



National  
Qualifications  
2022

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## 2022 Design and Manufacture

### National 5

## Finalised Marking Instructions

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## General marking principles for National 5 Design and Manufacture

*Always apply these general principles. Use them in conjunction with the detailed marking instructions, which identify the key features required in candidates' responses.*

- (a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.
- (b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.
- (c) To be awarded marks candidates must respond to the command word used in the question. For example, listing a valid point, even if correct, should not be awarded marks if the question asked for an outline, description or explanation.
- (d) Mark consecutive responses to match the marks in 'name/state' questions. For example, if two responses are given to a **1 mark** question, only the first response should be marked.
- (e) Candidates must answer all aspects of the question to gain full marks. For example, if the questions require two reasons candidates must make two valid and substantiated points relating to the question to gain both marks. If the questions require three stages to be described, candidates must provide a structure of characteristics and/or features of each of the three stages to be awarded all **3 marks**.
- (f) For each candidate response, the following provides an overview of the marking principles. Refer to the specific marking instructions for further guidance on how these principles should be applied.
  - (i) Questions that ask candidates to **name/state/complete**  
Candidates must provide the answer in brief form/name. Candidates will normally be required to make the same number of statements as marks available in the question.
  - (ii) Questions that ask candidates to **outline**  
Candidates must provide a brief sketch of content. More than naming, but not a detailed description. Candidates will normally be required to make the same number of actual/appropriate points as marks available in the question.
  - (iii) Questions that ask candidates to **describe**  
Candidates must provide a statement or structure of characteristics and/or features. This should be more than an outline or a list. Candidates may refer to, for instance, a concept, experiment, situation, or facts in the context of, and appropriate to, the question. Candidates will normally be required to make the same number of factual/appropriate points as marks available in the question.
  - (iv) Questions that ask candidates to **explain**  
Candidates must generally relate cause and effect and/or make relationships between things clear. This will be related to the context of the question or a specific area within a question.

## Marking instructions for each question

### Section 1

Question			Expected response	Max mark	Additional guidance
1.	(a)	(i)	Name a softwood: <ul style="list-style-type: none"> <li>red pine</li> <li>spruce.</li> </ul> <b>Any other suitable response.</b>	1	<b>1 mark</b> for correct response. Any other suitable response could include: <ul style="list-style-type: none"> <li>cedar</li> <li>douglas fir</li> <li>larch</li> <li>any reference to 'pine'.</li> </ul>
		(ii)	State one benefit of using MDF rather than softwood: <ul style="list-style-type: none"> <li>easily available</li> <li>large flat sheets</li> <li>good surface finish</li> <li>easy to paint</li> <li>doesn't warp/twist</li> <li>cheaper</li> <li>easier to cut and shape</li> <li>uses waste wood so more environmentally friendly.</li> </ul> <b>Any other suitable response.</b>	1	<b>1 mark</b> for correct response. Exemplar responses: <ul style="list-style-type: none"> <li>'<i>it is cheaper than softwood</i>' (1 mark)</li> <li>unqualified '<i>cheap</i>' scores. (0 marks)</li> <li>'<i>cheaper</i>' implies a comparison (1 mark)</li> <li>'<i>Stronger</i>' on its own (0 marks)</li> <li>'<i>Stronger than softwood</i>' (0 marks)</li> <li>'<i>Stronger</i>' with reference to grain (1 mark)</li> </ul>
	(b)	(i)	Marking out of the dowel joint. A description and/or sketch that includes <b>two</b> of the following: <ul style="list-style-type: none"> <li>set a marking gauge to half the thickness of the MDF or 6mm</li> <li>mark a centre line for dowels on the end of side A using a marking gauge</li> <li>measure 12 mm from the top and bottom of the side with rule and pencil for dowel locations</li> <li>use a try square to draw a line across the end of side A at 90 degrees to the edge</li> <li>use a bradawl/centre punch to create an indent at the dowel position.</li> </ul> <b>Any other suitable response.</b>	2	<b>1 mark</b> per correct description up to a total of <b>2 marks</b> . Steps should be in a sensible order to gain full marks. <b>1 mark</b> awarded for each stage where reference has been made to a suitable tool. An overall response that does not refer to appropriate tools scores a <b>maximum of 1 mark</b> . Candidates may use sketches to aid their descriptions. Lists of tools score <b>0 marks</b> , for example, ' <i>use a try square and pencil</i> '. ' <i>Mark the distance with a ruler</i> ' scores <b>1 mark</b> (a ruler should be used to measure). ' <i>Mark the lines with a rule(r)</i> ' (0 marks) ' <i>Mark out the position of the holes with a rule and pencil.</i> ' (1 mark)

