

Markscheme

May 2017

Design Technology

Higher level












Paper 3

12 pages

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The following are the annotations available to use when marking responses.

Annotation	Explanation	Shortcut	Annotation	Explanation	Shortcut
	Correct point (automatically awards 1 mark for each tick, up to the maximum for the question part)	ALT 1		Dynamic horizontal wavy line that can be expanded (for example, to highlight a section of irrelevant work)	
	Incorrect response (automatically awards zero)	ALT 0	NAQ	Not answered question	ALT 4
A+	Analysis		NBOD	No benefit of doubt	
B+	Balanced argument			Opinion	
	Benefit of the doubt		OC	Off course	
^	Caret – Omission	ALT 2	Text box	On page comment	ALT 9
	Cross – Incorrect point			Unclear	
D	Description	ALT 5		Repetition	
EVAL	Evaluation	ALT 7	SEEN	Seen (indicates that the point has been noted, but no credit has been given)	ALT 3
GEXP	[Good] Explanation (used when a point is explained (no EXP annotation))	ALT 6		Too vague	
	Dynamic, Horizontal (line that can be expanded)	ALT 8		Dynamic vertical wavy line that can be expanded (for example, to highlight a section of irrelevant work)	
			WTTE	Words to that effect (conveys the same meaning as marking point)	

You **must** make sure you have looked at all pages. Please put the **SEEN** annotation on any blank page, to indicate that you have seen it.

General Marking Instructions

Assistant Examiners (AEs) will be contacted by their team leader (TL) through RM™ Assessor, by e-mail or telephone – if through RM™ Assessor or by e-mail, please reply to confirm that you have downloaded the markscheme from IBIS. The purpose of this initial contact is to allow AEs to raise any queries they have regarding the markscheme and its interpretation. AEs should contact their team leader through RM™ Assessor or by e-mail at any time if they have any problems/queries regarding marking. For any queries regarding the use of RM™ Assessor, please contact emarking@ibo.org.

1. Follow the markscheme provided, award only whole marks and mark only in **RED**.
2. Make sure that the question you are about to mark is highlighted in the mark panel on the right-hand side of the screen.
3. Where a mark is awarded, a tick/check (✓) **must** be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark. **One tick to be shown for each mark awarded.**
4. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases use RM™ Assessor annotations to support your decision. You are encouraged to write comments where it helps clarity, especially for re-marking purposes. Use a text box for these additional comments. It should be remembered that the script may be returned to the candidate.
5. Personal codes/notations are unacceptable.
6. Where an answer to a part question is worth no marks but the candidate has attempted the part question, use the “ZERO” annotation to award zero marks. Where a candidate has not attempted the part question, use the “SEEN” annotation to show you have looked at the question. RM™ Assessor will apply “NR” once you click complete.
7. If a candidate has attempted more than the required number of questions within a paper or section of a paper, mark all the answers. Scoris™ will only award the highest mark or marks in line with the rubric.
8. Ensure that you have viewed **every** page including any additional sheets. Please ensure that you stamp “SEEN” on any additional pages that are blank or where the candidate has crossed out his/her work.
9. Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have got wrong. However, a mark should not be awarded where there is contradiction within an answer. Make a comment to this effect using a text box or the “CON” stamp.

General Marking Instructions

Subject Details: Design Technology HL Paper 3 Markscheme

Mark Allocation

Candidates are required to answer **ALL** questions in Section A (total **[20 marks]**) ONE question in Section B **[20 marks]**. Maximum total = **[40 marks]**.

Markscheme format example:

Question			Answers	Notes	Total
4.	b	ii	the displacement and acceleration ✓ are in opposite directions ✓	Accept <i>force</i> for <i>acceleration</i> .	2

- Each row in the “Question” column relates to the smallest subpart of the question.
- The maximum mark for each question subpart is indicated in the “Total” column.
- Each marking point in the “Answers” column is shown by means of a tick (✓) at the end of the marking point.
- A question subpart may have more marking points than the total allows. This will be indicated by “**max**” written after the mark in the “Total” column. The related rubric, if necessary, will be outlined in the “Notes” column.
- An alternative wording is indicated in the “Answers” column by a slash (/). Either wording can be accepted.
- An alternative answer is indicated in the “Answers” column by “**OR**” on the line between the alternatives. Either answer can be accepted.
- Words in angled brackets < > in the “Answers” column are not necessary to gain the mark.
- Words that are underlined are essential for the mark.
- The order of marking points does not have to be as in the “Answers” column, unless stated otherwise in the “Notes” column.
- If the candidate’s answer has the same “meaning” or can be clearly interpreted as being of equivalent significance, detail and validity as that in the “Answers” column then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by **OWTTE** (or words to that effect).
- Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
- Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. When marking, indicate this by adding **ECF** (error carried forward) on the script. “ECF acceptable” will be displayed in the “Notes” column.
- Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the “Notes” column.

