



National  
Qualifications  
2024

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## 2024 Design and Manufacture

### National 5

## Question Paper 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)	<p>Name a manufactured board:</p> <ul style="list-style-type: none"> <li>• plywood</li> <li>• MDF</li> <li>• hardboard.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for correct response.</p> <p><i>'veneered chipboard'</i> (1 mark)</p> <p><b>0 marks</b> to be awarded to flexi-ply and chipboard only (would not be suitable for this product).</p>
		(ii)	<p>An outline that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• cheaper than solid timber</li> <li>• easy to work with/saw</li> <li>• available in wide boards</li> <li>• do not warp or twist</li> <li>• smooth surface available from some boards</li> <li>• suitable strength from some boards</li> <li>• suitable durability</li> <li>• easy to source/readily available</li> <li>• can be made from recycled materials</li> <li>• takes a finish well.</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>Unqualified <i>'cheap'</i> and <i>'easy'</i> responses are insufficient to gain a mark but subsequent responses could still gain a mark.</p> <p>Candidates may refer to the bathroom cabinet in their answer.</p> <p><i>'Easy to work with.'</i> (1 mark)</p> <p><i>'Plywood is strong.'</i> (1 mark)</p> <p><i>'Plywood is available in large sheets which is ideal for the back panel.'</i> (1 mark)</p> <p><i>'MDF is smooth.'</i> (1 mark)</p> <p><i>'Easy to use.'</i> (0 marks) as it is unqualified.</p> <p><i>'They are smooth.'</i> (0 marks). Too vague because not all manufactured boards are smooth.</p> <p><i>'They are strong.'</i> (0 marks). Too vague because not all manufactured boards are strong.</p> <p><i>'it's sturdy.'</i> (0 marks)</p>

Question		Expected response	Max mark	Additional guidance
	(b) (i)	<p>Stages for tenon part: A description and/or sketch that could include some of the following:</p> <p><b>Marking out stage</b></p> <ul style="list-style-type: none"> <li>• measure and mark position of joint on top surface with rule and pencil</li> <li>• draw lines at 90 degrees with try square</li> <li>• mark depth of lines with mortise gauge.</li> </ul> <p>There is no requirement to refer to the identified stages in the correct sequence.</p> <p><b>Any other suitable response.</b></p>	3	<p><b>1 mark</b> for each correct response up to a total of <b>3 marks</b>.</p> <p>References to marking out the mortise will not attract marks.</p> <p>References to a marking gauge attract marks (no need to refer to mortise gauge).</p> <p><i>‘Draw the lines with a mortise gauge.’ (1 mark)</i></p> <p><i>‘Mark the waste wood with diagonal lines.’ (1 mark)</i></p> <p><i>‘Use a steel rule for measuring the sizes on the wood then draw these lines with a try square. Mark the lines around the wood with a marking gauge.’ (3 marks)</i></p> <p><i>‘Use an engineer square’ (0 marks)</i></p> <p><i>‘Mark positions of lines using a ruler.’ (0 marks).</i> A ruler is used for measuring.</p>

Question		Expected response	Max mark	Additional guidance
	(ii)	<p>Mortises cut to the correct depth:</p> <ul style="list-style-type: none"> <li>tighten/set depth gauge/depth stop</li> <li>put masking tape around the chisel for guidance.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for correct response up to a total of <b>2 marks</b>.</p> <p>Maximum one mark per identified way of ensuring depth. Two marks cannot be awarded to an extended description of one method.</p> <p><i>'Set the depth stop or put masking tape on the chisel.'</i> (2 marks).</p> <p><i>'Mark depth line of 30mm on the piece of wood and set bottom of cutting chisel to line up to this line.'</i> (1 mark)</p> <p><i>'Set depth stop.'</i> (1 mark)</p> <p>Reference to depth on its own does not warrant a mark.</p> <p><i>'Set the depth.'</i> (0 mark)</p> <p><i>'Set the depth to 30mm.'</i> (0 mark)</p> <p><i>'Set the drill.'</i> (0 marks)</p> <p><i>'Set the mortise machine to 30mm'</i> (0 marks)</p> <p><i>'Use a steel ruler.'</i> (0 marks)</p> <p><i>'Put a steel rule in the cut hole to check depth'</i> (0 marks)</p>
	(iii)	<p>Alternative woodwork joint:</p> <ul style="list-style-type: none"> <li>halving</li> <li>dowel</li> <li>rub.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for correct response.</p> <p>Candidates must name a joint.</p> <p><i>'Butt joint.'</i> (1 mark)</p> <p><i>'Biscuit joint.'</i> (1 mark)</p> <p><i>'Dovetail Halving.'</i> (1 mark)</p> <p><i>'Dovetail.'</i> (0 marks)</p> <p><i>'Cross halving joint.'</i> (0 mark)</p> <p><i>'Glue it.'</i> (0 marks)</p> <p><i>'Mitre Joint.'</i> (0 marks)</p> <p><i>'Lap Joint.'</i> (0 marks)</p>

