

**GCE**

**Design and Technology**

**H006/01: Principles of Product Design**

Advanced Subsidiary GCE

**Mark Scheme for June 2019**

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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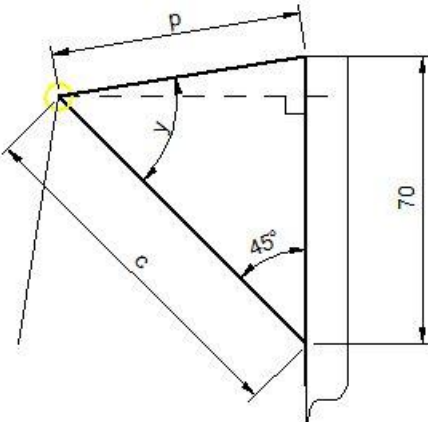
Annotation	Meaning
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
	Tick (not used on level Qs)
	Benefit of doubt
	Noted but no credit given
L1	Level 1 response
L2	Level 2 response
L3	Level 3 response
ECF	Error carried forward
RE	Rounding error
highlighter	A line is highlighted next to relevant part if only part is answering Q

Question			Answer	Mark	Guidance
1	(a)		<p>Possible design features may include:</p> <ul style="list-style-type: none"> <li>• Pivoting razor head enables a closed shave (1).</li> <li>• White TPE material and/or grooves on razor handle adds grip and stops slipping when wet (1).</li> <li>• Size of razor handle means it can be easily held in the hand (1).</li> <li>• The space under the razor when placed on a surface means it can be easily gripped and picked up. (1)</li> <li>• Any other valid suggestion.</li> </ul>	3	<p>One mark for identifying each of three design features that meet the needs of the intended user.</p> <p>The responses <b>must</b> be taken from <b>Fig. 1</b>.</p>
1	(b)	(i)	<p>Possible thermoplastic materials may include:</p> <ul style="list-style-type: none"> <li>• Polypropylene (PP) (1).</li> <li>• High impact polystyrene (HIPS) (1).</li> <li>• ABS(1)</li> <li>• Any other valid suggestion.</li> </ul>	1	<p>One mark for identifying a suitable thermoplastic material.</p> <p>Accept incorrect spelling if whole name is written.</p> <p>Accept common abbreviation - e.g. PP.</p>
1		(ii)	<p>Possible responses may include:</p> <p>If the answer provided by the candidate is polypropylene (PP):</p> <ul style="list-style-type: none"> <li>• Durable (1) therefore can withstand being dropped or knocked (1).</li> <li>• Rigid (1) gives the razor structure and stability so that force can be applied in use without it bending or snapping.</li> <li>• Recyclable (1) as the razor is disposable it prevents landfill waste (1)</li> <li>• Any other valid suggestion.</li> </ul> <p>A similar level of exemplification will be expected from candidates should a different thermoplastic material be given.</p>	4	<p>In each case:</p> <p>One mark for identifying a property of the material identified in part (b) (i).</p> <p>One mark for justifying why the property of the material makes it suitable for the handle part A.</p> <p>Properties given must relate to the material stated in part (b) (i).</p>

1	(c)	(i)	<p>Possible manufacturing methods may include:</p> <ul style="list-style-type: none"> <li>• Injection moulding (1).</li> <li>• Any other valid suggestion.</li> </ul>	1	One mark for identifying a suitable manufacturing method.
1		(ii)	<p>Possible responses may include:</p> <p>If the answer provided by the candidate is injection moulding:</p> <ul style="list-style-type: none"> <li>• Intricate detail such as the reinforcement can be integrated into the mould (1) reducing stages in production/ increasing speed (1).</li> <li>• The TPE grip can be over moulded onto the handle during the process (1). This means that two different colours and materials can be moulded together reducing stages in production/increasing speed (1).</li> <li>• Integral fixings can be moulded (1) to enable different parts to be jointed without separate fastenings (1).</li> <li>• Accuracy (1). It is a precise method of manufacture so it can include fixtures on the moulding that will accurately meet another adjoining part (1).</li> <li>• Any other valid suggestion.</li> </ul> <p>A similar level of exemplification will be expected from candidates should a different manufacturing method be given.</p>	4	<p>In each case:</p> <p>One mark for identifying a reason why the manufacturing method identified in part (c) (i) would be used.</p> <p>One mark for justifying why the manufacturing method makes it suitable for forming the handle part A.</p> <p>Reasons given must relate to the manufacturing method stated in part (c) (i).</p>

