



# Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCE

In Design and Technology: Product Design

8DT0/01

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
<b>1(a)</b>	Both points from the following explanation:- <ul style="list-style-type: none"> <li>The material will return / spring back to its original shape (1) after being deformed / force is removed. (1)</li> </ul>	<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
<b>1(b)</b>	Any four of the following properties appropriately contextualised:- <ol style="list-style-type: none"> <li>Strong enough to resist the force required to punch through multiple sheets of paper without it bending / breaking. (1)</li> <li>Tough enough to resist an impact if it is knocked onto the floor. (1)</li> <li>Sufficient plasticity / malleability to be formed into the required shape without fracture. (1)</li> <li>Hard enough to not be scratched / worn away with continued use (1)</li> <li>Durable enough to last a reasonable amount of time. (1)</li> </ol>	Do not accept simple unqualified statements. Responses must outline an appropriate property and relate it to the punch handle.	<b>(4)</b>

Question Number	Answer	Additional Guidance	Mark
<b>1(c)</b>	Any two of the points from the following description:- <ul style="list-style-type: none"> <li>Heated up to less than its upper critical point / an oxide colour / purple / blue / 250 – 350°C (1) allowed to cool slowly in still air /quench. (1)</li> </ul>	Do not accept an unqualified reference to heating or cooling	<b>(2)</b>
<b>Total for question</b>			<b>8</b>

Question Number	Answer	Mark
<b>2(a)</b>	<p>Any six of the following stages of the process:-</p> <ol style="list-style-type: none"> <li>1. Screw turns drawing granules in.</li> <li>2. Heaters melt granules / polymer melted.</li> <li>3. Polymer gathered at the front of the screw.</li> <li>4. Screw plunges forward.</li> <li>5. Polymer injected into die.</li> <li>6. Die cooled with water channels.</li> <li>7. Die opened.</li> </ol>	<b>(6)</b>

Question Number	Answer	Additional Guidance	Mark
<b>2(b)</b>	<p>A calculation that includes the following:-</p> <p>Volume of cuboid = <math>12 \times 11 \times 4 = 528\text{mm}^3</math> (1)</p> <p>Radius of hole = <math>6/2 = 3\text{mm}</math> (1)</p> <p>Correct formula = <math>\pi R^2 H</math> (1)</p> <p>Volume of hole = <math>\pi \times 3^2 \times 3 = 84.8\text{mm}^3</math> (1)</p> <p>Volume of button = <math>528 - 84.8 = 443.2\text{mm}^3</math> (1)</p> <p>To 2 s.f. = <math>440\text{mm}^3</math> (1)</p>	<ul style="list-style-type: none"> <li>• Accept alternative methods of correct working out.</li> <li>• Error carried forward should be applied.</li> </ul> <p>Award full marks for correct answer only.</p>	<b>(6)</b>

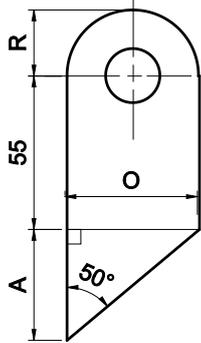
Question Number	Answer	Mark
<b>2(c)</b>	<p>Any three explanations that include a correct characteristic (1) and a linked justification of that characteristic (1).</p> <ol style="list-style-type: none"> <li>1. Low power consumption (1) therefore battery will last a long time / only requires a small battery / can be solar panel powered. (1)</li> <li>2. The panels are thin (1) so will fit in available space / will not make the calculator bulky. (1)</li> <li>3. They have sufficient / high resolution / sharp / bright screen (1) to show the information clearly. (1)</li> <li>4. They are light weight (1) aiding portability. (1)</li> </ol>	<b>(6)</b>
<b>Total for Question = 18</b>		

Question Number	Answer	Mark
<b>3(a)</b>	<p>Any one explanations that include a correct reason (1) and a linked justification of that reason (1).</p> <ol style="list-style-type: none"> <li>1. Chipboard is a composite / has no grain (1) therefore it has a uniform consistency. (1)</li> <li>2. Chipboard contains a large amount of glue / polymer (1) therefore it is not affected by moisture / temperature changes. (1)</li> </ol>	<b>(2)</b>

