

HKDSE Biology SBA

Practical-related tasks
20 & 26 June, 2009



HKDSE Bio School-Based Assessment

Principles of SBA design:

- integrate assessment with teaching and learning
- align with curriculum aims (e.g. develop the ability to make scientific inquiries) by addressing curriculum emphases and learning targets (e.g. make careful observations, formulate hypothesis for investigation)
- feedback for better learning and teaching



HKDSE Bio School-Based Assessment

- **20%** of subject mark
- Implemented in 2 phases:

- **2012 & 2013 Exams**

Practical related tasks only

- **2014 Exam & onwards**

**Both practical related tasks
& non-practical related tasks**



2012 & 2013 **Biology & Combined Science (Biology part) examinations** – Practical related task only

Assessment Area	Abilities assessed
Practical skills (Ability area A)	<ul style="list-style-type: none">• Ability to organize and perform practical work• Ability to make accurate observations and measurements
Investigation report (Ability area B)	<ul style="list-style-type: none">• Identification of problem and formulation of hypothesis, if applicable• Design and method of investigation• Presentation of results• Interpretation and discussion of results and conclusion

[Types of practical-related tasks]

Types of practical work that can be included in SBA:

- (a) **investigative practical work G1 (Area A)**
- (b) **microscopic examination (Area A)**
- (c) **dissection of animal / animal organs (Area A)**
- (d) **ecology fieldwork G1 (Area A)**
- (e) **biological drawing (Area A)**

Area A

- Task types (b) - (e) are **optional**; no more than 1 assessment on these types of tasks will be counted in the final ability area A mark.
- **G1**: Group work allowed. Teachers assess the practical skills of **individual students** within each group.

[Types of practical-related tasks]

Types of practical work that can be included in SBA:

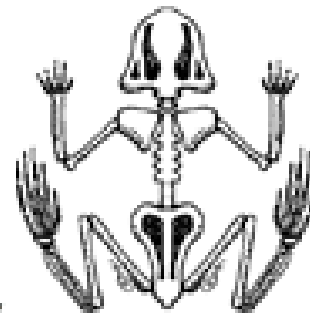
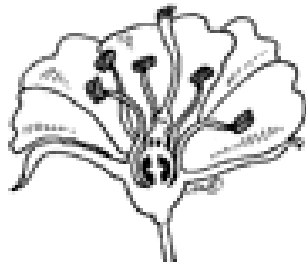
- (a) **investigative practical work G1 (Area A or/and Area B)**
- (b) **microscopic examination (Area A)**
- (c) **dissection of animal / animal organs (Area A)**
- (d) **ecology fieldwork G1 (Area A)**
- (e) **biological drawing (Area A)**

■ **Area B :**

- The reports that contribute to the final area B mark must come from **different sub-topics** listed under each topic, labelled with (a) to (f), in the **Biology Curriculum & Assessment Guide (p.14-15)** and **Combined science Curriculum & Assessment Guide (p.15)**
- Full instruction on procedure should NOT be given

Practical related tasks for learning and teaching

- Minimum no. of practical related tasks for learning and teaching:
 - Biology – 8 tasks in S5 & S6
 - Combined Science (Biology part): 4 tasks in S5 & S6
- Teachers will be asked to submit **a list of tasks done in S5 to S6**, showing the coverage of the different types of work.



Assessment framework of SBA for 2012 & 2013 **Biology** examinations

Minimum number of assessments							<i>Min. no. of practical related tasks for learning and teaching</i>
Practical-related tasks (20%)					Non-practical related tasks		
Area A (Practical skills)		Area B (Report)		Assignment			
S6	1	(8%)	1	(6%)	-	(0%)	8
S5	1		1	(6%)	-		

The best 2 marks a candidate obtains in ability area A in S5 and S6; the best mark obtained in ability area B in S5; and the best mark obtained in ability area B in S6 will be used in calculating the candidate's final SBA mark.