1	(d)*	<p><b>Indicative content:</b></p> <p>Impacts that disposable products have on the environment may include:</p> <ul style="list-style-type: none"> <li>• High/constant demand for single use products so large amounts of resources used in the production of these products. E.g. paper cups, from the use of the wood pulp, which comes from trees which are cut down, processed and transported to the energy of turning it into a cup and then finishes applied to make it water resistant.</li> <li>• End of life of the products, increase in rubbish going to landfill or having to be recycled. Increase in products ending up in the ocean, damaging natural habits e.g. plastic straws, nappies.</li> <li>• Single use so it is encouraging a throw away culture where people are de-sensitised to the impact that throwing away a product means.</li> <li>• Products such as batteries has previously been dumped in landfill and created hazardous waste which negatively affected the environment and animals living around the area.</li> <li>• Any other valid suggestion.</li> </ul>	<p><b>8</b></p> <p>For MB3 to be awarded there will be two or three impacts discussed.</p> <p>If candidate does not provide an analytical/evaluative response then only L1 can be awarded.</p>	<p><b>Level 3 [6-8 marks]</b></p> <p>The candidate has a clear understanding of the relationship between disposable products and the environment. They produce a thorough discussion in relation to the question by explaining a number of impacts that disposable products have on the environment. The explanation of impacts is clear and well-developed and different products are used to exemplify the points being made.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated with the use of examples.</i></p> <p><b>Level 2 [3-5 marks]</b></p> <p>The candidate has a reasonable understanding of the relationship between disposable products and the environment. They produce a sound discussion in relation to the question by explaining a number of impacts that disposable products have on the environment. The explanation of impacts is sufficient although one or two opportunities are missed in referring to different products.</p> <p><i>There is a line of reasoning presented with some structure.</i></p>
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					<p><i>The information presented is for the most part relevant and supported by some evidence.</i></p> <p><b>Level 1 [1-2 marks]</b> The candidate has a basic knowledge of the relationship between disposable products and the environment. Any reference to impacts is largely descriptive in nature. The response contains no analysis of evaluation.</p> <p><i>The information has some relevance and is presented with limited structure or detail. The information is supported by limited evidence.</i></p> <p><b>0 marks</b> No response or no response worthy of credit.</p>
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Question		Answer	Mark	Guidance
2	(a)	 <p>The largest section of <math>y</math> can be calculated because the angles of a triangle <math>= 180^\circ</math></p> <p>therefore:  <math>180 - 90 - 45 = 45^\circ</math> (1).</p> <p>To calculate the smallest section of <math>y</math> use the Tangent rule (1):  <math>\tan(\text{small } y) = \frac{10}{60}</math></p> <p><math>\tan(\text{small } y) = 0.1666</math></p> <p><math>\text{small } y = \tan^{-1}(0.1666) = 9.46 \text{ or } 9.5^\circ</math> (1).</p> <p>therefore:  <math>y = 45^\circ + 9.46^\circ = 54.46^\circ = 54.5^\circ</math> (1).</p>	4	<p>Award four marks as follows:</p> <p>One mark for calculating the angle of the largest section of <math>y</math>.</p> <p>One mark for understanding which trigonometry formula to apply to calculate the angle of the smallest section of <math>y</math>.</p> <p>One mark for calculating the angle of the smallest section of <math>y</math>.</p> <p>One mark for adding the angle of the largest section and smallest section of <math>y</math> together to get the overall angle to 1 decimal place.</p> <p>If correct answer is given without working out shown award full marks.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p> <p>*Allow error carried forward (ECF) where correct working out is shown.</p>