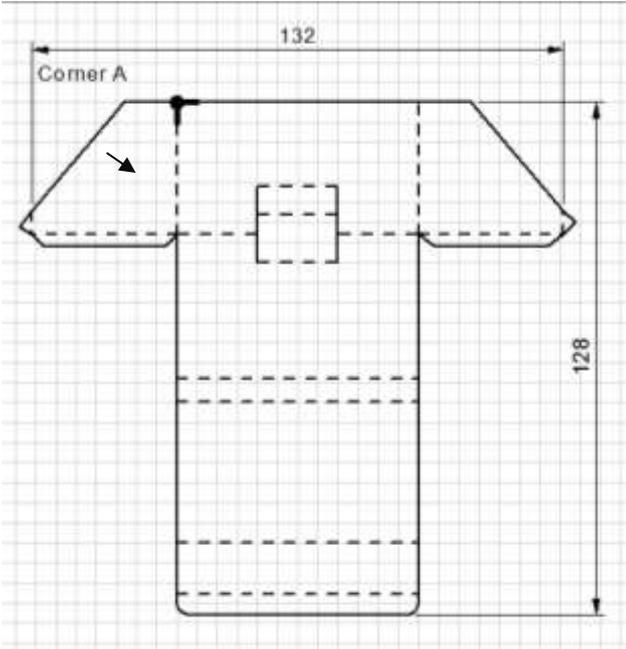
Question Number	Answer	Mark
<b>3(b)</b>	<p>Any two explanations that include a correct reason (1) and a linked justification of that reason (1).</p> <ol style="list-style-type: none"> <li>1. To improve the aesthetics / makes the desk more appealing (1) so that it sells more (1)</li> <li>2. To prevent corrosion (1) resulting from moisture on skin / moisture /oxygen in the air. (1)</li> <li>3. Because it is a durable finish (1) it will not flake, peel or chip over time / so the handle will retain its good aesthetics. (1)</li> <li>4. Cost effective finish (1) for the economic / low priced market. (1)</li> </ol>	<b>(4)</b>

Question Number	Answer	Additional guidance	Mark
<b>3(c)</b>	<p>Any three of the following that includes a correct reason (1) and a linked justification of that reason (1).</p> <ol style="list-style-type: none"> <li>1. No need to assemble the units in the factory (1) which saves time / labour. (1)</li> <li>2. Less space needed to store finished units (1) so less warehouse space required. (1)</li> <li>3. The packaged units are smaller (1) so less packaging material is needed. (1)</li> <li>4. More units can be fitted into one lorry (1) so less delivery trips needed / less fuel. (1)</li> </ol>	<p>Additional information</p> <p>Do not accept 'cheaper' as it is given in the stem.</p> <p>Do not accept sustainability type responses as these are directed to benefit the environment rather than the manufacturer.</p>	<b>(6)</b>
<b>Total for question</b>			<b>12</b>

Question Number	Answer	Additional guidance	Mark
<b>4a</b>	Any two of the following tool:-  1. Engineers square 2. Odd leg/Jenny callipers 3. Centre punch	Additional guidance  Do not accept a hammer.	<b>(2)</b>

Question Number	Answer	Additional guidance	Mark
<b>4b</b>	 <p>A calculation that includes the following:-</p> <p>Recall formula                      <math>\tan \sigma = O/A</math>                      (1)</p> <p>Transposed formula                <math>A = O/\tan \sigma</math>                      (1)</p> <p>Length of A                            <math>A = 48/\tan 50</math>  <math>= 40.277\text{mm}</math>                      (1)</p> <p>Length of R                            <math>R = 48/2 = 24\text{mm}</math>                      (1)</p> <p>Length of leg                         <math>= 40.277 + 55 + 24</math>  <math>= 119.277\text{mm}</math>                      (1)</p> <p>Answer to one decimal place = <b>119.3mm</b>                      (1)</p>	Accept alternative methods of correct working out.  Error carried forward should be applied.  Award full marks for correct answer only.	<b>(6)</b>

Question Number	Answer	Mark
<b>4c</b>	Any two of the following:-  1. Offset lithography (1) 2. Gravure (1) 3. Flexography (1)	<b>(2)</b>