Question		Expected response	Max mark	Additional guidance
	(ii)	<p>Correct depth of holes.</p> <p>Outline either:</p> <ul style="list-style-type: none"> <li>• setting a rubber/metal depth stop/masking tape on a drill bit to the appropriate height so that it doesn't go into the material further than required, this could be in pillar or hand drill</li> <li>• setting the depth stop on pillar drill by taking the end of the drill to a mark on edge of sound box top at the desired depth.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p>To be awarded marks candidates must provide an <b>outline</b> when answering this question.</p> <p><b>1 mark</b> for correct response.</p> <p>Accept:</p> <ul style="list-style-type: none"> <li>• <i>'use a piece of masking tape wrapped around the drill bit to show how deep to go'</i> (1 mark).</li> </ul>
	(iii)	<p>Alternative joint.</p> <p>State any <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• rebate</li> <li>• lap</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for correct response.</p> <p><i>'Butt joint'</i> (1 mark)</p> <p>Candidates must name a joint.</p> <p><i>'Glue it'</i> (0 marks)</p> <p><i>'Corner halving'</i> (0 marks)</p>
(c)	(i)	<p>Name the adhesive.</p> <ul style="list-style-type: none"> <li>• PVA glue.</li> </ul>	1	<p><b>1 mark</b> for correct response.</p> <p><i>'Wood glue'</i> (1 mark)</p> <p><i>'Glue'</i> (0 marks)</p> <p>Trade names of glues (0 marks)</p>
	(ii)	<p>Holding wood.</p> <p>A description and/or sketch that could include some of the following:</p> <ul style="list-style-type: none"> <li>• organise pieces of wood with end grain in alternate directions</li> <li>• cramp the glued pieces together using sash cramps</li> <li>• use sash cramps above and below joined pieces to maintain a flat sheet or apply weights to prevent cupping</li> <li>• put glued pieces in the bench vice to keep flat until dry.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for valid description.</p> <p>Candidates may refer to joining techniques such as dowelling or biscuits.</p> <p>A response such as <i>'Glue it'</i> is not sufficient as it does not refer to holding (0 marks).</p> <p>A basic response such as <i>'Clamp it'</i>, <i>'sash clamp'</i> or <i>'put it in a vice'</i> (1 mark).</p>

Question		Expected response	Max mark	Additional guidance
	(iii)	<p>Good application of a wood varnish using a brush:</p> <ul style="list-style-type: none"> <li>• apply a thin coat</li> <li>• apply an even coat</li> <li>• cover all surfaces</li> <li>• remove any bristles that come off the brush</li> <li>• remove excess varnish off brush before applying to wood so the amount of varnish applied is easily controlled</li> <li>• brush with the grain.</li> <li>• Multiple layers applied.</li> <li>• Sand between layers.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each correct response up to a <b>maximum of 2 marks.</b></p> <p><b>0 marks</b> to be awarded to '<i>apply with brush</i>' as this is in the question.</p> <p><b>'Apply thin coats' (2 marks)</b></p>
(d)	(i)	<p>Saw for cutting shape:</p> <ul style="list-style-type: none"> <li>• coping saw</li> <li>• junior hacksaw</li> <li>• scroll saw</li> <li>• fret saw</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for correct response.</p> <p>Accept:</p> <ul style="list-style-type: none"> <li>• hegner saw</li> <li>• band saw.</li> <li>• Abrafile saw.</li> </ul> <p><b>'Abrafile' (1 mark)</b></p> <p><b>'Hack saw'</b> scores 0 unless qualified by TPI.</p>
	(ii)	<p>Finish plastic edge, three stages.</p> <p>A description that includes <b>three</b> of the following:</p> <ul style="list-style-type: none"> <li>• filing/scraping</li> <li>• use abrasive papers/cloth/wool</li> <li>• polishing/buffing.</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p>To be awarded marks candidates must provide a <b>description</b> when answering this question.</p> <p><b>1 mark</b> for each valid stage point up to a <b>maximum of 3 marks.</b></p> <p>Description must reference workshop tools/equipment to gain marks.</p> <p>Reference to '<i>machine sanders</i>' <b>(0 marks)</b></p> <p><b>'Wet and dry paper – use dry first then wet' (1 mark)</b></p> <p><b>'Wet and dry sandpaper' (1 mark)</b></p> <p>References to '<i>sand/glass paper</i>' on their own <b>(0 marks)</b></p> <p>Only 1 mark for multiple filing/scraping actions e.g. '<i>cross file</i>', '<i>draw file</i>'.</p>