2	(b)		<p>Cost is £225 (1).</p> <p><math>75 \times 0.92 = 69</math> (1).</p> <p><math>(69 \times 5.93) - 225 = 184.17</math> (1).</p> <p><math>(184.17/225) \times 100 = 81.9\%</math> (1).</p>	4	<p>Award four marks as follows:</p> <p>One mark for calculating the total cost of the book lights.</p> <p>One mark for calculating 92% of the book lights purchased.</p> <p>One mark for calculating the net income (subtracting the total expenses from the revenue).</p> <p>One mark for calculating the percentage profit that the shop makes on the book lights to 1 decimal place.</p> <p>If correct answer is given without working out shown award full marks.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p> <p>*Allow error carried forward (ECF) where correct working out is shown.</p>
2	(c)	(i)	<p><math>4 \times (100 \times 30) = 12000</math></p> <p><math>2 \times (30 \times 30) = 1800</math></p> <p><math>12000 + 1800 = 13800</math> (1).</p> <p><math>13800 - (20 \times 90) = 12000 \text{ mm}^2</math> (1).</p>	2	<p>Answer two marks as follows:</p> <p>One mark for calculating the external surface area of the box.</p> <p>One mark for calculating the external surface area of the box with one window cut out.</p> <p>If correct answer is given without working out shown award full marks.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p>

					*Allow error carried forward (ECF) where correct working out is shown.
		(ii)	<p>Possible reasons may include:</p> <ul style="list-style-type: none"> <li>• Inform (1) to communicate to the person purchasing the product, what it does, how long it works etc. (1).</li> <li>• Appeal (1) to look more attractive to the consumer/stand out on shelf and increase sales (1).</li> <li>• Function (1) to add a barcode and product number so that it can be sold/priced etc. (1).</li> <li>• Any other valid suggestion.</li> </ul>	4	<p>In each case:</p> <p>One mark for identifying a reason why graphics are applied to the box.</p> <p>One mark for justifying why these graphics would be applied.</p> <p>Specific reference to the context in the question is needed for marks to be awarded.</p>

Question			Answer	Mark	Guidance
3	(a)	(i)	<p>Possible materials may include:</p> <ul style="list-style-type: none"> <li>• MDF (1).</li> <li>• XPS closed cell extruded polystyrene foam/insulation board (Styrofoam) (1).</li> <li>• Balsa (1)</li> <li>• Any other valid suggestion.</li> </ul>	1	<p>One mark for identifying a suitable material.</p> <p>Accept incorrect spelling if whole name is written.</p> <p>Accept common abbreviation - e.g. MDF.</p>
		(ii)	<p>Possible responses may include:</p> <p>If the answer provided by the candidate is MDF:</p> <ul style="list-style-type: none"> <li>• Easily shaped, so the model can be generated quickly (1).</li> <li>• Uniform structure so the model will have a smooth finish (1).</li> <li>• Lightweight so the solid model can be held comfortably (1).</li> <li>• Any other valid suggestion.</li> </ul> <p>A similar level of exemplification will be expected from candidates should a different material be given.</p>	2	<p>In each case:</p> <p>One mark for justifying why the material identified makes it suitable for the block model.</p> <p>Reasons given must relate to the material stated in part (a) (i).</p>

