

# Mark Scheme (Results) Summer 2016

Pearson Edexcel GCE  
in Design & Technology (6GR02/01) Paper 1

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Summer 2016

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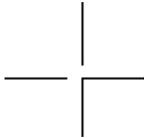
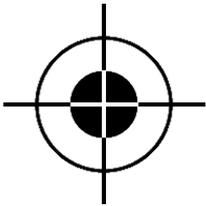
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## General Marking Guidance

- 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
1(a)	<p>Award one mark for each characteristic up to a maximum of 2 marks</p> <ol style="list-style-type: none"> <li>1. Provides a durable/hard/thick/rigid/strong/hard wearing protective cover (1)</li> <li>2. The process is expensive (1)</li> <li>3. Process is time consuming (1)</li> <li>4. Spines are often rounded/have hinges to ease opening (1)</li> <li>5. Individual sections/signatures are stitched together (1)</li> <li>6. Pages/Signatures/sections are glued to the spine (1)</li> <li>7. Covers are often cloth covered (1)</li> <li>8. Aesthetically pleasing binding method/ not visible like comb binding (1)</li> <li>9. Increases life-span of book (1)</li> <li>10. High quality method (1)</li> <li>11. Protects pages well (1)</li> <li>12. Spine can be printed on (1)</li> <li>13. Opens relatively flat (1)</li> <li>14. Requires limited/ small binding margin (1)</li> <li>15. Suitable for binding a large number of pages (1)</li> </ol>	(2)
1(b)	<p>Award one mark for each property. Properties must be appropriate for the heading</p> <p>Functional properties</p> <ol style="list-style-type: none"> <li>1. Strong/durable/resists tearing (1)</li> <li>2. Absorbs ink well (1)</li> <li>3. Good rigidity (1)</li> <li>4. High quality print possible (1)</li> </ol> <p>Aesthetic properties</p> <ol style="list-style-type: none"> <li>1. opaque (1)</li> <li>2. Range of special finishes possible (1)</li> <li>3. Smooth/crisp/glossy finish (1)</li> <li>4. Comes in a range of colours (1)</li> <li>5. Watermark (1)</li> </ol> <p style="text-align: right;">(2 x 1)</p>	(2)

1(c)

Quality control mark	Name	Explanation
	1. Crop mark (1) 2. Trim mark (1)	1. Used to make sure that the pages are cut in the correct place (1) to ensure consistency throughout the book (1)
	1. Colour bar / Greyscale (1)	1. Used to make sure that the final print colour is correct / consistent (1) by measuring density / quality either visually or using a densitometer (1)
	1. Registration mark (1) 2. Alignment mark (1)	1. Used to prevent blurring of images / keep images in focus (1) because they show that the plates/colours are aligned (1)  2. Check the alignment of the print (1) by checking each colour perfectly overlaps (1)

(3 x 1)  
(3 x 2)

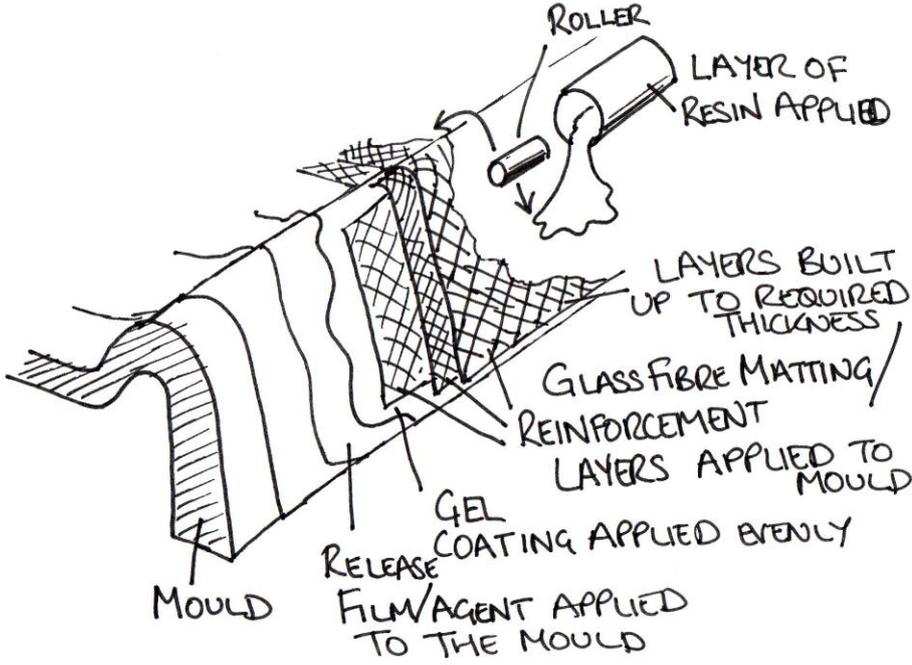
(9)