Question		Expected response	Max mark	Additional guidance
	(e)	(i)	1	1 mark for correct response. <i>'Balsa wood'</i> scores 1 (strong enough for this part of the product).
		(ii)	4	To be awarded marks candidates must provide a <b>description</b> when answering this question. <b>1 mark</b> for each valid point or effective sketch leading to a clear description, up to a <b>maximum of 4 marks</b> . Where candidates refer to marking diagonals on the end of the blank it is not necessary to reference a tool as a straight edge would suffice. At all other stages, candidates must reference workshop tools used to mark out and remove the corners. <i>'Saw diagonals'</i> (0 marks). Candidate must name the type of saw. <i>'Plane corners'</i> (1 mark). Type of plane not required.
		(iii)	2	To be awarded marks candidates must provide an outline when answering this question. <b>1 mark</b> for each correct response up to a <b>maximum of 2 marks</b> . Accept references to finishes such as oil/wax/varnish (1 mark) <i>'don't rush/take your time'</i> (0 marks) <i>'Sand it'</i> (1 mark) <i>'Speed it up'</i> (1 mark)

Question		Expected response	Max mark	Additional guidance
	(f)	<p>Explain why epoxy resin is suitable:</p> <ul style="list-style-type: none"> <li>• will glue different materials such as metal and wood together</li> <li>• will provide a strong join.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark per correct response up to a total of 2 marks.</b></p> <p><i>'Very waterproof'</i> (0 marks). This is true but not relevant to the question asked.</p> <p><i>'Durable'</i> (1 mark)</p> <p><i>'Strong'</i> on its own (1 mark)</p> <p><i>'tough'</i> (1 mark)</p>
	(g)	(i) <p>Measure and mark out metal.</p> <p>A description and/or sketch that includes <b>three</b> of the following:</p> <ul style="list-style-type: none"> <li>• use Engineer's blue</li> <li>• use a steel rule and scribe to measure and mark out locations of all holes and bends</li> <li>• use an engineer's square to draw lines across the metal bar</li> <li>• use a scribe to draw lines across the metal bar (90 degrees to edge) at all marks</li> <li>• use odd-leg callipers, set to half the width of the metal bar, to draw a centre line/measure and mark out centres for holes using rule and scribe</li> <li>• use a centre punch and ball pein hammer to create indents at hole centres</li> <li>• use spring dividers at each end to draw the semi-circle.</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p>1 mark for each correct description up to a <b>maximum of 3 marks.</b></p> <p><b>A list of tools on its own scores zero marks.</b></p> <p>An overall response that does not refer to appropriate tools scores a <b>maximum of 1 mark.</b></p> <p>Candidates may use sketches to aid their descriptions.</p> <p>Exemplar responses</p> <p><i>'A steel rule can be used to measure the sizes'</i> scores (1 mark).</p> <p>Descriptions <b>implying</b> measurement can also gain marks e.g. <i>'a steel rule can mark the middle'</i> (1 mark)</p> <p><i>'A scribe to mark the lines.'</i> (1 mark)</p> <p><i>'Mark the lines with an Engineer's square'</i> (1 mark)</p> <p><i>'Mark the lines with an Engineer's square and scribe'</i> (2 marks)</p> <p><i>'Use a template to mark the shape'</i> (1 mark)</p> <p><i>'First put on the measurements using a steel rule and mark on the lines with a scribe. Punch the centre of the cross to make a dent that stops the dividers slipping'</i> (3 marks).</p> <p><i>'Using odd leg callipers mark the centre lines. Draw the curves with dividers'</i> (2 marks)</p> <p>References to <i>'a compass'</i> (0 marks).</p> <p>Reference to a <i>'try square'</i> (0 marks)</p> <p>Sketches may attract marks independently.</p>

Question		Expected response	Max mark	Additional guidance
	(ii)	<p>Bend the metal headphone support.</p> <p>A description that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• put the metal bar into an engineer's vice or bending bars in a vice with the bend line at the edge or use a box folder</li> <li>• use a hammer/mallet to bend the metal bar</li> <li>• Use of a jig/former/template.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> per correct description up to a <b>total of 2 marks.</b></p> <p>Box folder named as '<i>bending machine</i>' or '<i>gabro</i>' is acceptable.</p> <p><b>'Bend it' (0 marks)</b></p> <p><b>'Bend it using the box folder' (1 mark)</b></p> <p>To gain a second mark, when referencing the box folder, candidates must reference the setting up of the guard or the angles.</p> <p><b>'Heat it' (0 marks)</b></p> <p><b>'Heat it in the forge' (1 mark)</b></p>
	(iii)	<p>Reason for dip coating.</p> <p>State any <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• prevent corrosion</li> <li>• appearance reasons</li> <li>• ease of application.</li> <li>• durability.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each correct response up to a <b>maximum of 2 marks.</b></p> <p>References to '<i>texture/grip</i>' scores 0 marks as it is unlikely this part of the product will not be handled.</p> <p><b>'Easy' (0 marks)</b></p> <p>Informed comparison to other appropriate finishes can gain marks.</p> <p><b>'Gives an even coat' (0 marks).</b></p> <p><b>'Easy compared to adding layers of paint' (1 mark)</b></p>