Question		Expected response	Max mark	Additional guidance
	(c)	(i)	1	1 mark for correct response. <i>'Step drill.'</i> (1 mark) <i>'Jobber drill.'</i> (1 mark)
		(ii)	1	1 mark for correct response. <i>'To prevent it from breaking.'</i> Unqualified <i>'quick'</i> or <i>'easy'</i> responses score <b>0 marks</b> . <i>'The thermoplastic is less likely to snap as it can be held securely.'</i> (1 mark) <i>'The plastic becomes weak/brittle'</i> (1 mark)
		(iii)	2	1 mark for each correct response up to a maximum of 2 marks. Responses must refer to the pillar drill before use, not the user. <i>'Put the guard down before use and use a g clamp to hold the plastic securely.'</i> (2 marks) <i>'You must wear goggles.'</i> (0 marks) <i>'The guard.'</i> (0 marks)

Question		Expected response	Max mark	Additional guidance
	(iv)	<p>Stages used to shape the acrylic:</p> <p>Typical responses are likely to include reference to:</p> <ul style="list-style-type: none"> <li>• heating plastic in oven/on strip heater</li> <li>• bend around a former</li> <li>• secure in place until it sets</li> <li>• leave until cool before removing from former/jig/vice.</li> </ul> <p><b>Any other suitable response.</b></p>	<b>3</b>	<p>To be awarded marks candidates must provide a description when answering this question.</p> <p><b>1 mark</b> for each valid point or effective sketch leading to a clear description, up to a <b>maximum of 3 marks.</b></p> <p><i>'Heat it in the oven.'</i> (1 mark)</p> <p><i>'Bend it around a template'</i> (1 mark)</p> <p><i>'Check against a template'</i> (1 mark)</p> <p><i>'Bend it around a piece of wood'</i> (1 mark) implies use of a former.</p> <p><i>'Leave it to cool'</i> (1 mark) (does not reference a workshop tool but no additional tool required at this point).</p> <p><i>'Bend it around a piece of wood and clamp it in place'</i> (2 marks)</p> <p><i>'Heat it.'</i> (0 marks)</p> <p><i>'Bend it.'</i> (0 marks)</p> <p>Marks can be awarded for sketches.</p>

Question		Expected response	Max mark	Additional guidance
	(d) (i)	Suitable hardwood: <ul style="list-style-type: none"> <li>• mahogany</li> <li>• oak</li> <li>• beech</li> <li>• ash.</li> </ul> <b>Any other suitable response.</b>	1	<b>1 mark</b> for correct response. Balsa is not suitable as it is not strong enough.
	(ii)	Turning technique: <ul style="list-style-type: none"> <li>• parallel turning.</li> </ul> <b>Any other suitable response.</b>	1	<b>1 mark</b> for correct response. <i>'Step turning.'</i> (1 mark)
	(iii)	Name the tool to check the diameter: <ul style="list-style-type: none"> <li>• outside callipers.</li> </ul> <b>Any other suitable response.</b>	1	<b>1 mark</b> for correct response. References to metric callipers, digital callipers, vernier callipers, or templates attract marks. Steel rule, inside callipers or odd leg callipers score <b>0 marks</b> . <i>'Callipers'</i> (0 mark)
	(iv)	Ensure a high-quality finish on the woodturning lathe: Outline that includes <b>two</b> of the following: <ul style="list-style-type: none"> <li>• ensure that the lathe tools are sharp</li> <li>• increase speed of lathe</li> <li>• feed the lathe tool slowly</li> <li>• apply appropriate pressure with tool</li> <li>• sand the work using a range of glass paper grades from rough to smooth or from low numbers to high</li> <li>• burnishing the wood.</li> </ul> <b>Any other suitable response.</b>	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> . <i>'Raise the grain.'</i> (1 mark) <i>'Sand it.'</i> (1 mark) Accept references to finishes such as oil/wax/varnish. (1 mark) <i>'Speed it up.'</i> (1 mark) <i>'don't rush/take your time.'</i> (0 marks) too vague – speed needs to reference the tool.