3	(b)	<p><b>Indicative content:</b></p> <p><b>The candidate is expected to demonstrate their understanding of the process involved through a series of annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must demonstrate a clear understanding of the end to end process.</b></p> <p>Process: Based on an MDF model:</p> <ul style="list-style-type: none"> <li>○ Creating the block. Measuring, marking out and cut to size. Possible tools: ruler, tri square, pencil, band saw. Joining more than one sheet together to create the desired thickness (if necessary). Possible equipment: PVA glue, G clamp.</li> <li>○ Marking out. Use of a template for the bottle shape. Possible materials, card laser cutter, craft knife.</li> <li>○ Cutting out and shaping. Possible tools: bandsaw, files, disc sander, or other appropriate tool. The edges of the bottle and marked out and then round off with a file and then using a disk sander. A template may be used to check the curve/ radius.</li> <li>○ Details for the cap and grip should be added by either sanding, cutting and re-joining or other appropriate method.</li> <li>○ The Bottle should be finished with a fine grade of glass paper, or silicon carbide paper (dry).</li> <li>○ Any other valid suggestion.</li> </ul> <p>Other processes are feasible and will gain credit if the appropriate understanding is shown.</p>	<p><b>5</b></p> <p>All processes demonstrated must relate to the block model of the shampoo bottle.</p> <p>Candidate can draw on practical experience from product analysis and the workshop to suppose their answer to this question.</p> <p>Candidates can be awarded for CAM/3D printing, however the process, equipment, tools and machinery should be clearly identified, including the drawing of the bottle in CAD.</p>	<p><b>Level 3 [4-5 marks]</b> The candidate demonstrates a good level of detail of the process needed to manufacture an actual size block model of the shampoo bottle using technical terms and consideration of any relevant equipment, tools and machinery required. Sketches, if used will be clear and supported with relevant notes. The process includes all relevant stages.</p> <p><b>Level 2 [2-3 marks]</b> The candidate will demonstrate a sound level of detail of the process needed to manufacture an actual size block model of the shampoo bottle using some technical terms and some consideration of any relevant equipment, tools and machinery required. Sketches, if used, will for the most part be clear and supported with notes most of which are relevant. The process includes some relevant stages.</p> <p><b>Level 1 [1 mark]</b> The candidate will demonstrate a limited level of detail of the process needed to manufacture an actual size block model of the shampoo bottle with a limited use of technical terms and basic consideration of any relevant</p>
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					<p>equipment, tools and machinery required. Sketches, if used, will be unclear with only basic notes to accompany them. Few relevant stages are included.</p> <p><b>0 marks</b> No response or no response worthy of credit.</p>
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3	(c)	<p><b>Indicative content:</b></p> <p><b>The candidate is expected to demonstrate their understanding of the process involved through a series of annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must demonstrate a clear understanding of the end to end process.</b></p> <p>Manufacturing process:</p> <ul style="list-style-type: none"> <li>• A parison is extruded or injection moulded preform is created. <ul style="list-style-type: none"> <li>○ Plastic granules/powder is inserted into a hopper.</li> <li>○ Screw forces the plastic along.</li> <li>○ Heaters soften the plastic.</li> <li>○ The plastic is pushed through a die to create the shape of the parison. The plastic is injected into a mould for a preform, cooled, the mould is then opened and the preform removed.</li> </ul> </li> <li>• Parison/preform is inserted into mould of the bottle and secured.</li> <li>• Air is blown into the mould stretching the walls of the parison and inflating it to take the shape of the mould.</li> <li>• Mould is opened, blowing rod extracted and bottle is removed.</li> <li>• Excess material is trimmed.</li> <li>• Any other valid suggestion.</li> </ul> <p>Other processes are feasible and will gain credit if the appropriate understanding is shown.</p>	<p><b>8</b></p> <p>All processes demonstrated must relate to the hollow bottle body of the shampoo bottle.</p> <p>Candidate can draw on practical experience from product analysis and the workshop to suppose their answer to this question.</p> <p>L3 candidates are expected to give details of how the parison/preform is manufactured.</p> <p>To achieve L3 it is expected that the mould will be the shape of the bottle.</p>	<p><b>Level 3 [6-8 marks]</b> The candidate has demonstrated a thorough understanding of the process needed to manufacture the hollow bottle body as a batch of 100000 with accurate technical terms and detailed consideration of any relevant materials, equipment or machinery required. Sketches if used will be clear and supported with relevant notes. The process will be end to end and clear in the way it is explained.</p> <p><b>Level 2 [3-5 marks]</b> The candidate has demonstrated a sound understanding of some aspects of the process needed to manufacture the hollow bottle body as a batch of 100000 with reasonable use of technical terms and some consideration of any materials, equipment or machinery required. Sketches, if used, will for the most part be clear and supported with notes most of which are relevant. The end to end process may contain some gaps in understanding.</p> <p><b>Level 1 [1-2 marks]</b> The candidate has demonstrated a limited knowledge of the process,</p>
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					<p>applying this knowledge in a basic way to how the batch of 100000 hollow bottle bodies would be manufactured with limited use of technical terms and a basic consideration of any materials, equipment or machinery required. Sketches, if used, will be unclear with only basic notes to accompany them. The end to end process may not exist and if anything is basic in nature.</p> <p><b>0 marks</b> No answer or answer not worthy of credit.</p>
<b>3</b>	<b>(d)</b>		$30/200 \times 500 = 75 \text{ ml (1).}$	<b>1</b>	<p>One mark for calculating how much detergent is needed in a 500 ml bottle.</p>