Question Number	Answer	Additional guidance	Mark															
<b>4d</b>	<p>A net drawing of the package drawn to 1/3 of the dimensions shown. Marks will be awarded as follows:-</p> 	<p>Additional Guidance</p> <p>Tolerance +/- 1mm on all measurements</p> <p>Accept the ends correctly drawn against any face.</p> <p>Accept glue tabs drawn in any correct position.</p>	<b>(9)</b>															
<table border="1"> <thead> <tr> <th>Level</th> <th>Mark</th> <th>Descriptor</th> </tr> </thead> <tbody> <tr> <td></td> <td>0</td> <td>No rewardable materials</td> </tr> <tr> <td>Level 1</td> <td>1 - 3</td> <td> <ul style="list-style-type: none"> <li>• Drawing of net is produced with limited precision and accuracy.</li> <li>• Some sections of the net in correct position.</li> <li>• Some fold lines are correctly detailed with correct positioning.</li> <li>• Some line style is consistent and appropriate throughout.</li> <li>• Some glue tabs are correctly proportioned and located.</li> </ul> </td> </tr> <tr> <td>Level 2</td> <td>4 - 6</td> <td> <ul style="list-style-type: none"> <li>• Drawing of net is produced with some precision and accuracy.</li> <li>• Most sections of the net in correct position.</li> <li>• Most fold lines are correctly detailed with correct positioning.</li> <li>• Most line style is consistent and appropriate throughout.</li> <li>• Most glue tabs are correctly proportioned and located.</li> </ul> </td> </tr> <tr> <td>Level 3</td> <td>7 - 9</td> <td> <ul style="list-style-type: none"> <li>• Drawing of net is produced with precision and accuracy.</li> <li>• All sections of the net in correct position.</li> <li>• Fold lines are correctly detailed with correct positioning.</li> <li>• Line style is consistent and appropriate throughout.</li> <li>• Glue tabs and are correctly proportioned and located.</li> </ul> </td> </tr> </tbody> </table>				Level	Mark	Descriptor		0	No rewardable materials	Level 1	1 - 3	<ul style="list-style-type: none"> <li>• Drawing of net is produced with limited precision and accuracy.</li> <li>• Some sections of the net in correct position.</li> <li>• Some fold lines are correctly detailed with correct positioning.</li> <li>• Some line style is consistent and appropriate throughout.</li> <li>• Some glue tabs are correctly proportioned and located.</li> </ul>	Level 2	4 - 6	<ul style="list-style-type: none"> <li>• Drawing of net is produced with some precision and accuracy.</li> <li>• Most sections of the net in correct position.</li> <li>• Most fold lines are correctly detailed with correct positioning.</li> <li>• Most line style is consistent and appropriate throughout.</li> <li>• Most glue tabs are correctly proportioned and located.</li> </ul>	Level 3	7 - 9	<ul style="list-style-type: none"> <li>• Drawing of net is produced with precision and accuracy.</li> <li>• All sections of the net in correct position.</li> <li>• Fold lines are correctly detailed with correct positioning.</li> <li>• Line style is consistent and appropriate throughout.</li> <li>• Glue tabs and are correctly proportioned and located.</li> </ul>
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<b>Total for question</b>			<b>19</b>															

Question Number	Answer	Additional guidance	Mark
<b>5a</b>	<p>Any five of the following:-</p> <ol style="list-style-type: none"> <li>1. Length of hand / fingers have influenced the diameter of the hand holds. (1)</li> <li>2. Finger sizes have influenced the size / length / width of the trigger switch. (1)</li> <li>3. Range of finger movement has influenced how far the trigger switch moves. (1)</li> <li>4. Position of fingers / stronger fingers have influenced the position of the trigger. (1)</li> <li>5. Arm reach has influenced the distance between the two handles (1)</li> <li>6. Range of comfortable wrist movement has influenced the angle of the top handle. (1)</li> <li>7. Width / thickness of fingers have influenced the guard gap in the handle. (1)</li> </ol>	<p>Additional guidance</p> <p>Do not award responses that just identify a feature of the strimmer (E.g. Handle size). Responses must link a human size to a relevant feature to gain a mark.</p>	<b>(5)</b>