Question		Expected response	Max mark	Additional guidance
	(e) (i)	<p>Marking out:</p> <p>A description that includes <b>three</b> of the following:</p> <ul style="list-style-type: none"> <li>• use Engineer's blue</li> <li>• set odd-leg callipers to correct size using rule</li> <li>• mark lines for centre using odd-leg callipers</li> <li>• centre punch the middle of the crosses</li> <li>• draw lines at 90° with an Engineer's square</li> <li>• draw lines with a scribe</li> <li>• mark the arcs with dividers</li> <li>• use a template.</li> </ul> <p><b>Any other suitable response.</b></p>	<b>3</b>	<p><b>1 mark</b> for each correct description up to a <b>maximum of 3 marks</b>.</p> <p>A list of tools on its own scores <b>0 marks</b>.</p> <p><i>'Use a steel rule to measure the sizes.'</i> (1 mark)</p> <p><i>'Use a scribe to mark the lines.'</i> (1 mark)</p> <p><i>'mark the waste.'</i> (1 mark)</p> <p><i>'Use a template to mark the shape'</i> (1 mark)</p> <p><i>'Mark the lines with an Engineer's square and scribe.'</i> (2 marks)</p> <p>References to <i>'a compass.'</i> (0 marks)</p> <p>References to <i>'a try square.'</i> (0 marks)</p> <p>Sketches may attract marks independently.</p> <p>If the graphic indicates the right tool but has been annotated incorrectly marks should be awarded.</p>

Question		Expected response	Max mark	Additional guidance
	(ii)	<p>Bend the metal bracket:</p> <p>A description that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• place in bending bars/vice</li> <li>• place the bend line at the edge</li> <li>• use a mallet to bend the metal bar</li> <li>• use of a jig/former/template to check the angle.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> per correct description up to a total of <b>2 marks</b>.</p> <p>Box folder named as 'bending machine' or 'Gabro' is acceptable.</p> <p><i>'Put the metal bar into an engineer's vice.'</i> (1 mark)</p> <p><i>'Bend it using the box folder.'</i> (1 mark)</p> <p><i>'Bend it.'</i> (0 marks)</p> <p><i>'Use the forge to heat it up.'</i> (0 mark) any reference to heating scores zero marks.</p> <p>To gain a second mark, when referencing the box folder, candidates must reference either lining up or setting up of the angles.</p>
	(iii)	<p>Benefit of using paint:</p> <p>State any two 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> <li>• different surface finishes available (matt/satin/gloss)</li> <li>• textured paint can add grip</li> <li>• easy to clean.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each correct response</p> <p>Informed comparison to other appropriate finishes can gain marks.</p> <p><i>'Looks better compared to without painting it.'</i> (1 mark)</p> <p><i>'Looks good.'</i> (1 mark)</p> <p><i>'You can spray it.'</i> (1 mark)</p> <p><i>'Protect the metal.'</i> (1 mark)</p> <p><i>'Easy.'</i> (0 marks)</p> <p><i>'Gives an even coat.'</i> (0 marks)</p>

Question		Expected response	Max mark	Additional guidance
	(f)	<p>Description of how to ensure a good quality thread is cut:</p> <ul style="list-style-type: none"> <li>• select a clean/undamaged tap</li> <li>• use of cutting compound</li> <li>• accurate alignment</li> <li>• half turn forward, quarter turn back.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each valid point or effective sketch leading to a clear description, up to a <b>maximum of 2 marks.</b></p> <p><b>1 mark</b> for valid point leading to a clear description.</p> <p>References to different types of tap can gain <b>2 marks.</b></p> <p>Candidates can only refer to an internal thread being cut.</p> <p>Reference to different types of lubricant <b>1 mark.</b></p> <p><i>‘Tap the hole with a taper tap followed by a middle tap and then a plug tap.’ (2 marks)</i></p> <p><i>‘for every half turn forward of the die, come back a quarter turn to remove the excess material’ (1 marks) mark awarded for action not referencing the tool.</i></p> <p><i>‘start the process with a taper tap’ 1 mark</i></p> <p><i>‘Make sure the tap is sharp’ (1 mark)</i></p> <p><i>‘Tap the hole.’ (0 marks)</i></p> <p><i>‘Make sure the tool is sharp.’ (0 mark)</i></p> <p><i>‘Create the thread with a tap.’ 0 marks.</i></p> <p><i>‘Check it with a screw.’ 0 marks.</i></p> <p>References to checking scores <b>0 marks.</b></p>