Question		Expected response	Max mark	Additional guidance
2.	(a)	<p>Outline must reference information gained from a user trip, that is gained from personal experience.</p> <p>The statements below should be qualified by the candidate to gain marks.</p> <p>Outline of any <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• ease of use</li> <li>• how well it works</li> <li>• how easy the tent is to put up/take down</li> <li>• important design features</li> <li>• areas for improvement.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide an outline when answering this question.</p> <p><b>1 mark</b> for each piece of information, up to a <b>maximum of 2 marks.</b></p> <p>Reference to weather conditions and durability of the tent can gain a mark.</p> <p><i>'A user trip could be used to gain information on how easy the tent is to put up'. (1 mark)</i></p> <p><i>'A user trip may give information on whether it is waterproof'. (1 mark)</i></p> <p>Where candidates give generic responses such as strength or size, they must qualify this by relating to a specific aspect of the tent.</p> <p><i>'Strength of the tent' – too vague (0 marks)</i></p> <p><i>'How durable the tent is' (0 marks)</i></p> <p><i>'The size of the tent' (0 mark)</i></p> <p><i>'Does the tent work as it should?' (0 marks)</i></p> <p><i>'The height of the tent to allow you to stand up' (1 mark)</i></p> <p><i>'How breathable it is' (1 mark) as breathable refers to the fabric of the tent.</i></p> <p><i>'Strength of the poles' (1 mark)</i></p>

Question		Expected response	Max mark	Additional guidance
	(b)	<p>A description that refers to three of the following stages:</p> <ul style="list-style-type: none"> <li>• decide on the questions to be used</li> <li>• identify the target audience</li> <li>• test/check the questionnaire for example length/clarity</li> <li>• ask questions/distribute the questionnaire</li> <li>• collect results</li> <li>• analyse results.</li> </ul> <p>Any other suitable response</p>	3	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each valid description up to a <b>maximum of 3 marks</b>. Some interpretation may be required from the marker with reference to the bullet points on the left.</p> <p>Typical responses:  <i>'Hand out questionnaire to target audience'</i> (2 marks)  <i>'Hand out questionnaire'</i> (1 mark).  <i>'Don't make it too long as people may get bored'</i> (1 mark).</p> <p>A list of questions can be interpreted as generating a questionnaire.</p> <p><i>'Firstly, you would decide on your target market and then write the questions to suit them. Then you would give the questionnaires out to the group and ask them to fill it in. Once the questionnaires are complete, you would analyse the data and record the results.'</i>  <b>(3 marks)</b></p> <p><i>'Give questionnaires to a group of people from your target market to fill in and then analyse the results.'</i>  <b>(3 marks)</b></p> <p><i>Give out a list of questions to a group from your intended market.</i>  <b>(1 mark)</b></p>

Question	Expected response	Max mark	Additional guidance
3.	<p>Candidate describes <b>three</b> aspects of:</p> <ul style="list-style-type: none"> <li>• morphological analysis</li> <li>• brainstorming.</li> </ul> <p><b>Morphological analysis:</b></p> <p>A description that refers to the following stages:</p> <ul style="list-style-type: none"> <li>• identify a set of suitable parameters for the table heading</li> <li>• populate the rows with suitable attributes</li> <li>• choose combinations of attributes</li> <li>• generate ideas from results.</li> </ul> <p><b>Brainstorming:</b></p> <p>A description that refers to the following stages:</p> <ul style="list-style-type: none"> <li>• communicate the purpose of the activity</li> <li>• group activity</li> <li>• coming up with lots of ideas within a designated time</li> <li>• record all ideas</li> <li>• no ideas too silly</li> <li>• spark ideas off of each other.</li> </ul> <p>Any other suitable response.</p>	3	<p>To be awarded marks candidates must provide a description when answering this question. <b>1 mark</b> for each valid point leading to a clear description, up to a <b>maximum of 3 marks</b>.</p> <p>Candidates do not need to refer to <b>all three stages to gain full marks</b>.</p> <p><i>‘People shout out lots of ideas and someone writes them down’</i> <b>(2 marks)</b>.</p> <p><i>‘Think of lots of ideas’</i> <b>(0 marks)</b></p> <p>This response is too vague.</p> <p><i>‘Brainstorming is where a group of people shout out lots of ideas and someone writes them down.’</i> <b>(2 marks)</b></p> <p><i>‘Brainstorming is when people think of lots of ideas.’</i> <b>(1 mark as refers to group)</b>.</p> <p><i>‘Morphological analysis is when the designer makes a table with columns relating to different aspects affecting the design, they list options in each column, randomly select <b>one</b> option from each column and sketch an idea that includes the selections.’</i> <b>(3 marks)</b></p> <p>Acceptable responses may include descriptions of the following idea generation techniques:</p> <ul style="list-style-type: none"> <li>• technology transfer</li> <li>• analogy</li> <li>• lateral Thinking</li> <li>• mood board</li> <li>• lifestyle board</li> <li>• take your pencil for a walk</li> <li>• design stories.</li> </ul>