**Total for question**

**13**

Question Number	Answer	Mark									
2(a)	<p>Award one mark for each appropriate risk, and one mark for each appropriate control measure. The control measure must relate to the risk.</p> <table border="1" data-bbox="304 465 1257 1458"> <thead> <tr> <th data-bbox="304 465 504 528">Activity</th> <th data-bbox="504 465 796 528">Risk</th> <th data-bbox="796 465 1257 528">Control Measure</th> </tr> </thead> <tbody> <tr> <td data-bbox="304 528 504 947">Cutting out the net</td> <td data-bbox="504 528 796 947">           1. Cuts/ injury to hands/fingers (1)         </td> <td data-bbox="796 528 1257 947">           1. Use a cutting mat / safety rule (1)            2. Be trained in safe use of equipment (1)            3. Wear (cut resistant) gloves (1)            4. Cut away from the hands/body (1)           <p style="text-align: right;">(1)</p> </td> </tr> <tr> <td data-bbox="304 947 504 1458">Assembling the net</td> <td data-bbox="504 947 796 1458">           1. Inhalation of fumes (1)            2. Irritation of skin /eyes (1)         </td> <td data-bbox="796 947 1257 1458">           1. Ensure good ventilation/extraction / wear respirator mask/ use a fume cupboard (1)            2. Wear gloves/barrier cream (1)            3. Wash hands after use (1)            4. Training (1)            5. Use tools/spreader to apply adhesive (1)           <p style="text-align: right;">(1)</p> </td> </tr> </tbody> </table>	Activity	Risk	Control Measure	Cutting out the net	1. Cuts/ injury to hands/fingers (1)	1. Use a cutting mat / safety rule (1) 2. Be trained in safe use of equipment (1) 3. Wear (cut resistant) gloves (1) 4. Cut away from the hands/body (1) <p style="text-align: right;">(1)</p>	Assembling the net	1. Inhalation of fumes (1) 2. Irritation of skin /eyes (1)	1. Ensure good ventilation/extraction / wear respirator mask/ use a fume cupboard (1) 2. Wear gloves/barrier cream (1) 3. Wash hands after use (1) 4. Training (1) 5. Use tools/spreader to apply adhesive (1) <p style="text-align: right;">(1)</p>	<p>(4)</p>
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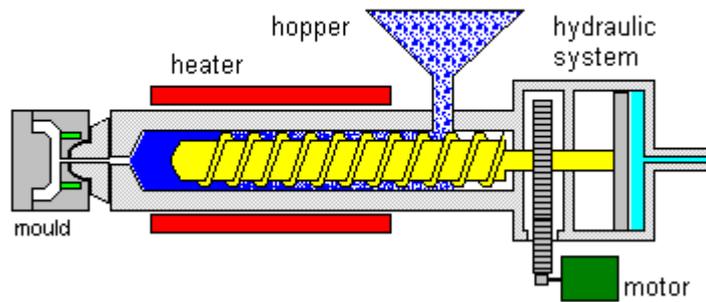