Assessment framework of SBA for 2012 & 2013 **Combined Science (Biology part)** examinations

Minimum number of assessments						<i>Min. no. of practical related tasks for learning and teaching</i>
Practical-related tasks (10%)				Non-practical related tasks		
Area A (Practical skills)		Area B (Report)		Assignment		
S6	1	(4%)	1	(6%)	-	(0%)
S5					-	
						4

The best mark a candidate obtains in each ability area will be used in calculating the candidate's final SBA mark.



Switching of courses



- Students who follow a science course with a Biology component (including **Biology**, **Combined Science (Biology part)** and **Integrated Science**) at **S5 are allowed to switch** to another one with a **Biology** component in their **S6** year of study, provided that the school concerned is permitted to present candidates for the examination of the subject to be entered by the candidates.
- These students have to **seek approval from their schools** for such switching

They are required to fulfill the **same** SBA requirements **as** those **transfer** candidates (i.e. **S6 requirement**)

Transfer students

- minimum requirements for SBA in **S6** :

Year of examination	Minimum number of assessments required for BIOLOGY
2012 & 2013	2 Area A (Practical skills) + 1 Area B (Reports)

Year of examination	Minimum number of assessments required for COMBINED SCIENCE (BIOLOGY part)
2012 & 2013	1 Area A (Practical skills) + 1 Area B (Reports)

Private Candidates

- Private candidates are **NOT** required to complete the SBA component. Their subject mark will be based entirely on their public examination results and adjusted accordingly.
- Private candidates who have SBA marks obtained from previous examinations are **NOT** allowed to carry forward these marks to subsequent examination.

Planning for teaching & assessment

- Teachers are free to devise their SBA tasks so that students will be exposed to a variety of experiences covering different topics of the curriculum.

“Relation of the Curriculum to SBA”

- * Topics included in Combined Science (Biology part)

Topic	Possible practical tasks	Area A					Area B
		(a)	(b)	(c)	(d)	(e)	
III.	Organisms and Environment						
	a. Essential life processes in plants						
	■ Studying the effect of light intensity on gas exchange in land or water plant *	✓					✓
	■ Comparing the distribution of stomata on both sides of a leaf *	✓					✓
	■ Relationship between leaf surface area and transpiration*	✓					✓
	■ Investigating the effects of environmental factors (e.g. humidity, light intensity and wind) on rate of transpiration*	✓					✓
	■ Examining the cross sections of the leaf, stem and root of a young dicotyledonous plant to study the structures related to transport of substances / provision of support*	✓	✓			✓	
	b. Essential life processes in animals						
	■ Identifying composition in some common foodstuffs*	✓					
	■ Comparing the vitamin C content in different fruits and vegetables*	✓					✓
	■ Investigating the action of digestive enzymes (e.g. amylase, protease)*	✓					✓
	■ Examining the alimentary canal and its associated glands of a dissected mammal			✓		✓	
	■ Examining the breathing system of a dissected mammal*			✓		✓	
■ Dissecting a pig's heart to examine its structure*			✓		✓		
c. Reproduction, growth and development							
■ Examining the adaptive features of an insect-pollinated flower / a wind-pollinated flower					✓		
■ Examining the reproductive system of a dissected mammal*			✓		✓		
■ Investigating the necessary conditions for seed germination	✓					✓	
d. Coordination and response							
■ Dissecting an ox's eye to examine its structures*			✓		✓		
■ Investigating phototropic responses of roots and shoots*	✓					✓	
f. Ecosystems							
■ Conducting an ecological study of a local habitat*	✓			✓		✓	
IV.	Health & Diseases						
	c. Body defence mechanisms						
■ Examining features of mammalian skin in relation to body defence		✓				✓	

Setting assessment tasks

The tasks devised should

- guide students to develop science process skills and other generic skills outlined in the curriculum;
- be able to achieve a balanced integration between theory and practice;
- be appropriate to the topic taught, and suit the strength and ability of the students;
- be able to differentiate the students according to the ability to be assessed.