Question			Answer	Mark	Guidance
4	(a)	(i)	<p>Possible smart materials may include:</p> <ul style="list-style-type: none"> <li>Thermochromic pigment (1).</li> <li>Any other valid suggestion.</li> </ul>	1	One mark for identifying a suitable smart material.
		(ii)	<p>Possible ways may include:</p> <p>If the answer provided by the candidate is thermochromic pigment:</p> <ul style="list-style-type: none"> <li>Prevents wasting electricity repeatedly charging as the user can see the water is still hot (1).</li> <li>Saves time as the user does not have to wait for the kettle to re-boil if they can see that the water is still hot enough (1).</li> <li>Safety, there is a visual indication that the water is boiling hot so users that have difficulties sensing temperatures can be aware (1).</li> <li>Any other valid suggestion.</li> </ul> <p>A similar level of exemplification will be expected from candidates should a different smart material be given.</p>	1	One mark for identifying a reason how the smart material identified in part (a) (i) enhances the usability of the kettle.
4	(b)		<p>Possible advantages may include:</p> <ul style="list-style-type: none"> <li>Can be used by left handed and right handed</li> </ul>	2	One mark for identifying each of two advantages of the kettle having a separate base.



			<p>people (1).</p> <ul style="list-style-type: none"> <li>• Stops the kettle from sliding (1).</li> <li>• Prevents it from being poured while switched on (1).</li> <li>• Stops the wire getting caught up (1).</li> <li>• Connection is underneath so less likely to come into contact with water (1).</li> <li>• Any other valid suggestion.</li> </ul>		
<b>4</b>	<b>(c)</b>		<p>Possible features may include:</p> <ul style="list-style-type: none"> <li>• The translucency of the panel allows the user to see how much water is in the kettle (1) and fill to the correct amount for the number of cups they are using (1).</li> <li>• The handle is curved to make it more ergonomic (1), increasing comfort and ease of use (1).</li> <li>• The position of the handle is away from the spout (1) reducing the risk of scalding from the steam that may rise when pouring (1).</li> <li>• The lid has a semi-circular area that enables to user to locate their hand under (1), to increase grip and leverage when opening (1).</li> <li>• The kettle is an appropriate size (1) and so that the majority of people can lift it even when full (1).</li> <li>• Any other valid suggestion.</li> </ul>	<b>4</b>	<p>In each case:</p> <p>One mark for identifying a feature of the kettle that enhances usability.</p> <p>One mark for justifying why this feature enhances usability in relation to the product specified.</p> <p>Any answers relating to the base or colour changing nature of the panel cannot be awarded credit.</p> <p>Specific reference to the context in the question is needed for marks to be awarded.</p>
<b>4</b>	<b>(d)</b>		<p><math>1\text{ml} = 1\text{cm}^3</math>  <math>1750\text{ml} = 1750\text{cm}^3</math> (1).</p> <p><math>V = \pi r^2 h</math></p>	<b>3</b>	<p>Award three marks as follows:</p> <p>One mark for converting the units involved.</p>

			$\frac{1750^*}{\pi r^2} = h \text{ (1).}$ $h = 9.9 \text{ cm (1).}$		<p>One mark for recalling and manipulating the formula required.</p> <p>One mark for calculating the maximum height of the water in the kettle.</p> <p>If correct answer is given without working out shown award full marks.</p> <p>Where an incorrect answer is given working out should be used to credit appropriate marks.</p> <p>*Allow error carried forward (ECF) where correct working out is shown.</p>
4	(e)		<p><b>Indicative content:</b></p> <p>Possible responses may include:</p>	6	<p><b>Level 3 [5-6 marks]</b></p> <p>The candidate has a clear understanding of different strategies that are used to explore, create and evaluate design ideas. They produce</p>