Question		Expected response	Max mark	Additional guidance
4.	(a)	<p>Outline including any of the following:</p> <ul style="list-style-type: none"> <li>• dimensions of component parts</li> <li>• how the parts join together/assembly information</li> <li>• number of component parts</li> <li>• internal detail of parts</li> <li>• information on materials</li> <li>• information on parts.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide an outline when answering this question.</p> <p><b>1 mark</b> for each valid point leading to a clear outline, up to a <b>maximum of 2 marks.</b></p> <p><i>‘Working drawings communicate the sizes of the different parts.’</i> <b>(1 mark)</b></p> <p><i>‘Shows you how to make it’.</i> <b>(1 mark)</b></p> <p><i>‘To see how it works’.</i> <b>(0 marks)</b></p>
	(b)	<p>Outline including any of the following:</p> <ul style="list-style-type: none"> <li>• communicates aesthetic qualities; colours, textures, patterns, proportion</li> <li>• communicates materials</li> <li>• can be used to present to a client</li> <li>• can be used in marketing</li> <li>• easy to modify</li> <li>• easy to share electronically.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide an outline when answering this question.</p> <p><b>1 mark</b> for each valid point leading to a clear outline, up to a <b>maximum of 2 marks.</b></p> <p>Marks can be awarded for responses regarding computer graphics/models.</p> <p><i>‘To show how all the parts fit together’</i> <b>(1 mark)</b></p> <p><i>‘To know what it will look like’</i> is too vague <b>(0 marks)</b></p> <p><i>‘You can see it in 3D’, on its own</i> <b>(0 marks)</b></p> <p><i>‘You can see it in 3D therefore you can spin it around to see it from different angles’</i> <b>(1 mark)</b></p> <p><i>‘Computer generated graphics give a realistic representation of what the final product will look like’.</i> <b>(1 mark)</b></p> <p><i>‘These graphics can be used to communicate what materials the product is made from’.</i> <b>(1 mark)</b></p> <p><i>‘Faster than sketching’</i> <b>(0 marks)</b></p> <p><i>‘Faster to edit’</i> <b>(1 mark)</b></p>

Question	Expected response	Max mark	Additional guidance
5.	<p>A description that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• can be produced quicker than other model types</li> <li>• the designer gets to see their ideas in a 3D form</li> <li>• as part of an idea generation technique</li> <li>• the materials used are easy to source, for example, card or paper</li> <li>• the modelling materials are low cost</li> <li>• the designer may be able to create forms that are difficult to sketch</li> <li>• sketch modelling does not require a high level of skill</li> <li>• can be shown to others for initial feedback</li> <li>• to evaluate a relevant aspect of a sketch model</li> <li>• can be altered and refined.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each valid point leading to a clear description, up to a <b>maximum of 3 marks.</b></p> <p>Unqualified '<i>cheap</i>' '<i>quick</i>' or '<i>easy</i>' responses score <b>0 marks.</b></p> <p>References to correct stages in the design process can gain marks.</p> <p><i>'A rough idea of what it looks like'</i> <b>(1 mark)</b></p> <p><i>'Quick to make'</i> <b>(0 marks)</b></p> <p><i>'Quicker to make than scale models'</i> <b>(1 mark)</b></p>

Question		Expected response	Max mark	Additional guidance
6.	(a)	<p>Description must reference how ergonomics may have influenced the sun lounger.</p> <p>Typical responses could include reference to:</p> <p><b>Anthropometrics</b></p> <ul style="list-style-type: none"> <li>any one lounge part linked to one piece of appropriate anthropometric information.</li> </ul> <p><b>Physiology</b></p> <ul style="list-style-type: none"> <li>strength required to carry sun lounge</li> <li>strength required to fold lounge</li> <li>strength required to adjust angle of back and leg rest</li> <li>aspects relating to the comfort of the lounge.</li> </ul> <p><b>Psychology</b></p> <ul style="list-style-type: none"> <li>orange colour to make the user feel warm.</li> </ul> <p><b>Any other suitable response.</b></p>	4	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>No marks to be awarded for repetition within parts 6a and 6b</b></p> <p><b>1 mark</b> for each reason valid description, up to a <b>maximum of 4 marks.</b></p> <p><b>0 marks</b> should be awarded for generic statements about ergonomics.</p> <p><b>0 marks</b> should be awarded for percentiles only.</p> <p><b>Example responses</b></p> <p><b>Anthropometrics</b></p> <p><i>'The width of the lounge has been designed to be wide enough to suit the user's shoulder width.'</i> (1 mark)</p> <p><i>'The arm rests have been designed to be wide enough to suit the average user's forearm width.'</i> (1 mark)</p> <p><i>'The lounge has been designed to hold the weight of the average adult.'</i> (1 mark)</p> <p><b>Physiology</b></p> <p><i>'The sun lounge is easy to carry by the user'. (1 mark)</i></p> <p><i>'The reclining of the lounge is easy to operate by the user'. (1 mark)</i></p> <p><i>'Head cushion to make user think the lounge is comfortable' (1 mark)</i></p> <p><i>'The lounge looks like it will be comfortable because it reclines.'</i> (1 mark)</p>