Question	Expected response	Max mark	Additional guidance
2.	<p>Outline must reference information gained from a user trip.</p> <p>The statements below should be qualified by the candidate to gain marks.</p> <p>Candidates may outline features referring to the following parts:</p> <p><b>light</b></p> <ul style="list-style-type: none"> <li>• the light gives off a bright enough light</li> <li>• wire length suitable for height of light</li> <li>• brightness of light adjustable</li> </ul> <p><b>controller</b></p> <ul style="list-style-type: none"> <li>• easy to understand</li> <li>• buttons easy to press</li> <li>• easy to charge/change batteries</li> </ul> <p><b>stand/base</b></p> <ul style="list-style-type: none"> <li>• stability of the stand</li> <li>• stand easy to adjust</li> <li>• Portability of the stand</li> <li>• Supports weight of the light</li> </ul> <p><b>phone holder</b></p> <ul style="list-style-type: none"> <li>• phone fits in the holder</li> <li>• phone held securely in the holder</li> <li>• phone easy to access in the holder</li> </ul> <p><b>adjuster</b></p> <ul style="list-style-type: none"> <li>• ease of turning the knobs</li> <li>• the grips</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p>To be awarded marks candidates must provide an outline of areas that could be evaluated when answering this question.</p> <p><b>1 mark</b> for each piece of information, up to a <b>maximum of 3 marks.</b></p> <p><i>‘Are parts easy to adjust for the average strength user?’ (1 mark)</i></p> <p><i>‘The light gives off a bright enough light for selfies or recording videos.’ (1 mark)</i></p> <p><i>‘How bright it is.’ (1 mark)</i></p> <p><i>‘The height of the ring light.’ (1 mark)</i></p> <p><i>‘Is it stable.’ (1 mark)</i></p> <p><i>‘is it easy to set up.’ (1 mark)</i></p> <p>Lists of parts score <b>0 marks.</b></p> <p><i>‘The light, stand and base.’ (0 marks)</i></p> <p>Candidates should refer to the ring light and stand.</p> <p><i>‘Can the user open the packing easily?’ (0 marks)</i></p> <p><i>‘Clarity of instructions.’ (0 marks)</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 ring light.</p> <p><i>‘Strength of the ring light.’ (0 marks)</i></p> <p><i>‘The materials of the ring light.’ (0 marks)</i></p> <p><i>‘Does the ring light work properly?’ (0 marks)</i></p>

Question			Expected response	Max mark	Additional guidance
3.	(a)		Idea generation technique: <ul style="list-style-type: none"> <li>morphological analysis</li> </ul>	1	1 mark for the correct response.
	(b)		Alternative research technique: <ul style="list-style-type: none"> <li>brainstorming</li> </ul> <b>Any other suitable response.</b>	1	1 mark for the correct response. Candidates may also refer to: <ul style="list-style-type: none"> <li>pencil for a walk</li> <li>SCAMPER</li> <li>technology transfer</li> <li>analogy/biomimicry</li> <li>lifestyle board</li> <li>mood board</li> <li>lateral thinking.</li> </ul>
4.	(a)	(i)	Outline including any of the following: <ul style="list-style-type: none"> <li>communicates aesthetic qualities; colours, textures, patterns, proportion</li> <li>communicates material</li> <li>can be used to present to a client</li> <li>can be used in marketing.</li> </ul> <b>Any other suitable response.</b>	2	To be awarded marks, candidates must provide an outline when answering this question. <b>1 mark</b> for each valid point leading to a clear outline, up to a maximum of <b>2 marks</b> . <i>'You can see it in 3D.'</i> (1 mark) <i>'You can see the colours.'</i> (1 mark) <i>'You can see the colours and patterns.'</i> (1 mark) <i>'These graphics can be used to communicate what materials the product is made from.'</i> (1 mark) <i>'Easy to send to the client.'</i> (1 marks) <i>'easy to modify if produced by CAD.'</i> (1 marks) generic responses linked to computer graphics are unlikely to gain marks. <i>'To know what it will look like'</i> is too vague. (0 marks) <i>'Easy to store.'</i> (0 marks) <i>'Easy to send.'</i> (0 marks)