Question Number	Answer	Mark
<b>5b</b>	<p>Any two benefits that include a correct reason and two linked justifications of that benefit.</p> <ol style="list-style-type: none"> <li>1. Creates more jobs (1) giving employees a regular income / higher pay (1) increasing their quality of life. (1)</li> <li>2. Employers need new skills (1) so employees are trained up (1) leading to greater job satisfaction / promotion. (1)</li> <li>3. Established a need for health and safety laws (1) which were brought in by the government (1) making the work environment a safer place (1)</li> <li>4. Trade unions established (1) increasing the influence /power of employees (1) bringing many employee benefits (sick pay, holidays, pensions, etc.) (1)</li> </ol>	<b>(6)</b>
<b>Total for question</b>		<b>11</b>

Question Number	Answer	Mark
<b>6a</b>	<p>Any three reasons with a linked justification of that reason.</p> <ol style="list-style-type: none"> <li>1. Nylon fabric is non-absorbent (1) so the umbrella dries quickly. (1)</li> <li>2. Nylon fabric produces a flexible canopy (1) so the umbrella can be folded for transport / storage. (1)</li> <li>3. Nylon fabric has sufficient elasticity (1) allowing the canopy to stretch into shape / maintain the canopy shape when put up. (1)</li> <li>4. Nylon fabric can be produced in colours / patterns (1) so the umbrellas can be more aesthetically appealing. (1)</li> <li>5. Nylon fabric is sufficiently resistant to ultra-violet light (1) giving it a long life. (1)</li> </ol>	<b>(6)</b>

Question Number	Answer	Additional guidance	Mark
<b>6b</b>	<p>Any two of the concept reasons with a linked justification of that reason, and both points from the umbrella design.</p> <p>Concept</p> <ol style="list-style-type: none"> <li>1. Designers recognize that they do not fully understand how users will instinctively interact with a product (1) so observing consumers use a design is essential. (1)</li> <li>2. It is a reiterative process (1) in order to achieve the optimum outcome. (1)</li> <li>3. The design is adapted to suit the user (1) rather than the user adapting to suit the design. (1)</li> </ol> <p>Umbrella design</p> <ol style="list-style-type: none"> <li>4. The designer would observe that a user holds the umbrella pole off to one side of the body (1) and therefore has extended one side of the umbrella to give full cover from the rain. (1)</li> <li>5. The designer would observe that people use umbrellas on mobility scooters / wheelchairs / golf carts / bicycles (1) and has made the design less wind-resistant (1)</li> </ol>	<p>Max 4 points for the concept.</p> <p>Accept any appropriate / realistic application for the umbrella design.</p>	<b>(6)</b>
<b>Total for question</b>			<b>12</b>

Question Number	Indicative content	Mark
<b>7</b>	<p><b>A04 2a = 4 marks, A04 2b = 4 marks</b></p> <p>This question requires candidates to discuss the philosophy of Art Deco and its influence on products. Candidates may refer to the following in their responses:-</p> <ol style="list-style-type: none"> <li>1 Eclectic / ideas come from a wide range of sources.</li> <li>2 Decorative / elegant / glamorous style.</li> <li>3 Geometric shapes / zig-zag lines / symmetry</li> <li>4 Bright / garish colours</li> <li>5 New materials (e.g. stainless steel, aluminium, plywood, bakelite)</li> <li>6 Opulent architectural and decorative arts style.</li> <li>7 Popular modernism.</li> <li>8 A response to human need for pleasure / a reaction against austerity.</li> <li>9 Primary purpose to be beautiful / ornamental.</li> <li>10 Both hand-crafted and machine-made items accepted.</li> <li>11 Affordable materials should be used.</li> </ol>	<b>(8)</b>
<b>Total for question</b>		<b>8</b>

### Marking instructions

A maximum of 4 marks can be awarded for demonstration of knowledge in isolation without linked understanding.