Question		Expected response	Max mark	Additional guidance
	(b)	<p>Description must reference how function may have influenced the sun lounger.</p> <ul style="list-style-type: none"> <li>• can be folded up for easy storage</li> <li>• materials used will be easy to clean</li> <li>• should be light in weight so it is easy to carry</li> <li>• should be comfortable to sit in for long periods of time.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>No marks to be awarded for repetition within parts 6a and 6b</b></p> <p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each valid description, up to a <b>maximum of 2 marks.</b></p> <p><b>0 marks</b> should be awarded for generic statements.</p> <p>Ergonomic responses can gain marks as long as they are not a repeat of part (a).</p>
	(c)	<p>Description must reference steps that a designer may have taken to extend a products life expectancy.</p> <p>Typical responses could include reference to:</p> <ul style="list-style-type: none"> <li>• use durable/suitable materials</li> <li>• use strong materials</li> <li>• assembly considerations</li> <li>• apply suitable finishes</li> <li>• use standard components that can be easily replaced</li> <li>• make it easy to maintain by the user; easy to clean, etc.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each valid point leading to a clear description, up to a <b>maximum of 2 marks.</b></p> <p><i>‘The designer could use standard components in the assembly of the product so that they can be easily replaced if they break.’ (1 mark)</i></p> <p><i>‘The designer could use materials that are durable against wear and tear to make the product last longer.’ (1 mark)</i></p> <p><i>‘Materials need to be strong and durable’ (2 marks)</i></p>

Question		Expected response	Max mark	Additional guidance
7.	(a)	<p>A description that includes <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• research into new materials pushes the development on new products</li> <li>• research into new technology pushes the development on new products</li> <li>• research into new production methods pushes the development on new products</li> <li>• innovative technology generates new products</li> <li>• new products are created that are not based on market research.</li> </ul>	1	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><i>‘When a new technology is developed it means new products can be designed.’ (1 mark)</i></p> <p><i>‘Technology push refers to new products being developed because new technologies have been developed.’ (1 mark)</i></p>
	(b)	<p>A description that includes <b>one</b> of the following:</p> <ul style="list-style-type: none"> <li>• when products are developed in response to market forces or customer needs</li> <li>• changes in society mean new products are required by users.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><i>‘Market pull refers to when companies have to come up new products because consumers want them’.</i> (1 mark)</p>
	(c)	<p>Any suitable marketing technique that could influence sales.</p> <p>marketing techniques could reference the following:</p> <ul style="list-style-type: none"> <li>• adverts, for example, TV, radio, billboard posters/leaflets</li> <li>• websites/social media/apps</li> <li>• celebrity endorsement</li> <li>• free gifts/prizes</li> <li>• emphasise brand name, target same market</li> <li>• special offer/low initial price</li> <li>• prominent location in stores</li> <li>• sell under a recognised brand name</li> <li>• try before you buy.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each valid response, up to a <b>maximum of 2 marks.</b></p>

Question	Expected response	Max mark	Additional guidance
8.	<p>Candidates should describe the following broad areas of aesthetics:</p> <ul style="list-style-type: none"> <li>• colour</li> <li>• shape</li> <li>• form</li> <li>• texture</li> <li>• line</li> <li>• proportion</li> <li>• symmetry</li> <li>• contrast</li> <li>• harmony</li> <li>• pattern</li> <li>• fashion</li> <li>• material</li> <li>• theme/style.</li> </ul> <p>Any other suitable response.</p>	4	<p><b>1 mark</b> per correct description up to a total of <b>4 marks</b>.</p> <p>To gain <b>1 mark</b>, candidates should refer to <b>one</b> of the broad areas and link it to a part, or parts, of the pedal car.</p> <p><i>‘The silver colour in the centre of the wheels and the yellow body.’ (1 mark)</i></p> <p><i>‘The black and white colours contrast’ (2 marks)</i></p> <p><i>‘Bright colour’ (1 mark)</i></p> <p><i>‘The car is yellow’ (1 mark)</i></p> <p><i>‘Colourful’ – this is too vague (0 marks)</i></p> <p>A list of aesthetic terms scores <b>0 marks</b>.</p> <p><i>‘The checkerboard pattern on the pedal car.’ (1 mark)</i></p> <p>Basic specification type statements such as: <i>‘It must look good.’ (0 marks).</i></p>