Section A

Question		Answers	Notes	Total
1.	a	<p>designers develop a deeper understanding of the needs, tasks and environments of users with limited mobility ✓ helps them test ideas / gain feedback / show empathy during development ✓</p> <p>involving a variety of users throughout the development ✓ results in a more inclusive design / improves its diffusion into the market / improves its commercial viability ✓</p>	<p><i>Award [1] for identifying a reason why user centred design has been applied in the development of the Cimzia system and [1] for a brief explanation</i></p>	<p>2 max</p>
	b	<p>personae represent the characteristics and lifestyle of the target audience/designers use personae to summarise user research ✓ to focus the designer's understanding of the required needs/challenges during design development eg easier to hold/grip, large plunger, ergonomics etc ✓</p>	<p><i>Award [1] for identifying a reason why the designers of the Cimzia system might have applied the use of personae and [1] for a brief explanation</i></p>	<p>2</p>
	c	<p>provides more independence ✓ reinforces confidence ✓ users feel smarter (greater sense of achievement) ✓ users are more enabled (less effort required) ✓ fewer errors (less stressed/more satisfied) ✓ less intimidating than a normal syringe ✓</p>	<p><i>Award [1] for each way that the Cimzia system may lead to psycho-pleasure is listed up to a maximum of [2].</i></p>	<p>2 max</p>
	d	<p><i>Learnability:</i> the Cimzia System is intuitive / easy to learn how to use it ✓ simple design / minimal components / minimal instructions / training ✓ low memory burden / easy to remember how to use ✓ [2 max]</p> <p><i>Attitude:</i> the product received recognition from the Arthritis Foundation ✓ users feel less stressed / more confident / perceive it as easy to use / safer ✓ users are likely to spread the word within their peer group on the effectiveness of the system ✓ [2 max]</p>	<p><i>Award [1] for each of two distinct points in an explanation of how learnability may contribute to the usability of the Cimzia system.</i></p> <p><i>Award [1] for each of two distinct points in an explanation of how attitude may contribute to the usability of the Cimzia system.</i></p> <p><i>[2 max] for each separate and distinct explanation.</i></p>	<p>4 max</p>

Question		Answers	Notes	Total
2.	a	<p>is more cost effective for large companies/smaller companies may not have sufficient funds ✓</p> <p>more suited for high rate of production ✓</p> <p>larger companies are more likely to have the expertise / workforce / time / necessary training to implement lean production ✓</p> <p>larger companies are under more pressure to reduce their environmental impact ✓</p> <p>Larger companies are more likely to create more waste ✓</p>	<p><i>Award [1] for each reason why lean production is more likely to be implemented by multinational companies is identified up to a maximum of [2]</i></p>	<p>2 max</p>
	b	<p>Nike factory workers are highly trained and multi-skilled / empowered / have a deeper appreciation of the production process ✓</p> <p>involved in decision making / able to contribute to the production system ✓</p> <p>continuously improving the process ✓</p>	<p><i>Award [1] for identifying a reason how Nike's approach is an example of Kaizen and [1] for a brief explanation</i></p>	<p>2</p>
	c	<p>empowering workers / doing it right first time/ partnerships with suppliers ✓</p> <p>leads to higher efficiency / improved rate of production / fewer defects / reduced lead time / reduced lost time ✓</p>	<p><i>Award [1] for identifying which principle of lean production would have the most impact on reducing the delivery times and [1] for a brief explanation</i></p>	<p>2</p>

<p>d</p>	<p>QA is process orientated / takes place throughout the process ✓ sets specifications / standards / processes prior to production ✓ to prevent defects / lead to the production of a defect free product ✓ through checking material / ensuring staff are sufficiently trained / machines calibrated, etc ✓ [2 max]</p> <p>QC is product orientated ✓ detects defects in the product ✓ correct the manufacturing process ✓ using tests / quality checks / inspections / SPC, etc ✓ based on tolerances/specifications that have been set as part of the QA process ✓ [2 max]</p>	<p><i>Award [1] for each of two distinct points in a suggestion of how Nike would use QA to reduce the number of defects in their products.</i></p> <p><i>Award [1] for each of two distinct points in a suggestion of how Nike would use QA to reduce the number of defects in their products.</i></p> <p><i>[2 max] for each separate and distinct suggestion.</i></p>	<p>4 max</p>
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Section B