<p><b>2(b)</b></p>	<p>Award one mark for an appropriate reason, and further marks for descriptions.</p> <ol style="list-style-type: none"> <li>1. Equipment is readily available in schools/colleges (1) meaning that there is no need to buy specialist tools/reduces cost (1)</li> <li>2. Set up times are reduced (1) as there is no need to program CNC equipment (1)</li> <li>3. It would not be efficient use of time/resources to produce a die cutter (1) as the wallet is a prototype and may need to be changed / large quantities are required for die-cutting to be cost effective (1)</li> <li>4. Not necessary to invest in expensive equipment (1) so saves money for a one-off product (1)</li> </ol> <p style="text-align: right;">(1 x 2)</p>	<p style="text-align: center;"><b>(2)</b></p>
<p><b>2(c)</b></p>	<p>Method of production must be suitable for a batch of 1000 Award one mark for a reason, with a further mark for expansion.</p> <ol style="list-style-type: none"> <li>1. CNC equipment will ensure consistency (1) as all of the wallets will be identical (1)</li> <li>2. The design will be stored on a computer (1) allowing for further wallets to be made quickly (1)</li> <li>3. Eliminates the need to produce a die forme (1) which would add expense to the production process (1)</li> <li>4. It would be easier to amend the design compared to die cutting (1) as adjustments are done using the software package (1)</li> <li>5. Multiple nets can be cut out at the same time (1) making the process more efficient / less wasteful than other methods (1)</li> <li>6. very adaptable (1) only need to change settings such as speed/pressure/focus (1)</li> <li>7. quality checks are built in to the process (1) reducing labour costs/increasing the speed of manufacture (1)</li> </ol> <p style="text-align: right;">(1 x 2)</p>	<p style="text-align: center;"><b>(2)</b></p>
<p><b>2 (d)</b></p>	<p>Award one mark for each appropriate reason, and further marks for expansion.</p> <ol style="list-style-type: none"> <li>1. Relatively low set-up costs/lower set up costs than flexography/lithography (1) as there are no expensive plates to produce/does not add significantly to the cost of production (1)</li> <li>2. Commercial screens are rapidly made using a light sensitive emulsion (1) which makes them efficient for small print runs (1)</li> <li>3. Can be used to print onto a range of different surfaces (1) as it is a direct printing method (1)</li> <li>4. Screens are reusable (1) therefore can be saved for later batches (1)</li> <li>5. The process is flexible / new stencils can be easily made (1) allowing changes to be made if required (1)</li> <li>6. Screens can be produced using a plotter cutter in school (1) allowing for the wallets to be produced entirely in school (1)</li> </ol> <p style="text-align: right;">(1 x 2) (1 x 2)</p>	<p style="text-align: center;"><b>(4)</b></p>
<b>Total for question</b>		<b>12</b>