Section 2

Question			Expected response	Max mark	Additional guidance
9.	(a)	(i)	<p><b>Cast Iron</b></p> <p><b>State any appropriate property of cast iron for the base</b></p> <p>Suitable because of:</p> <ul style="list-style-type: none"> <li>weight for holding the parasol down</li> <li>durable.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for identifying cast iron (only correct response for most suitable material).</p> <p><b>No marks to be awarded for repetition within parts 9ai and 9aii.</b></p> <p><b>1 mark</b> for a valid point explaining its suitability.</p> <p>Typical response may be:</p> <ul style="list-style-type: none"> <li><i>'it's heavy.'</i> (1 mark)</li> <li><i>'it's a strong metal.'</i> (1 mark)</li> <li><i>'Suitable for casting'</i> (0 marks)</li> </ul> <p>An incorrect material with a suitable property relevant to the <b>parasol base</b> can gain a mark e.g.</p> <p><i>'aluminium'</i> (0 marks)</p> <p><i>'it doesn't rust'</i> (1 mark)</p> <p><i>'cast iron'</i> (1 mark)</p> <p><i>'it is heavy'</i> (1 mark)</p> <p><i>'aluminium'</i> (0 marks)</p> <p><i>'it is heavy'</i> (1 mark) – <b>this gains the mark as it is a suitable response for the base needs.</b></p> <p><i>'cast iron'</i> (1 marks)</p> <p><i>'it doesn't rust'</i> (0 marks)</p> <p>No Response</p> <p><i>'it is heavy'</i> (1 mark)</p> <p>No Response</p> <p><i>'it doesn't rust'</i> (1 mark)</p>

Question		Expected response	Max mark	Additional guidance
	(ii)	<p><b>Polypropylene</b></p> <p><b>State any appropriate property of polypropylene:</b></p> <ul style="list-style-type: none"> <li>• strong/impact or shatter resistant: if being moved around</li> <li>• waterproof for weather/hosing down</li> <li>• in built colour: requires no extra finish so low outdoor maintenance</li> <li>• lightweight to take home from shop</li> <li>• durability: screw thread cap-resistant to wearing away/moving around a patio.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for identifying polypropylene (only correct response for most suitable material).</p> <p><b>No marks to be awarded for repetition within parts 9ai and 9aii</b></p> <p><b>1 mark</b> for a valid point explaining its suitability.</p> <p><i>'acrylic – too brittle'</i>. (0 marks)</p> <p><i>'Suitable for rotational moulding'</i> (0 marks)</p> <p>An incorrect material with a suitable property relevant to the <b>parasol base</b> can gain a mark e.g. <i>'acrylic'</i> (0 marks)</p> <p><i>'water resistant'</i> (1 mark) – this gains the mark as it is a suitable response for the base needs.</p> <p><i>'acrylic'</i> (0 marks)</p> <p><i>'it is brittle'</i> (0 marks)</p> <p><b>This isn't a reason for the suitability of the material for the base</b></p> <p><i>'Polypropylene'</i> (1 mark)</p> <p><i>'water resistant'</i> (1 mark)</p> <p><i>'Polypropylene'</i> (1 marks)</p> <p><i>'Its heavy'</i> (0 marks) (none of the plastics are heavy)</p> <p>No Response</p> <p><i>'it is heavy'</i> (0 marks) (none of the plastics are heavy)</p> <p>No Response</p> <p><i>'it doesn't rust'</i> (1 mark)</p>
	(b)	<p><b>Rotational moulded features</b></p> <p><b>State any two of the following:</b></p> <ul style="list-style-type: none"> <li>• mould split lines</li> <li>• ejector points</li> <li>• a hollow item</li> <li>• uniform wall thickness.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each identification feature of rotational moulding up to a <b>maximum of 2 marks</b>.</p> <p>Accept <i>'made from plastic'</i> (1 mark)</p> <p>Descriptions of rotationally moulded features can gain marks.</p>
	(c) (i)	<p>Sand casting</p> <p>Die casting</p>	1	<p><b>1 mark</b> for correct process.</p> <p><i>'Casting'</i> (1 mark).</p>
	(ii)	<p>Injection moulding</p>	1	<p><b>1 mark</b> for correct process.</p>