Question		Answers	Notes	Total
3.	a	cycle commuters ✓ cycle courriers ✓ ecofans / eco warriors / eco champions ✓ technophiles ✓ bike / fitness enthusiasts / sports enthusiasts ✓ leisure / elderly cyclists ✓ Ford brand loyalists ✓	Award [1] for each potential consumer target groups of the Ford Mode:Flex e-bike listed up to a maximum of [2].	2 max
	b	different sizes ✓ different colours ✓ different bikes eg off-road, all-terrain, tandem, basic versions ✓ different battery range ✓ single mode version eg only sporty ✓ additional modes included ✓	Award [1] for each way the concept of a product family can be applied to the Ford Mode:Flex e-bike is listed up to a maximum of [2].	2 max
	c	by producing a bike that can be used by a wide range of people ✓ Increasing their involvement in physical activities / leading to a more active society / increased well-being / health ✓ by encouraging people to use the bike instead of a car ✓ reducing traffic congestion / reduces fuel usage / pollution ✓ Including an App that provides useful information ✓ encourages use of public transport / active lifestyle ✓	Award [1] for identifying a reason how Ford might be meeting their corporate social responsibility objectives through the Ford Mode:Flex e-bike and [1] for a brief description.	2 max

<p>d</p>	<p>the Ford Mode:Flex e-bike is not an example of sustainable design because the scenario is based on more than just the development of a single product ✓</p> <p>the bike design is a result of cooperation between various stakeholders (eg Ford, local authorities, app developers, users etc) that extend beyond solely developing the Ford Mode:Flex e-bike ✓</p> <p>sustainable innovation facilitates the diffusion / marketing of sustainable products into the marketplace ✓</p> <p>leading to a large-scale system (eg integrated information, App connectivity and communication data) ✓</p> <p>supporting the use of greener transportation/more environmentally friendly / healthy lifestyles / societal well-being when integrated within a wider system ✓</p> <p>sustainable innovation requires funding from a number of different stakeholders / sustainable innovation is more expensive to implement ✓</p>	<p><i>Award [1] for each of five distinct points in an explanation of why the Ford Mode:Flex e-bike is an example of sustainable innovation rather than sustainable design</i></p> <p>Note: do not credit responses which define sustainable design</p>	<p>5 max</p>
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<p>e</p>	<p>Environmental: (Planet) the Ford Mode:Flex e-bike uses an electric motor / battery power ✓ encourages a move away from the use of cars ✓ while also leading to a reduction in pollution / emissions / non-renewable energy ✓ this may assist in the reaching of increasingly stringent regulations regarding urban air quality ✓</p> <p>the highly efficient transfer of energy from the pedals to the hub / the sensors monitoring the pedalling / the bicycle's lightweight frame ✓ allows the battery to run longer before recharging ✓ prolonging the battery's life / thus reducing energy consumption ✓</p> <p>the bicycle uses aluminium ✓ which can be easily recycled ✓ helping to preserve resources ✓</p> <p>the bike requires very little maintenance / uses durable material ✓ prolonging product life ✓ leading to a reduction in energy consumption / material consumption / waste ✓ [3 max]</p> <p>Economic: (Profit) the development of the Ford Mode:Flex e-bike may attract a wider range of users / lead Ford to create new markets ✓ this may lead to an increase of sales for Ford ✓ leading to an increase in profits (the bottom line figure) ✓</p> <p>the production of the bike creates employment ✓ in manufacturing/software sectors ✓ creating wealth ✓ [3 max]</p>	<p><i>Award [1] for each of three distinct points in an explanation of how the triple bottom line applies to the Ford Mode:Flex e-bike.</i></p> <p><i>[3 max] for each separate and distinct explanation.</i></p>	<p>9 max</p>
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		<p>Social: (People)</p> <p>the Mode: Link app encourages a wide range of users to cycle ✓ by tracking their fitness / by helping less able users / by including different modes ✓ bringing health benefits for all levels of riders ✓</p> <p>the Mode: Link app links to location and bus and train times / folding feature ✓ encourages the use of public transportation ✓ reduces car usage / creates less stress from congested roads / improves air quality ✓</p> <p>the Mode: Link app builds a cycling community / encourages social interaction ✓ communicates the cyclist locations / activities ✓ promoting greater social interaction ✓</p> <p>[3 max]</p>		
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