Question Number	Answer	Mark
3(a)	 <ol style="list-style-type: none"> <li>1. Mould/former is produced (1)</li> <li>2. The mould/former is polished with releasing agent (1)</li> <li>3. Gel coating applied to the mould evenly (1)</li> <li>4. Glass fibre matting reinforcement is stippled onto the mould/former /glass fibres are sprayed onto the mould (1)</li> <li>5. Layer of resin/polyester applied (1)</li> <li>6. Layers are built up to the required thickness (1)</li> <li>7. Leave to cure/set/dry before removal from the mould/former (1)</li> <li>8. Edges are cut to size/ sanded smooth (1)</li> </ol> <p style="text-align: right;">(4 x 1)</p> <p>Maximum 3 marks if no sketch Maximum 2 marks if only simple labels</p>	(4)

<p><b>3(b)</b></p>	<p>Award one mark for identifying an advantage/disadvantage and a further mark for expansion up to a maximum of two marks for each.</p> <p>Advantages</p> <ol style="list-style-type: none"> <li>1. Has good strength once set (1) which allows for a long service life (1)</li> <li>2. High water resistance/weatherproof (1) which makes it suitable for outdoor use (1)</li> <li>3. Wide range of working temperatures (1) allows for repairs to be made in-situ or in a range of weather conditions (1)</li> <li>4. Does not shrink when cured (1) which will prevent gaps appearing between the parts (1)</li> <li>5. Can be used to bond differing types of material (1) allowing for the sign to be manufactured without use of mechanical fixings /other named adhesives (1)</li> <li>6. Rapid setting versions are available (1) which allows for completion within an appropriate timescale.</li> </ol> <p>Disadvantages</p> <ol style="list-style-type: none"> <li>1. Relatively expensive compared to other adhesives (1) which adds to the cost of the sign (1)</li> <li>2. Needs to be mixed from two parts (1) which if mixed incorrectly could cause the joint to fail/ takes time to prepare adding to assembly time/costs (1)</li> <li>3. Can be harmful/irritant/ gives off strong fumes when being mixed (1) therefore more control measures are needed (1)</li> <li>4. Incorrect ratio of resin to hardener can create heat/bubbles (1) which could damage the final sign (1)</li> <li>5. Slow setting / takes a long time to reach full strength (1) so will need temporary support while the adhesive cures/adds to overall production time (1)</li> <li>6. Limited time to use adhesive (1) which could result in more waste (1)</li> </ol> <p style="text-align: right;">(1x2) (1x2)</p>	<p style="text-align: right;"><b>(4)</b></p>
<b>Total for question</b>		<b>8</b>

Question Number	Answer	Mark
4(a)	<p>Award one mark for each appropriate reason, and further marks for expansion.</p> <ol style="list-style-type: none"> <li>1. The light emitted is not directional (1) therefore has the same brightness from all angles (1)</li> <li>2. Can work in a wide range of temperatures (1) making them equally suitable for indoor or outdoor use (1)</li> <li>3. Does not need to have a regulated power supply (1) so can be connected directly to the mains/plugged in (1)</li> <li>4. The panels have a long life (1) which reduces maintenance costs/cost of replacement (1)</li> <li>5. They are low power units/low Wattage/low energy (1) meaning running costs are lower than other types of bulb/less harmful to the environment (1)</li> <li>6. Panels can be made waterproof (1) allowing for safe use outside (1)</li> <li>7. Panels are very thin (1) so displays can be used in various locations (1)</li> </ol> <p style="text-align: right;">(1x2) (1x2)</p>	<b>(4)</b>
4(b)	<p>Award one mark for a valid statement, and a second mark for expansion.</p> <ol style="list-style-type: none"> <li>1. Good electrical insulator (1) to prevent electrical shock (1)</li> <li>2. Good thermal/chemical/water/ corrosion resistance (1) allows for use in a wide range of locations/outdoor use /protects the contents of the display (1)</li> <li>3. Semi-rigid so will hold its shape (1) without further structural framework (1)</li> <li>4. Available in a range of colours (1) which can be used for corporate purposes (1)</li> <li>5. Tough /durable (1) therefore cannot easily be damaged/resists impact damage/increases life-span of the product (1)</li> <li>6. Lightweight (1) so can be easily fixed and does not impose excessive loading on the background structure (1)</li> <li>7. Can be transparent (1) therefore the advertisement can be clearly seen (1)</li> <li>8. Easily shaped using injection moulding (1) leaving the display with an attractive shiny surface finish (1)</li> </ol> <p style="text-align: right;">(1x2)</p>	<b>(2)</b>

4(c)



1. granulated polymer is placed into hopper (1)
2. Polymer is heated to liquid (1)
3. As polymer becomes liquefied the screw is forced back (1)
4. Archimedes Screw drive feeds polymer through barrel (1)
5. The screw is forced forward under hydraulic high pressure and injects the liquid plastic into the split mould (1)
6. The mould is cooled rapidly, sometimes with water (1)
7. The split mould opens for quick rejection of the product (1)