Question		Expected response	Max mark	Additional guidance
10.	(a)	<p>Description of the negative or positive impacts of technologies, such as laser cutters including any of the following:</p> <ul style="list-style-type: none"> <li>• repeatability/consistency as each part is manufactured identically</li> <li>• accuracy</li> <li>• extremely detailed/complex</li> <li>• fast speed of production makes high volumes/have a faster production rate than tradition methods</li> <li>• reduced waste material</li> <li>• cutting internal shapes</li> <li>• ability to etch and engrave</li> <li>• low labour costs</li> <li>• reduces lead time as less tooling is required</li> <li>• many products can be made</li> <li>• it is still necessary that skilled craftspeople are needed to create certain products</li> <li>• the process is fully automated</li> <li>• product can be created/edited directly from CAD drawing</li> <li>• increased efficiency as machines can run 24 hours a day.</li> </ul>	4	<p><b>1 mark for each benefit up to a maximum of 4 marks.</b></p> <p>Responses referring to the benefits of computerised systems can gain marks for example, 'Laser cutter files are easy to send via email/the internet'.</p> <p>Unqualified '<i>cheap</i>' or '<i>easy</i>' responses score <b>0 marks</b>.</p> <p><i>'Fast/faster'</i> (1 mark)</p> <p><i>'More efficient'</i> (1 mark)</p> <p><i>'More reliable'</i> (1 mark)</p>
	(b)	<p>A description that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• fewer workers required</li> <li>• workers require a new skill set to manufacture products</li> <li>• lower salaries</li> <li>• economic decline of local area</li> <li>• outsourcing manufacturing overseas leads to closure of factories</li> <li>• more jobs in training/sourcing technology/repairing technology</li> <li>• products are cheaper compared to those made using traditional methods of manufacture</li> <li>• a wider range of products available</li> <li>• products are more readily available.</li> <li>• throw-away society</li> <li>• safer working environment due to reduced contact with machinery</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark for each valid point leading to a clear description, up to a maximum of 2 marks.</b></p> <p>Candidates can refer to positive or negative impacts on society to gain marks.</p> <p>Unqualified '<i>quick</i>', '<i>cheap</i>' or '<i>easy</i>' responses score <b>0 marks</b></p> <p><i>'fewer people are injured'</i> (1 mark)</p>

Question		Expected response	Max mark	Additional guidance
11.	(a)	<p>An outline that includes <b>two</b> of the following.</p> <ul style="list-style-type: none"> <li>• quality of a hand-made item made by a craftsperson</li> <li>• personalisation/made to measure products</li> <li>• products can be made locally</li> <li>• satisfaction of having a unique product</li> <li>• locally sourced materials.</li> <li>• less storage needed if products are made to order</li> <li>• skilled workforce keeps their jobs</li> <li>• can charge a higher price</li> <li>• unique work</li> <li>• less capital investment.</li> <li>• tend to be longer lasting than mass produced products.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each valid point, up to a <b>maximum of 2 marks.</b></p> <p><i>‘The product made will be a better quality than if it was made in mass manufacture due to the care taken by the person making it.’ (1 mark)</i></p> <p><i>‘Furniture can be made to order so there is no need for the manufacturer to have a big stock room.’ (1 mark)</i></p> <p><i>‘Traditional machines are used so expensive moulds are not needed.’ (1 mark)</i></p> <p>Candidates may refer to a handcrafted product for example an item of furniture in their description:</p> <ul style="list-style-type: none"> <li>• <i>‘Care is taken when making the table therefore it is likely to be a good quality.’ (1 mark)</i></li> <li>• <i>‘Gives people jobs’ (0 marks)</i></li> </ul>
	(b)	<p>A description that includes four of the following:</p> <ul style="list-style-type: none"> <li>• locally sourced</li> <li>• transporting materials from overseas causes air pollution</li> <li>• deforestation causes loss of habitat for wildlife</li> <li>• woods should have forest stewardship certification (fsc)</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>• other legal certification</li> <li>• use recycled materials</li> <li>• materials should be recyclable</li> <li>• use environmentally friendly materials</li> <li>• reduce material waste</li> <li>• trees should be replanted for sustainable forestry</li> <li>• apply a finish to extend the lifespan of materials</li> <li>• design products to use less material</li> <li>• design for disassembly</li> <li>• up-cycling/repurposing of materials.</li> </ul> <p><b>Any other suitable response.</b></p>	4	<p><b>1 mark</b> for each valid point leading to a clear description, up to a <b>maximum of 4 marks.</b></p> <p>Responses such as:</p> <p><i>‘Hardwoods are shipped overseas which pollutes the air’ (1 mark)</i></p> <p><i>‘Extending the lifespan by adding a finish.’ (1 mark)</i></p> <p><i>‘Deforestation reduces animal habitat.’ (1 mark)</i></p>

[END OF MARKING INSTRUCTIONS]