Question		Expected response	Max mark	Additional guidance
	(ii)	<p>An outline that includes two of the Following:</p> <ul style="list-style-type: none"> <li>• can be used to show alignment of parts</li> <li>• joining methods can be clearly shown</li> <li>• to show individual parts</li> <li>• useful to show the number of parts.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each valid point up to a maximum of <b>2 marks</b>.</p> <p><i>'You can see how it fits together.'</i> (1 mark)</p> <p><i>'You can get the sizes'</i> (1 mark) as, although not displayed on the question graphic, this is possible.</p>
(b)	(i)	<p>A explanation that includes <b>two</b> of the following:</p> <ul style="list-style-type: none"> <li>• test proportion of component parts</li> <li>• exploring different sizes</li> <li>• test the product</li> <li>• test ergonomics</li> <li>• test if the design fits in a location</li> <li>• see the product in a 3D form</li> <li>• designs can be altered and refined</li> <li>• justifying the use of scale.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p>To be awarded marks, candidates must provide an explanation 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>Unqualified 'cheap' 'quick' or 'easy' responses score <b>0 marks</b>.</p> <p>Reference to cost of materials score <b>0 marks</b>.</p> <p>Reference to the range/angle of movement of the clapper board arm can gain a mark.</p> <p><i>'Designers can test if their design fits in the location it is being designed for.'</i> (1 mark)</p> <p><i>'The designer of the clapper board could test if the top part opens easily.'</i> (1 mark)</p> <p><i>'Ergonomics can be tested to make sure the item is the right size for human interaction.'</i> (1 mark)</p> <p><i>'Help visualise what the finished product will look like.'</i> (0 marks)</p>
	(ii)	<p>Alternative modelling technique:</p> <ul style="list-style-type: none"> <li>• sketch</li> <li>• block</li> <li>• computer generated.</li> </ul> <p><b>Any other suitable response.</b></p>	1	<p><b>1 mark</b> for the correct response.</p> <p>Candidates may also refer to:</p> <ul style="list-style-type: none"> <li>• test model</li> <li>• prototype.</li> </ul>

Question		Expected response	Max mark	Additional guidance
5.	(a)	<p>Description must reference how function may have influenced the gaming chair.</p> <p><i>You must give different examples for (a) and (b).</i></p> <p>Typical responses could include reference to:</p> <ul style="list-style-type: none"> <li>• armrests move up and down</li> <li>• the back of the seat reclines</li> <li>• wheels to allow chair to move</li> <li>• headrest/cushion to ensure comfort</li> <li>• comfort for long periods of time</li> <li>• can rotate/spin to face other directions</li> <li>• adjustable height of seat.</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>1 mark</b> for each valid description, up to a <b>maximum of 4 marks.</b></p> <p>Ergonomic responses can gain marks as long as they are speaking about a specific functional part/feature of the gaming chair.</p> <p><i>‘the chair spins to face other directions.’ (1 marks)</i></p> <p><i>‘The gaming chair has wheels so the user can move it.’ (1 mark)</i></p> <p><i>‘The seat height is adjustable.’ (1 mark)</i></p> <p><i>‘The back can be changed to a different angle.’ (1 mark)</i></p> <p><i>The seat is cushioned to provide comfort.’ (1 mark)</i></p> <p><b>0 marks</b> should be awarded for generic statements.</p> <p><i>‘The arm rests are adjustable’ (0 marks)</i></p> <p><i>The back can move.’ (0 marks)</i></p> <p><i>‘It is easy to move around.’ (0 marks)</i></p> <p><i>‘the chair spins.’ (0 marks)</i></p> <p><i>The seat is comfortable.’ (0 marks)</i></p>

Question	Expected response	Max mark	Additional guidance
(b)	<p>Description must reference how ergonomics may have influenced the gaming wheel and pedals.</p> <p>Typical responses could include reference to:</p> <p><b>Anthropometrics</b> Any one part of the gaming chair linked to one piece of appropriate anthropometric information.</p> <ul style="list-style-type: none"> <li>• diameter of steering wheel, hand grip diameter</li> <li>• size of buttons, thumb pad size</li> <li>• width of pedals, width of foot</li> <li>• distance of buttons, thumb length.</li> </ul> <p><b>Physiology</b></p> <ul style="list-style-type: none"> <li>• soft parts on the steering wheel for comfort/grip</li> <li>• ease of pressing buttons</li> <li>• strength required to turn the wheel</li> <li>• force required to push pedals.</li> </ul> <p><b>Psychology</b></p> <ul style="list-style-type: none"> <li>• black and red to make the user feel dangerous when gaming</li> <li>• steering wheel is shaped like a race car to make the user feel like they are racing</li> <li>• Different shapes to infer use.</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>1 mark</b> for each reason valid description, up to a <b>maximum of 4 marks.</b></p> <p><b>Anthropometrics</b> <i>'The diameter of the steering wheel should fit the grip size of the user.'</i> (1 mark)</p> <p><i>'The pedals should fit the width of the user's foot. (1 mark)</i></p> <p><i>'The buttons should be easy to reach using the thumb, when steering.'</i> (1 mark)</p> <p><b>Physiology</b> <i>'The pedals are easy to push by the user'. (1 mark)</i></p> <p><i>'The steering wheel should be turned for the average user.'</i> (1 mark)</p> <p><b>Psychology</b> <i>'The shape of the wheel is like a real race car, so will make the user feel like they are really racing.'</i> (1 mark)</p> <p><b>0 marks</b> should be awarded for generic statements about ergonomics.</p> <p><i>'Gaming wheel fits user's sizes.'</i> (0 marks)</p> <p><i>'The steering wheel is comfortable.'</i> (0 marks)</p> <p><b>0 marks</b> should be awarded for percentiles only.</p> <p><i>'Fits 50th%ile sizes.'</i> (0 marks)</p>