Level	Mark	Descriptor A04
	0	No rewardable content
<b>Level 1</b>	1-2	<ul style="list-style-type: none"> <li>• Superficial response that demonstrates basic knowledge of a narrow range of relevant factors.</li> <li>• Makes tentative connections between factors discussed, demonstrating a limited understanding of the design concept.</li> </ul>
<b>Level 2</b>	3-5	<ul style="list-style-type: none"> <li>• Coherent response demonstrating competent knowledge of a sufficient range of relevant factors.</li> <li>• Makes sound connections between factors discussed, demonstrating a competent understanding of the design concept.</li> </ul>
<b>Level 3</b>	6-8	<ul style="list-style-type: none"> <li>• Comprehensive response demonstrating thorough knowledge of a wide range of relevant factors.</li> <li>• Makes effective connections between factors discussed, demonstrating a thorough understanding of the design concept.</li> </ul>

Question Number	Indicative content	Additional guidance	Mark
8	<p><b>A03 1a = 4 marks, A03 1b = 8 marks.</b></p> <p>Candidates should evaluate the user requirements of the two desk lamps. Some points for expansion may link to any of the identified impacts:-</p> <p><b><u>Points for expansion</u></b></p> <ol style="list-style-type: none"> <li>1 Function / performance</li> <li>2 Ergonomics</li> <li>3 Anthropometrics</li> <li>4 Energy</li> <li>5 Safety</li> <li>6 Hygiene</li> <li>7 Aesthetics</li> <li>8 Durability</li> <li>9 Materials</li> <li>10 Cost</li> </ol> <p><b><u>Identified Impacts</u></b></p> <p>Positives of ABS lamp</p> <ol style="list-style-type: none"> <li>1. Brightness of the ABS lamp can be adjusted.</li> <li>2. Goose neck much easier to adjust as no need to lock.</li> <li>3. ABS may be more stable as stem is at rear of base.</li> <li>4. LEDs will use a fraction of the energy /cheaper to run.</li> <li>5. LEDs will not get hot.</li> <li>6. Touch controls are easier accessed on the top of the base rather than hidden behind the incandescent base.</li> <li>7. ABS surfaces are easier to clean than brass which may tarnish.</li> <li>8. LEDs will last much longer than an incandescent bulb so less maintenance.</li> <li>9. The aesthetics are modern which may match a modern styled home environment.</li> <li>10. ABS lamp will cost less as polymer mass produced mouldings are cheaper than brass components.</li> </ol> <p>Positives of brass lamp</p> <ol style="list-style-type: none"> <li>11. Brass lamp may be more stable as base is chunky / heavy.</li> <li>12. Brass may be stronger / tougher / longer lasting than ABS mouldings.</li> <li>13. The aesthetics are traditional and will fit into a period home.</li> </ol>	<p>Accept negative alternatives to the positives stated.</p> <p><b>Do not</b> accept environmental impact issues unless justified in terms of social impact.</p>	(12)
			12

Level	Mark	Descriptor A03
	0	No rewardable content.
Level 1	1-3	<ul style="list-style-type: none"> <li>• Applies a basic understanding to deconstruct information, making limited connections between concepts.</li> <li>• Incomplete evaluation with unresolved conclusion that demonstrates limited syntheses of understanding.</li> <li>• Judgements are tentatively supported by evidence.</li> </ul>
Level 2	4-6	<ul style="list-style-type: none"> <li>• Applies a generally sound understanding to deconstruct information and provide some clear connections between concepts.</li> <li>• Imbalanced evaluation that synthesises some relevant understanding into a generally coherent conclusion.</li> <li>• Judgements are occasionally supported by relevant evidence.</li> </ul>
Level 3	7-9	<ul style="list-style-type: none"> <li>• Applies an effective understanding to deconstruct information and provide logical connections between concepts.</li> <li>• Balanced evaluation that synthesises relevant understanding into a considered conclusion.</li> <li>• Judgements are mostly supported by relevant evidence.</li> </ul>
Level 4	10-12	<ul style="list-style-type: none"> <li>• Applies a comprehensive understanding to deconstruct information and provides insightful connections between concepts throughout.</li> <li>• Thorough and balanced evaluation that synthesises relevant understanding into a well-developed conclusion.</li> <li>• Judgements are supported by pertinent evidence throughout.</li> </ul>

