HKDSE Design and Applied Technology

SBA Assessment Criteria Revised Version

(Applicable to the 2021 HKDSE and Onwards)

1. HKDSE DAT Assessment Objectives

To evaluate students' abilities in the following:

1. to apply research, graphical communication and information processing skills to the design process.
2. to respond to identified needs, wants and opportunities for technological products and processes, while being aware of the impacts of technology and design on society.
3. to use the design process to develop design solutions to design problems in a range of contexts.
4. to select and use appropriate technology and relevant resources for designing, manufacturing and marketing a product.
5. to demonstrate appropriate design decisions based on knowledge and understanding of design practices and relevant technological systems and processes.

(Extracted and adapted from 2019 HKDSE DAT Assessment Framework)

2. The School-based Assessment (SBA) Project

- School-based Assessment (SBA) is an integral part of the DAT curriculum. Students can gain experience with genuine technological problems while working through the design cycle in a design activity. SBA activities will include open-ended tasks which allow students to show their technological capability by drawing on their accumulated experience.

- HKEAA will set three 'contextual challenges' for the SBA project. Students will choose one 'contextual challenge' and are required to complete one sustained design, make and evaluate project centred on the iterative processes. The project will consist of a portfolio and a final prototype, with a total mark of 100 and accounting for 40% of the subject mark.

- In the context of SBA project, 'prototype' refers to all working solutions including products, models and systems that are sufficiently developed to be tested and evaluated. A final prototype could be a highly finished product, made as 'proof of concept' prior to manufacture, a scaled working model or a functioning system where a full-sized product would be impractical. Students are required to produce a physical final prototype that can be properly tested and evaluated in the environment it is intended for. Therefore, only computer modelling and simulation are not considered an appropriate alternative for the final prototype.

- Approximately 25-35 working hours should be devoted to the project. Major parts of the final prototype should be made from raw materials and not be directly built using commercially available kits; however, commercially available mechanical components, control components, and programming devices are permitted.

- The project is a significant part of the teaching and assessment requirements of Design and Applied Technology; it is important that students have opportunities to access facilities whereby the realisation of the project can be achieved.

- Depending on the nature of the project, items to be submitted by students will be:
  - a working physical model/prototype, or a virtual 3D model plus a working partial physical model, and
  - an A4 or A3 size portfolio.

3. Revised Framework for the Assessment Criteria for SBA Project

The revised assessment criteria for students' SBA task are summarised in the table below.

Area	Assessment Criteria	Marks	Weight-ing	Assessment Objectives				
				1	2	3	4	5
Identify, investigate and outline design opportunities to address needs and wants	1. Identifying and investigating design opportunities	10	4%	✓	✓	✓		
	2. Developing a design brief and specifications	5	2%		✓	✓		
Design and make prototypes that are fit for purpose	3. Generating design ideas	10	4%	✓	✓	✓		✓
	4. Developing design ideas into a final solution (a) Quality of design development (b) Quality of final design solution	15 10	10%	✓		✓	✓	✓
	5. Making the final prototype (a) Planning for making (b) Materials, tools, equipment and processes for making (c) Quality of final prototype	3 12 15	12%			✓	✓	✓
Analyse and evaluate: • design decisions and outcomes • wider issues in design and technology	6. Testing and evaluating (a) Design decisions and prototype(s) (b) Wider issues in design and technology related to the final design solution	15 5	8%		✓	✓		✓
	Total marks (%of subject mark)	100 (40%)						

4. Assessment Criteria for SBA Project

Assessment Criterion	Description	Mark Range	Maximum Mark
1. Identifying and investigating design opportunities	• Identifies a wide range of design opportunities within the selected context that can be related to the needs and wants of potential users and which inform the development of appropriate design briefs. • Employs a broad range of strategies, including both primary and secondary methods of investigation and practical experimentation to thoroughly explore design opportunities. • Undertakes effective and perceptive analysis of information, fully addressing the needs, wants and values of potential users.	8-10	10
	• Identifies appropriate design opportunities which partially inform the development of appropriate design briefs. • Employs a range of strategies and techniques, which may include some practical activities, to explore design opportunities. • Undertakes general analysis of information, addressing the needs, wants and values of potential users to some extent.	4-7	
	• Identifies a few design opportunities which have limited influence on the development of possible design briefs. • Undertakes little or limited investigation that may not directly relate to the context. • Demonstrates only a basic understanding of the information gathered, and/or undertakes superficial analysis of the information.	1-3	
	Sub-total: (% of subject mark)	10 (4%)	