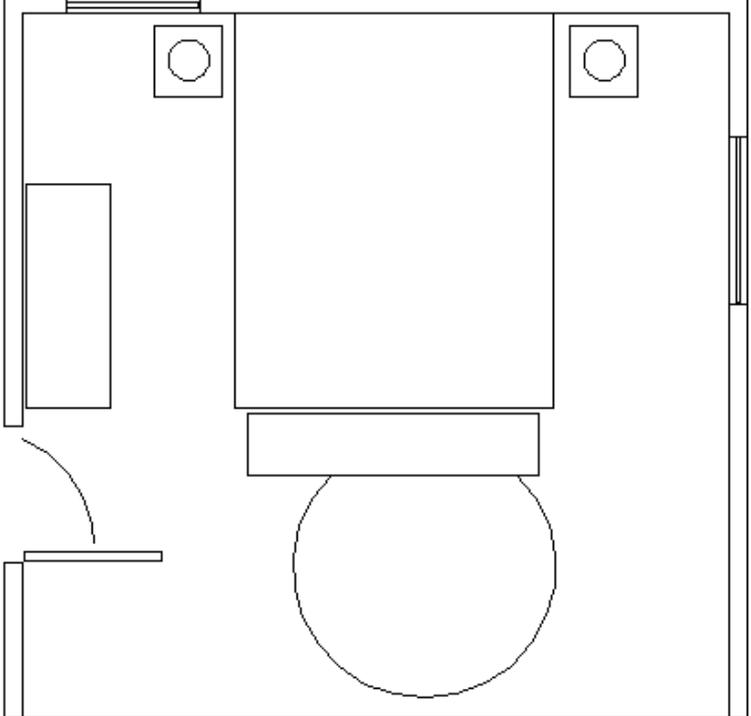
*Max 4 marks if no reference is made to the Archimedean screw  
Max 2 mark for accurate sketch with simple labelling (i.e. parts labelled with no description. The above diagram would only get 2 marks)*

(5x1)

(5)

Total for question

11

Question Number	Answer	Mark
5(a)	 <p>Award marks as follows (up to 2 marks):</p> <ol style="list-style-type: none"> <li>1. Room drawn approximately square, with at least three walls having a representation of thickness (1)</li> <li>2. Indication of windows and doors in approximately the correct location (1)</li> </ol> <p>The following drawn in the correct location and proportions (up to a further 4 marks)</p> <ol style="list-style-type: none"> <li>3. Bed (1)</li> <li>4. Both bedside cabinets and lamps (1)</li> <li>5. Wardrobe (1)</li> <li>6. Unit at base of the bed (1)</li> <li>7. Circular rug (1)</li> </ol> <p><i>If items 1 and 2 are not correctly drawn as described above, a maximum of four marks should be awarded.</i></p> <p style="text-align: right;">(6 x 1)</p>	<b>(6)</b>
5(b)	<p>Award one mark for a valid point, with a second mark for expansion</p> <ol style="list-style-type: none"> <li>1. Can be produced by rotating a plan view by 45° allowing the projection to be produced directly from the plan (1) whilst isometric drawings need to be completely drawn out as a new drawing (1)</li> <li>2. Circles on the horizontal plane remain as circles (1) whereas circles in isometric become an ellipse/distorted (1)</li> <li>3. Dimensions from plans can be used directly on the axonometric drawing (1) but this is not possible for all dimensions in isometric because the plan is distorted/squashed/altered in proportion (1)</li> <li>4. Provides a clearer view of the room (1) as 45° angle provides a better view than 30° (1)</li> </ol> <p style="text-align: right;">(2 x 1)</p>	<b>(2)</b>
<b>Total for question</b>		<b>8</b>