		<ul style="list-style-type: none"> <li>Importance of using strategies many include:               <ul style="list-style-type: none"> <li>Early rough models are important to get initial feedback. They test the feasibility of an idea before too much money and time is spent on the design. Features could include block modelling to target focus groups on shape.</li> <li>Highlighting any problems that could prevent the kettle from being successfully used. Block modelling of handle/ switch/ lid/ spout/ key interfaces. Testing function, usability, &amp; ergonomics with different users.</li> <li>They can also be used to work out the optimum wall thickness of the kettle, which will save the manufacturer costs and reduce environmental impact. Modelling the design in CAD to help calculate the weight and volume of material ensures that the product is costed adequately</li> <li>Ensure that the end product is desirable to the end user and sales are successful. Marketing would look at colour and style, users would be able to try out different colour combinations with potential users. CAD modelling could have been used to develop the shape and style of the kettle.</li> </ul> </li> <li>Any other valid suggestion.</li> </ul>	<p>of strategies will be referred to.</p> <p>If candidate does not provide an analytical/evaluative response then only L1 can be awarded.</p> <p>Describing different modelling techniques would only achieve L1.</p>	<p>a thorough discussion in relation to the question by explaining the relative importance of these strategies to realise the successful final design of the kettle. The explanation related to using different strategies is clear and well-developed with the specific features of the kettle used to exemplify key points being made.</p> <p><b>Level 2 [3-4 marks]</b> The candidate has a reasonable understanding of different strategies that are used to explore, create and evaluate design ideas. They produce a sound discussion in relation to the question by explaining the relative importance of these strategies to realise the successful final design of the kettle. The explanation related to using different strategies is sufficient although one or two opportunities are missed in referring to specific features of the kettle.</p> <p><b>Level 1 [1-2 marks]</b> The candidate has a basic knowledge of strategies that are used to explore, create and evaluate design ideas. Any reference to these strategies is descriptive in nature and has little appreciation of the importance of these strategies in realising the successful final design of the kettle. There is only basic reference to specific features of the kettle and the response contains no analysis or evaluation.</p> <p><b>0 marks</b> No answer or answer not worthy of credit.</p>
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4	(f)	<p>Possible responses may include:</p> <ul style="list-style-type: none"> <li>• Tipping device (1) The elderly are more likely to struggle lifting heavy appliances, and may shake when pouring especially those with arthritis (1) adding an additional section to the base which supports the kettle while it is being tipped will carry the weight and help the kettle to be safely poured at a steady rate (1).</li> <li>• Improving the opening of the lid (1). Elderly users may struggle to grip and pull the lid up, especially when the kettle has been used lots and may have a build-up of lime scale (1). By adding a button and mechanism at the top of the handle to pop up the lid, it eliminates the need for the users to grip and apply force (1).</li> <li>• Reducing the size (1) so that the kettle can boil 3/4 cups will make it lighter (1). This will make the kettle easier to carry, tip and pour safely for people who have limited strength in their hands, wrists or arms (1).</li> <li>• Adding an additional handle (1) to enable the user to hold the kettle securely with two hands will give the user more grip (1) to help steady the kettle when pouring (1).</li> <li>• Any other valid suggestion.</li> </ul>	3	<p>One mark for identifying a modification that could be made to the kettle in relation to the end user.</p> <p>Up to a further two marks for justifying why the identified modification would make it suitable for the elderly.</p> <p>Award marks for illustrations if provided.</p> <p>Specific reference to the context in the question is needed for marks to be awarded.</p>
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4	(g)	<p><b>Indicative content:</b></p> <p>Possible environmental impacts of the use of smart technologies in products may include:</p> <ul style="list-style-type: none"> <li>• In the kettle there could be reduction of electricity used as the user would know the temperature of the water and not need to reheat. This could reduce burning of fossil fuels.</li> <li>• Use of thermochromic pigment in products such as baby spoons could increase the environmental impact as it would make the product harder to recycle.</li> <li>• Photochromic material could be used in glasses reducing the need for users to have two pairs of glasses. Combining two products in one means less raw materials are used and less pollution from the manufacturing process.</li> <li>• The use of electrochromic materials in smart glass to enable the user to change the transparency with an electric signal. This reduces the need for curtains and blinds reducing the need for those products to be produced. It also could be programmed to change automatically to help control the temperature in a building which would reduce the impact from heating or cooling a room. However this does require electricity which could be supplied by burning fossil fuels which would have a negative impact on the environment.</li> <li>• Any other valid suggestion.</li> </ul>	6	<p><b>Level 3 [5-6 marks]</b></p> <p>The candidate has a clear understanding of smart technologies. They produce a thorough discussion in relation to the question by explaining the environmental impacts that arise from the use of smart technologies in products. The explanation of impacts is clear and well-developed and the relationship between the environment and use of the stated technologies is clear throughout the narrative.</p> <p><b>Level 2 [3-4 marks]</b></p> <p>The candidate has a reasonable understanding of smart technologies. They produce a sound discussion in relation to the question by explaining the environmental impacts that arise from the use of smart technologies in products. The explanation of impacts is sufficient although one or two opportunities are missed in exemplifying the use of smart and modern technologies in products.</p> <p><b>Level 1 [1-2 marks]</b></p> <p>The candidate has a basic knowledge of smart technologies. Any reference to the use of these technologies is descriptive in nature and has little appreciation of the environmental impacts that result. The response contains no analysis or evaluation.</p> <p><b>0 marks</b></p> <p>No answer or answer not worthy of credit.</p>
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Question		Answer	Mark	Guidance
5	(a)	<p>Possible ways may include:</p> <ul style="list-style-type: none"> <li>Recycling schemes (1) in some areas users have been given separate bins for their cardboard, plastic and general waste. Users are expected to sort and clean their recycling to try and reduce landfill waste (1).</li> <li>WEEE directive (1) means that manufacturers have a responsibility for their products end of life so when a user has finished with a product e.g. washing machine, the company collects and disposes of the products rather than the user (1).</li> <li>Car Tax (1) cars that have higher emissions are taxed more so the user has to pay more to run the vehicle to try and encourage users to make more environmentally friendly transport choices (1).</li> <li>Any other valid suggestion.</li> </ul>	4	<p>In each case:</p> <p>One mark for identifying a way in which users have been impacted by environmental incentives and directives.</p> <p>One mark for describing how these environmental incentives and directives have manifested themselves within users.</p>