Question		Expected response	Max mark	Additional guidance
6.	(a)	<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>	3	<p><b>1 mark</b> per correct description up to a total of <b>3 marks</b>.</p> <p>To gain <b>1 mark</b>, candidates should refer to one of the broad areas and link it to one of the play tent or trampoline.</p> <p><i>'The tent has a star design.'</i> (1 mark)</p> <p><i>'The red and blue sections of the tent contrast.'</i> (2 marks)</p> <p><i>'There is a striped pattern on the trampoline.'</i> (1 mark)</p> <p><i>'The primary colours will attract children.'</i> (1 mark)</p> <p><i>'It is red, blue and yellow.'</i> (1 mark)</p> <p><i>'It has bright colours.'</i> (1 mark)</p> <p><i>'They are both curved in shaped.'</i> (1 mark)</p> <p><i>'fun patterns.'</i> (1 marks)</p> <p>Vague/opinion-based responses attract <b>0 marks</b>.</p> <p><i>'Colourful'</i> (0 marks)</p> <p><i>'It's bright.'</i> (0 marks)</p> <p><i>'It has nice colours.'</i> (0 marks)</p> <p><i>'They look nice for children.'</i> (0 marks)</p> <p>A list of aesthetic terms scores <b>0 marks</b>.</p> <p>Basic specification type statements such as:</p> <p><i>'It must look good.'</i> (0 marks)</p> <p>Multiple references at any of the broad areas score <b>1 mark</b>.</p>

Question		Expected response	Max mark	Additional guidance
	(b)	<p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• ergonomics</li> <li>• materials; durability, weight, weatherproof, etc</li> <li>• aesthetic preferences of target market</li> <li>• function</li> <li>• BSI regulations.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark for each valid response, up to a maximum of 2 marks.</b></p> <p>Candidates must reference design aspects of the play tent or trampoline to gain marks.</p> <p><i>‘The designer must choose materials that are durable.’ (1 mark)</i></p> <p><i>‘They would need to make sure the children can fit in the doorways and tunnel.’ (1 mark)</i></p> <p><i>‘They have chosen colours to suit children, red, blue and yellow.’ (1 mark)</i></p> <p><i>‘They should have waterproof materials and be the right size for children.’ (2 marks)</i></p> <p><i>‘They are durable.’ (0 marks)</i></p> <p><i>‘They are colourful.’ (0 marks)</i></p> <p><i>‘They should be waterproof and the right size.’ (0 marks)</i></p> <p><i>‘They need to be the right size.’ (0 marks)</i></p> <p>Candidates can make reference to encouraging play to gain a mark.</p>

Question		Expected response	Max mark	Additional guidance
7.	(a)	<p>Any suitable marketing technique that could be used to promote products.</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/ user trial.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark for each valid response, up to a maximum of 2 marks.</b></p> <p><i>'Door to door.'</i> (1 mark)</p> <p><i>'niche marketing'</i> (1 mark)</p> <p><i>'User trip.'</i> (0 marks)</p>
	(b)	<p>Completing the table.</p> <ul style="list-style-type: none"> <li>• designer</li> <li>• sells products</li> <li>• consumers.</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p><b>1 mark for each correct response up to a maximum of 3 marks.</b></p> <p>Alternative response for designer: <i>'client.'</i> (1 mark)</p> <p>Alternative response for sells products: <i>'advertise products.'</i> (1 mark)</p> <p>Alternative response for consumer: <i>'buyer.'</i> (1 mark) <i>'shopper.'</i> (1 mark) <i>'the public.'</i> (1 mark)</p>