Question Number	Answer	Mark
<b>6(a)</b>	Award one mark for each appropriate reason, and a second mark for expansion. 1. Sizing agents can improve water resistance (1) to prevent ink from feathering on the surface (1) 2. Starches / sizing agents are used as an adhesive (1) to bind pigment particles to the paper (1) 3. Alum/sizing agents improve the strength/ durability of paper (1) by resisting moisture absorption (1) 4. Produce a better printing surface (1) which improves the quality/increases value of the final printed product (1) <div style="text-align: right;">(1x2)</div>	<b>(2)</b>
<b>6(b)</b>	Answers must be given in full. For full marks consideration should be made to advantages and disadvantages of using waste pulp. If only one side of the argument is presented, award a maximum of 7 marks  <b>Advantages</b> 1. Reduces the need to cut down trees/reduces the environmental impact of deforestation (1) 2. Reduces the amount of waste paper in landfill sites (1) 3. Pulp is produced from a sustainable source (1) 4. Less chemicals/bleaching needed than for mechanical and chemical pulp (1) 5. Reduced air and water pollution from disposing of paper/ transportation of timber (1) 6. Fewer greenhouse gases produced from decomposition (1) 7. Creates more employment than other methods of disposal (1) 8. Could use less energy than producing chemical or mechanical pulp (1) 9. Using waste pulp can be more cost effective (if qualified) (1)  <b>Disadvantages</b> 1. Paper can only be recycled 6 times/recycling shortens fibres (1) 2. Paper needs to be de-inked (1) 3. Glues/plastic windows/staples/clips need to be removed (1) 4. Waste produced by de-inking ends up in landfill (1) 5. Paper often has less strength than that made from virgin pulps (1) 6. Paper from waste pulp is less durable (1) 7. Waste pulp can only be used for lower grades of paper (1) 8. Has poor qualities for printing / ink bleeds (1) 9. Discoloured/lower quality paper is produced (1) 10. Chemicals/additive/ virgin fibres/ bleach need to be used to improve the pulp to the quality needed (1) 11. Processing waste pulp requires large amounts of energy (1)	<b>(8)</b>
<b>Total for question</b>		<b>10</b>

Question Number	Answer	Mark
7	<p>A balanced response should be put forward. Consideration of both surface modelling and wire frame modelling must be included for full marks. If only one is considered, award a maximum of 7 marks.</p> <p>Wire frame modelling.</p> <ol style="list-style-type: none"> <li>1. The client can visualise the underlying design structure of a 3D model (1)</li> <li>2. Can be used to show animations because calculations are relatively simple (1)</li> <li>3. Wire frame is the most abstract/least realistic form of 3D model (1)</li> <li>4. Can be difficult to interpret designs (1)</li> <li>5. The model consists of only lines, points and curves/ skeleton defining the edges of an object (1)</li> <li>6. Wire frame models can be processed faster (1)</li> <li>7. Wireframe models can be viewed in 1 dimension if required (1)</li> <li>8. Wireframe models require less memory space (1)</li> <li>9. Require less bandwidth to send electronically (1)</li> </ol> <p>Surface modelling.</p> <ol style="list-style-type: none"> <li>1. Allows organic shapes to be designed (1)</li> <li>2. Can give the client a realistic/ 3D view of the final product (1)</li> <li>3. Represents the outer surfaces of the final product (1)</li> <li>4. Easier to interpret than wire frame/orthographic drawings (1)</li> <li>5. Some systems can give photorealistic interpretations of surface finish (1)</li> <li>6. Not all surface modelling software allows textures/colours to be shown (1)</li> <li>7. Require powerful computer systems if models need to be animated (1)</li> <li>8. Producing rendered images can be time consuming (1)</li> <li>9. Surface modelling requires large amounts of memory (1)</li> <li>10. Does not show internal features (1)</li> <li>11. Model may have geometric inaccuracies (1)</li> </ol> <p style="text-align: right;">(8 x 1)</p>	<b>(8)</b>
	<b>Total for question</b>	<b>8</b>