Assessment Criterion	Description	Mark Range	Maximum Mark
2. Developing a design brief and specifications	• Generates a comprehensive, clearly stated and challenging design brief, with a thorough consideration of investigation undertaken, that fully addresses both the context and the needs, wants and values of potential user(s), and leads to a significant breakthrough in the design. • Produces a comprehensive, relevant and clearly explained list of specifications, that includes ample technology applications, and includes detailed, realistic, objective and measurable criteria which inform the designing and making of a prototype.	4-5	5
	• Generates a satisfactory design brief to meet challenges to some degree, with some investigation undertaken that address the context and most of the needs, wants and values of potential user(s). • Produces a relevant and explained list of specifications that includes some technology applications, and includes realistic, objective and measurable criteria which inform the designing and making of a prototype.	2-3	
	• Generates a basic design brief, but which may be lacking in both clarity and challenge, with little or no reference to the investigation, and which does not address the context and only meets some of the needs and wants of potential user(s). • Produces a list of design specifications with minimal detail which has limited potential to inform the designing and making of a prototype.	1	
	Sub-total: (% of subject mark)	5 (2%)	

Assessment Criterion	Description	Mark Range	Maximum Mark
3. Generating design ideas	• Adopts appropriate and coherent idea generating strategies[1] to explore and generate a board range of different, appropriate and imaginative preliminary ideas in response to the contextual challenge. • Provides comprehensive and clear preliminary designs with constant reference to the design brief and specifications, research and investigation, and with thorough consideration of the physical and emotional needs of intended users. • Demonstrates clear and systematic evidence of originality[2] and innovation[3] throughout the idea generation process, and of being prepared to take design risks.	8-10	10
	• Adopts appropriate idea generating strategies to explore and generate a range of appropriate preliminary ideas in response to the contextual challenge. • Provides basic preliminary designs with some reference to the design brief and specifications, research and investigation, and with some considerations of physical and emotional needs of intended users. • Demonstrates some evidences of originality and innovation throughout the idea generation process.	4-7	
	• Adopts no or limited idea generating strategies to generate preliminary ideas in response to the contextual challenge. • Provides a vague preliminary design with limited reference to the design brief and specifications, and research and investigation. • Demonstrates little or no evidence of originality and innovation throughout the idea generation process.	1-3	
	Sub-total: (% of subject mark)	10 (4%)	

[1] Idea generating strategies include but are not limited to mind-mapping, mood board, SCAMPER, freehand sketching, and modelling.

[2] Originality refers to the novelty, uniqueness, and unusualness of design ideas or responses.

[3] Innovation refers to consideration of new methods or ideas to improve and refine design solutions to meet the needs of the intended clients or users.

Assessment Criterion	Description	Mark Range	Maximum Mark
4. Developing design ideas into a final solution (a) Quality of design development	• Demonstrates perceptive use of research and investigation to inform ongoing design development. • Demonstrates comprehensive and thorough use of an iterative approach[4] in the development of a design solution. • Provides refinement and alternatives to designs with sound justifications that are informed by the in-depth application of technical knowledge of materials and processes. • Demonstrates effective and accomplished use of graphical and modelling skills (including CAD techniques, freehand sketches, models and mock-ups) to consistently and appropriately develop or communicate design ideas, and to inform decisions in the development of a final prototype.	11-15	15
	• Demonstrates considered use of research and investigation to inform ongoing design development. • Demonstrates proper use of an iterative approach in the development of a design solution. • Provides refinement and alternatives to designs with some justifications that are informed by the sound application of technical knowledge of materials and processes. • Demonstrates appropriate and satisfactory use of graphical and modelling skills (including CAD techniques, freehand sketches, models or mock-ups) to appropriately develop or communicate design ideas, and to inform decisions in the development of a final prototype.	6-10	
	• Demonstrates superficial use of research and investigation to inform design development. • Demonstrates basic use of an iterative approach in the development of a design solution. • Provides refinement and alternatives to designs with little or no justifications that are informed by the basic application of technical knowledge of materials and processes. • Makes basic or little use of graphical and modelling skills (including CAD techniques, freehand sketches, models or mock-ups), and such models as are provided are rarely clear enough to enable appropriate development or communication of design ideas in the development of a final prototype.	1-5	

[4] Iterative design is a design methodology involving a cyclical process of prototyping, testing, analysing, and refining a product or process. Based on the results of testing, the most recent iteration of a design, changes and refinements are made.