	(b)*	<p><b>Indicative content:</b></p> <p>Possible ways that environmental incentives and directives have influenced the design and manufacture of products may include:</p> <ul style="list-style-type: none"> <li>• Products are designed with the end of life now being considered, WEEE directive, including: <ul style="list-style-type: none"> <li>○ Clear labelling of materials</li> <li>○ Consideration of the selection of materials to ensure parts can either be reused or recycled.</li> <li>○ The number of different materials used in a product will be reduced.</li> <li>○ The joining methods will also be adapted to allow for ease of disassembly and repair.</li> </ul> </li> <li>• Material Selection <ul style="list-style-type: none"> <li>○ Sustainable materials are being chosen, e.g. wood from controlled sources.</li> <li>○ Recycled materials are being used more e.g. car tyres recycled to make pencil cases. Old CDs used in kitchen worktops.</li> <li>○ Alternative materials being used, e.g. bamboo toothbrushes.</li> </ul> </li> <li>• Increase in incentive to reduce rubbish going to landfill/time it takes for products to degrade. <ul style="list-style-type: none"> <li>○ Additives in plastic bags to make them breakdown quicker.</li> </ul> </li> <li>• Any other valid suggestion.</li> </ul>	8	<p><b>Level 3 [6-8 marks]</b></p> <p>The candidate has a clear understanding of environmental incentives and directives. They produce a thorough discussion in relation to the question by explaining how various incentives and directives have influenced the design and manufacture of products. The explanation of influences is clear and well-developed and a number of products are used to exemplify the points being made.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated with the use of examples.</i></p> <p><b>Level 2 [3-5 marks]</b></p> <p>The candidate has a reasonable understanding of environmental incentives and/or directives. They produce a reasonable discussion in relation to the question by explaining how various incentives and/or directives have influenced the design and/or manufacture of products. The explanation of influences is sufficient although one or two opportunities are missed in referring to different products.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.</i></p> <p><b>Level 1 [1-2 marks]</b></p> <p>The candidate has a basic knowledge of environmental incentives and/or directives. Any reference to this issue is descriptive in nature and has little appreciation of how these incentives and/or directives influence the design and/or manufacture of products. The response contains no analysis or evaluation.</p>
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					<p><i>The information has some relevance and is presented with limited structure or detail. The information is supported by limited evidence.</i></p> <p><b>0 marks</b> No answer or answer not worthy of credit.</p>
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**OCR (Oxford Cambridge and RSA Examinations)**  
**The Triangle Building**  
**Shaftesbury Road**  
**Cambridge**  
**CB2 8EA**

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998

Facsimile: 01223 552627

Email: [general.qualifications@ocr.org.uk](mailto:general.qualifications@ocr.org.uk)

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**Telephone: 01223 552552**  
**Facsimile: 01223 552553**

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