## Section 2

Question			Expected response	Max mark	Additional guidance
8.	(a)	(i)	<p>Outline two reasons why stainless steel is suitable for the splashback:</p> <ul style="list-style-type: none"> <li>• corrosion resistant</li> <li>• heat/flame resistant</li> <li>• scratch resistant</li> <li>• stain resistant</li> <li>• chemical resistant for cleaning</li> <li>• resistant to wear/durable</li> <li>• smooth surface</li> <li>• easy to clean</li> <li>• aesthetic qualities</li> <li>• polishes well</li> <li>• no additional finish required.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each correct reason up to a <b>maximum of 2 marks</b>.</p> <p>Different reasons must be given in parts (a)(i) and (a)(ii).</p> <p><i>'It is durable.'</i> (1 mark)</p> <p><i>'It looks good.'</i> (1 mark)</p> <p><i>'It is heat resistant and does not rust.'</i> (2 marks)</p> <p><i>'It is cheap.'</i> (0 marks)</p> <p><i>'It is strong'</i> (0 marks). The splashback is wall mounted and does not need to be strong.</p>
		(ii)	<p>Outline two reasons why melamine formaldehyde is suitable for the layer covering the chipboard worktop:</p> <p>State any appropriate property of:</p> <ul style="list-style-type: none"> <li>• heat resistant</li> <li>• water/moisture resistant</li> <li>• scratch resistant</li> <li>• stain resistant</li> <li>• chemical resistant for cleaning</li> <li>• resistant to wear/durable</li> <li>• smooth surface</li> <li>• easy to clean</li> <li>• non-toxic if in contact with food</li> <li>• available in lots of colours.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each correct reason up to a <b>maximum of 2 marks</b>.</p> <p>Different reasons must be given in parts (a)(i) and (a)(ii).</p> <p><i>'It is cheaper than using solid timber.'</i> (1 mark)</p> <p><i>'It looks good.'</i> (1 mark)</p> <p><i>'It is durable and comes in different colours.'</i> (2 marks)</p> <p><i>'It is strong'</i> (0 marks). The layer does not need to be strong.</p> <p><i>'It is cheap.'</i> (0 marks)</p>

Question		Expected response	Max mark	Additional guidance
	(b)	<p>State <b>two</b> features of vacuum forming:</p> <ul style="list-style-type: none"> <li>• rounded corners</li> <li>• tapered sides</li> <li>• thin wall thickness</li> <li>• thinning of material in areas of most stretch.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each identified feature of vacuum forming, up to a <b>maximum of 2 marks.</b></p> <p><i>'no sharp corners.'</i> (1 mark)</p> <p><i>'It is made in one piece.'</i> (0 marks)</p>
	(c)	<p>Outline any <b>two</b> reasons why die casting is a suitable process:</p> <ul style="list-style-type: none"> <li>• good surface finish</li> <li>• complex/detailed shapes</li> <li>• accurate shapes</li> <li>• accuracy allows parts to be assembled easily</li> <li>• solid metal product</li> <li>• economies of scale</li> <li>• faster than sand casting.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each reason up to a <b>maximum of 2 marks.</b></p> <p>Unqualified <i>'quick'</i>, <i>'cheap'</i> or <i>'easy'</i> responses score <b>0 marks.</b></p>

Question	Expected response	Max mark	Additional guidance
9.	<p>Outline of how designers and manufacturers could make products more environmentally friendly including any of the following:</p> <ul style="list-style-type: none"> <li>• renewable energy sources</li> <li>• make manufacturing more energy efficient</li> <li>• locally sourced materials/reduce transport</li> <li>• reduce packaging</li> <li>• reduce the amount of material used in product/ design of the product</li> <li>• only produce enough products to meet demand</li> <li>• increase lifespan of product</li> <li>• ease of maintenance</li> <li>• minimise waste material</li> <li>• reduce the component parts</li> <li>• reduce factory emissions</li> <li>• habitat not affected</li> <li>• use more sustainable materials</li> <li>• use recycled materials</li> <li>• design for recycling at the end of life</li> <li>• refurbish existing products or components</li> <li>• Reuse of materials.</li> </ul> <p><b>Any other suitable response.</b></p>	4	<p><b>1 mark</b> for each valid point with a clear description, up to a <b>maximum of 4 marks.</b></p> <p>Candidates must consider the final product rather than the design process.</p> <p><i>‘Manufacturers could use locally sourced materials so that there is less pollution caused transporting the materials to the factory.’</i> <b>(2 marks)</b></p> <p><i>‘The manufacturer could use recycled materials to make the product. They could use less packaging and source locally to avoid pollution from lorries. The product could be labelled so it can be recycled at the end of its use.’</i> <b>(4 marks)</b></p> <p><i>‘Extending the lifespan’</i> <b>(1 mark)</b> <i>‘Recycle cardboard models.’</i> <b>(0 marks)</b></p> <p><i>‘Instead of using paper use computers.’</i> <b>(0 marks)</b></p>

