieved (1)</li> <li>10. Adjust split die/use second die for final cut (1)</li> <li>11. Invert die to fully cut last threads (1)</li> </ol> <p style="text-align: right;">(6 x 1)</p>	<b>6</b>
<b>4(b)</b>	<p>Any five of the following steps clearly shown in the diagrams or annotated:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Two part rivet shown</p> </div> <div style="text-align: center;">  <p>Gun handles squeezed</p> </div> <div style="text-align: center;">  <p>Pin pulled Pin snaps Collar splayed</p> </div> </div> <ol style="list-style-type: none"> <li>1. Two part rivet shown / description of two part rivet / collar and mandrel / rivet and pin / head and tail in the text (1)</li> <li>2. Rivet gun shown / gun used / handles squeezed / pliers compressed (1)</li> <li>3. Mandrel (pin) is pulled (1)</li> <li>4. Collar / rivet is splayed / expanded / deformed by pin head (1)</li> <li>5. Mandrel pin snaps off (1)</li> </ol> <p style="text-align: right;">(5 x 1)</p>	<b>5</b>
<b>Total for question</b>		<b>11</b>

Question Number	Answer	Mark
<b>5(a)</b>	<p>Any three of the following with a linked relevant explanation:</p> <ol style="list-style-type: none"> <li>1. Hard (1) so it does not wear away quickly (1)</li> <li>2. Durable (1) so will last a long time /minimal maintenance (1)</li> <li>3. Low friction co-efficient / self-lubricating (1) so it spins freely / gives minimal friction /increased efficiency (1)</li> <li>4. Good heat conductor (1) it will dissipate the heat well and not become too hot (1)</li> <li>5. Heat resistant / high melting point (1) so will not soften / deform / due to the friction.</li> <li>6. Non-ferrous / will not corrode (1) so it is less likely to seize /deteriorate / extending its life (1)</li> <li>7. Non-magnetic (1) so won't collect filings from wearing components (1)</li> </ol> <p style="text-align: right;">(3 x 2)</p>	<b>6</b>
<b>5(b)</b>	<p>Any three of the following points with a linked relevant explanation:</p> <ol style="list-style-type: none"> <li>1. Higher cost of bearing (1)</li> <li>2. More parts / more processes needed / more time to manufacture / more complexity (1)</li> <li>3. Increased cost of the product. (1)</li> <li>4. Some require more maintenance / frequent lubrication / cleaning / replacement (1)</li> <li>5. Cannot take as large loads/ cannot take as large vibrations /not as strong (1)</li> <li>6. Forces are focused onto small points of contact between the balls and the races (1)</li> <li>7. Fail / break / jam / damage (1)</li> <li>8. More open to dust / dirt entering (1)</li> <li>9. Additional running costs / machine down time (1)</li> <li>10.They are larger components (1)</li> <li>11.More space needed for fitting /products are bigger (1)</li> <li>12.Only available in limited range of stock sizes (1)</li> <li>13.Constraints put on designs (1)</li> </ol> <p style="text-align: right;">(3 x 2)</p>	<b>6</b>
<b>Total for question</b>		<b>12</b>

Question Number	Answer	Mark
<b>6 (a)</b>	<p>Any 4 of the following points:</p> <ol style="list-style-type: none"> <li>1. Pressure sensitive /touch sensitive / electrical conductor when pressed / insulator when relaxed (1)</li> <li>2. Flexible / comfortable to wear (1)</li> <li>3. Cheap to manufacture / integrate into sleeve (1)</li> <li>4. Water resistant / washable (1)</li> <li>5. Lightweight (1)</li> <li>6. Only small / thin pieces are needed (1)</li> <li>7. Is not affected by extreme temperatures / hot or cold (1)</li> <li>8. It has a reliable / durable function / will last a long time (1)</li> <li>9. Contains no moving parts (1)</li> <li>10. Can be cut to any shape (1)</li> </ol> <p style="text-align: right;">(4 x 1)</p>	<b>4</b>
<b>6 (b)</b>	<p>Any eight of the following points but maximum of 7 if only positives or negatives used:</p> <p>Positives</p> <ol style="list-style-type: none"> <li>1. No mains power source is needed / can be used in remote areas / portable (1)</li> <li>2. Free energy (1)</li> <li>3. Clean energy/ environmentally friendly / no emissions from generating electricity from fossil fuels (1)</li> <li>4. It's a renewable source/sustainable (1)</li> <li>5. Provides unlimited recharges/won't run out of power (1)</li> <li>6. Relatively light weight (1)</li> <li>7. Some contain an internal battery to store energy for use at a later point (1)</li> </ol> <p>Negatives</p> <ol style="list-style-type: none"> <li>8. Only generates electricity in light/during the day /not as effective indoors / low light conditions / cloudy / weather dependant /can't use in a pocket or bag /more effective if directed towards the sun (1)</li> <li>9. Takes a long time to charge the phone /limited output (1)</li> <li>10. Relatively large unit /big/ larger than a spare battery / charging plug (1)</li> <li>11. Does not have to be charged prior to being used (1)</li> </ol> <p style="text-align: right;">(8 x 1)</p>	<b>8</b>
<b>Total for question</b>		<b>12</b>