Assessment Criterion	Description	Mark Range	Maximum Mark
(b) Quality of final design solution	• Develops a final design solution, with comprehensive and relevant details regarding materials, dimensions, finishes and fabrication techniques which clearly address all requirements of the design specifications.	8-10	10
	• Develops a final design solution, with sufficient details of materials, dimensions, finishes and/or fabrication techniques which address the main requirements of the design specifications.	4-7	
	• Develops a final design solution, with superficial details of materials, dimensions, finishes and/or fabrication techniques which address a few requirements of the design specifications.	1-3	
	Sub-total: (% of subject mark)	25 (10%)	

Assessment Criterion	Description	Mark Range	Maximum Mark
5. Making the final prototype (a) Planning for making	• Formulates and clearly communicates a timeline that is achievable, comprehensive and with relevant details of a logical sequence for the stages of making and testing the final prototype.	3	3
	• Formulates and presents a simple plan showing timed main stages and details that allows for monitoring of work progress.	2	
	• Action and time planning is not evident, or presents a generic action plan and/or time schedule that is not specific to the project.	1	
(b) Materials, tools, equipment and processes for making	• Applies appropriate technology including materials, systems, components and processes with good justifications; shows an excellent, in-depth understanding of material properties. • Uses appropriate tools, machinery and equipment skillfully (including digital design and manufacture[5]), and works with a high level of skill. • Makes accomplished use of an iterative approach to making[6] of the final prototype.	9-12	12
	• Applies appropriate technology including materials, systems, components and processes with adequate justifications; shows a satisfactory understanding of material properties. • Uses appropriate tools, machinery and equipment (including digital design and manufacture), and works with an adequate level of skill. • Makes considered use of an iterative approach in the making of the final prototype.	5-8	
	• Uses technology including materials, systems, components and processes with little justifications, and not all of which may be appropriate; shows limited understanding of material properties. • Uses appropriate tools, machinery and equipment (including digital design and manufacture), but works with a basic level of skill. • Makes basic or little use of an iterative approach in the making of the final prototype.	1-4	

[5] Digital design and manufacture in general refers to CAD, CAM, computer 3D modelling and simulation.

[6] Applying an iterative approach to making the prototype involves a process of planning, experimenting, making, testing and reviewing, to inform decision making, make improvements and refine prototypes at each stage of its making.

Assessment Criterion	Description	Mark Range	Maximum Mark
(c) Quality of final prototype	• Final prototype highly reflects the required design features of the final solution. • Final prototype produced to a high level of precision and accuracy, showing high quality and full attention to detail. • Final prototype functions as intended and fully meets the requirements of design specifications. • Quality of the overall appearance and finishing of the final prototype is good.	11-15	15
	• Final prototype basically reflects the design features of the final solution. • Final prototype largely produced to an adequate level of precision and accuracy, showing satisfactory quality and some attention to detail. • Final prototype mostly functions as intended and meets most of the requirements of the design specifications. • Quality of the overall appearance and finishing of the final prototype is satisfactory.	6-10	
	• Final prototype barely shows some design features of the final solution. • Final prototype is incomplete and made to a low level of accuracy, showing low quality and with little attention to detail. • Final prototype meets a limited part of the requirements of the design specifications. • Quality of the overall appearance and finishing of the final prototype is not satisfactory.	1-5	
	Sub-total: (% of subject mark)	30 (12%)	

Assessment Criterion	Description	Mark Range	Maximum Mark
6. Testing and evaluating (a) Design decisions and prototype(s)	• Undertakes sufficient, objective, critical and systematic analysis, including detailed test plan and evaluation of design ideas and decision making against the pre-set, measurable criteria whilst applying iterative design processes. • Undertakes objective and critical testing and evaluation of the final prototype in a predetermined environment, with the intended user group and against the pre-set, measurable criteria. • Draws highly convincing conclusions, with clear evidence of how the results are used to inform the modifications to the prototype, and with thorough consideration of the views of potential users. • Based on the testing and evaluation results, identifies how the design decisions and the final prototype could be further developed or improved to better meet the needs, wants and values of the intended users.	11-15	15
	• Undertakes basic and objective analysis, including a valid test plan and evaluation of design ideas and decision making partially against the pre-set, measurable criteria whilst applying iterative design processes. • Undertakes an objective testing and evaluation of the final prototype partially against the pre-set measurable criteria. • Draws generally appropriate conclusions, with some justifications of how the results are used to inform modifications to the prototype, and with some consideration of the views of potential users. • Makes reference to some aspects of the testing and evaluation results; shows how the design decisions and the final prototype could be further developed or improved; and attempts to meet the needs, wants and values of the intended users.	6-10	
	• Produces insufficient and mainly biased testing and evaluation of design ideas and decisions. • Produces an incomplete testing and evaluation of the final prototype, with superficial consideration of the views of potential users. • States some general and superficial suggestions on how the final prototype could be further developed or improved.	1-5	