Question	Expected response	Max mark	Additional guidance
10.	<p>Outline the benefits of 3D printers to create products.</p> <ul style="list-style-type: none"> <li>• models can be made with no craft skills</li> <li>• no need for workshops/tooling</li> <li>• the process can be automated</li> <li>• Doesn't require breaks</li> <li>• model can be created directly from CAD drawing</li> <li>• accurate product is produced</li> <li>• complex product is produced</li> <li>• same or similar materials to the final product can be used</li> <li>• additive process so less waste material</li> <li>• repeatability of process</li> <li>• no assembly as joints formed as part of 3D printed product</li> <li>• product can be easily revised and reprinted if required</li> <li>• good quality model can be produced so suitable to show client</li> <li>• cost effective way to produce a prototype</li> <li>• faster than traditional prototyping methods.</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p><b>1 mark</b> for each valid point with a clear description, up to a <b>maximum of 3 marks.</b></p> <p>Unqualified '<i>quick</i>', '<i>cheap</i>' or '<i>easy</i>' responses score <b>0 marks.</b></p> <p>References to environmental/ sustainability if unqualified responses score <b>0 marks.</b></p> <p><i>'3D printing materials come in a variety of colour.s'</i> <b>(1 mark)</b></p> <p><i>'It's Environmentally friendly.'</i> <b>(0 marks)</b> too vague</p>

Question		Expected response	Max mark	Additional guidance
11.	(a)	<p>Outline the benefits of using standard components:</p> <ul style="list-style-type: none"> <li>• manufacturer can buy in standard components reducing production time/ fewer stages in production</li> <li>• fittings produced in standard sizes so easy to plan into production</li> <li>• cheaper to buy than producing in-house</li> <li>• manufacturer has adaptability to use components on different products</li> <li>• reliable, consistent quality of product/quality assured by producer</li> <li>• reduces the cost of production</li> <li>• ease of repair/maintenance</li> <li>• available in large quantities/easy to source</li> <li>• will fit common tools</li> <li>• consistent quality.</li> </ul> <p><b>Any other suitable response.</b></p>	2	<p><b>1 mark</b> for each valid point with a clear outline, up to a <b>maximum of 2 marks.</b></p> <p>Unqualified '<i>quick</i>', '<i>cheap</i>' or '<i>easy</i>' responses score <b>0 marks.</b></p> <p>'<i>Speeds production process</i>' scores. <b>1 mark.</b></p>

Question		Expected response	Max mark	Additional guidance
11.	(b)	<p>Description of the impact of mass manufacturing technologies on society and the workforce.</p> <p>Responses could include reference to:</p> <ul style="list-style-type: none"> <li>• products are cheaper</li> <li>• cheap products encourage a throwaway culture</li> <li>• products are more readily available/meets consumer demand</li> <li>• quality of product more consistent</li> <li>• complex products available at a cheaper price</li> <li>• changes to number of workers required</li> <li>• workers require training on new manufacturing techniques / job roles</li> <li>• change in wages</li> <li>• impact on economic climate of area/social deprivation</li> <li>• less labour-intensive jobs</li> <li>• reduction in work related injuries.</li> </ul> <p><b>Any other suitable response.</b></p>	3	<p><b>1 mark</b> for a valid point with a clear description up to a <b>maximum of 3 marks.</b></p> <p>Candidates may refer to society, the workforce or both.</p> <p>References to <i>'Fast Fashion'</i> can gain marks.</p> <p>Candidates can gain marks by referring to positive or negative impacts.</p> <p><i>'They are cheaper to buy.'</i> (1 mark)</p> <p><i>'You can get them anywhere.'</i> (1 mark)</p> <p><i>'Lower skilled jobs pay less.'</i> (1 mark)</p> <p><i>'Higher skilled jobs pay more.'</i> (1 mark)</p> <p><i>'Increases waste.'</i> (0 marks)</p> <p><i>'You get paid less.'</i> (0 marks)</p>

[END OF MARKING INSTRUCTIONS]