Assessment Criterion	Description	Mark Range	Maximum Mark
(b) Wider issues in design and technology related to the final design solution	• Undertakes perceptive and critical analysis of the potential social, ethical or environmental impacts of final design solution, including positive and negative aspects, drawing balanced and supported conclusions.	4-5	5
	• Undertakes sound analysis of the potential social, ethical or environmental impacts of final design solution.	2-3	
	• Undertakes superficial analysis of the potential social, ethical or environmental impacts of final design solution.	1	
	Sub-total: (% of subject mark)	20 (8%)	

5. A Comparison of the Revised SBA Assessment Criteria Framework with the Previous version

Previous HKDSE DAT SBA Assessment Criteria (2012-2020)			**Revised HKDSE DAT SBA Assessment Criteria** (2021 and Onwards)		
1a. Problem identification - exploring problems and clarifying tasks	3.5%	7%	1. Identifying and investigating design opportunities	4%	6%
1b. Research in technology - studying technology and a real-world design	3.5%		2. Developing a design brief and specifications	2%	
1c. Exploring preliminary design ideas	3%	21%	3. Generating design ideas	4%	26%
2a. Development and refinement of creative ideas	9%		4. Developing design ideas into a final solution (a) Quality of design development (b) Quality of final design solution	10%	
2b. Realising the innovative final design solution	9%		5. Making the final prototype (a) Planning for making (b) Materials, tools, equipment and processes for making (c) Quality of final prototype	12%	
2c. Testing and evaluating the final design solution	9%	9%	6. Testing and evaluating (a) Design decisions and prototype(s) (b) Wider issues in design and technology related to the final design solution	8%	8%
2d. Overall presentation	3%	3%	*Overall presentation: subsumed under other assessment criteria stated above.*		
Total:	40% of subject mark		Total:	40% of subject mark	

Appendix

Other Related Issues

- **Requirements for Repeaters and Transfer Students**

School repeaters are candidates who have sat the HKDSE Examination in previous year(s) and are currently enrolled as S6 students in a school to retake the examination as school candidates. Generally speaking, SBA is compulsory for school repeaters. If a repeater studies in a school that offers Design and Applied Technology, the student has to be re-assessed in S6 and meet the stipulated SBA requirements. Their SBA results obtained in previous examinations will not be counted. If a repeater studies in a school that does not offer Design and Applied Technology, special permission may be granted for the student to be exempted from the SBA for this subject and his/her subject result will be based on the public examination result only. The school has to submit an application for exemption to the HKEAA when the repeater applies to enter for the examination, and certify that the subject concerned is not offered by the school.

Transfer students are S6 students sitting the examination for the first time, but who have transferred from one school to another after S5. Transfer students will need to submit SBA marks for S6 only, which will be proportionally adjusted to 40% and incorporated into their subject mark. Their SBA results obtained in S5 in the former school will not be counted.

For both school repeaters and transfer students, students' work completed in S5 can be carried forward to the new school for assessment. For example, students can make use of the data collected in S5 to complete their work in S6. Transfer students should provide information to their new school about the school in which they attended the S5 DAT course and the assessments completed there for their teachers' reference. Students who repeat S5 or who have transferred to an S5 class in another school are not considered to be school repeaters or transfer students. They must meet the full SBA requirements as normal S5 students.

- **Private Candidates**

The SBA projects for Design and Applied Technology, by their nature, should normally be carried out within the school environment and be appropriately supervised to ensure authentication. The HKEAA will not accept entries from private candidates for Design and Applied Technology.

(Extracted and adapted from 2019 HKDSE DAT SBA Teachers' Handbook)