Sample tasks

- Curriculum link
- Introduction
 - Background information
 - Skills / knowledge required (e.g. extraction skill; concept of hypothesis, dependent, independent and controlled variables)
- Scenario
- Task
- Materials & apparatus
- Procedure
- Generic guideline (for students) & Teachers' reference materials for investigation report
- Assessment criteria
- Further practical work

Assessment criteria – Area A

Criteria for assessing the ability to organise and perform practical work / ecology fieldwork:

- (i) The procedure for practical work is carried out safely
- (ii) Work is done in an organised and efficient way
- (iii) The apparatus is handled competently
- (iv) Instruments are used in appropriate ways to make accurate readings and measurements
- (v) The work area is kept neat and tidy.

Sample tasks:

**Vitamin C; protease in fruit;
transpiration; free-hand-section**

Criteria for assessing the ability to set up and use a microscope:

- (i) Uniform and appropriate illumination is achieved by means of suitable setting of the light source, mirror, condenser, filter and diaphragm as appropriate.
- (ii) Proper handling of observed specimens (wet or dry) is demonstrated.
- (iii) Correct choice and good use of eyepiece and objective is made for viewing specimens under low-power and high-power.
- (iv) Correct focusing procedure is used.
- (v) Correct viewing practices and posture are demonstrated.

Sample task: skin

Assessment criteria – Area A

Criteria for assessing the skills in dissecting animals/ animal organs:

- (i) Good manipulative skills are demonstrated.
- (ii) Effective use of dissecting instruments is observed during the course of the dissection.
- (iii) Relevant structures are clearly displayed.
- (iv) Structures are intact, clearly visible and free from surrounding overlying tissue.
- (v) Dissection is generally neat and tidy. No debris is scattered in the dish or on the board.

Sample task:

breathing system of the rat

Criteria for assessing biological drawings:

- (i) The drawing is accurate – there is a resemblance to the specimen; distinctive biological features are clear; the proportion of the various parts is accurate.
- (ii) The lines are smooth and clear, and overall the drawing is neat.
- (iii) Labels, title and magnification are given.

Sample tasks:

Skin; free-hand sectioning

Assessment criteria – Area B

Criteria for assessing the design and method of investigation:

- (i) The problem under investigation is clearly identified. The aim of the investigation is clearly stated
- (ii) If applicable, a hypothesis is put forward in a testable form and predictions are made
- (iii) Knowledge of biological principles is applied to the design of the investigation. Where applicable, assumptions used are clearly stated
- (iv) Suitable methods, techniques, including apparatus and materials to be used, are stated for the investigation
- (v) The method of changing the independent variable is stated and the ways for controlling other variables is/are stated
- (vi) The way(s) to obtain data for the dependent variable is/are stated with due attention being paid to accuracy.
- (vii) The procedure shows a logical ordering of steps and is written up clearly.
- (viii) Quantities, such as volumes and times, are stated, with appropriate SI units
- (ix) Control set-ups and various precautions are mentioned and explained.

Criteria for assessing the presentation of results, interpretation and conclusion:

- (i) The record of results indicates a high quality of accuracy and attention to details. Appropriate units are stated.
- (ii) Results are presented in appropriate forms such as tables, graphs, histograms or annotated illustrations with appropriate titles.
- (iii) Calculations where necessary are clearly shown.
- (iv) Trends and patterns in data are recognised.
- (v) Appropriate interpretations are made on the results in relation to the problem under investigation or hypothesis to be tested.
- (vi) Awareness is shown of the limitations of the methods used, sources of errors and their influence on the accuracy of the results obtained.
- (vii) Any unusual or anomalous observations are considered and their significance is assessed.
- (viii) Suggestions for improvement in technique and for further investigations are given where appropriate.
- (ix) Appropriate conclusions are drawn, supported by reasoned arguments. Consideration is given to the biological significance of the conclusions obtained.

Assessment criteria

- SBA Teachers' Handbook

- To be uploaded at the end of June 2009

URL: <http://www.hkeaa.edu.hk>

Click “HKDSE” in the homepage, choose “SBA”

- Hard copy available to teachers in September 2009

Assessment criteria

- Illustrated in the sample tasks
 - Type (a) :
 - Protease activity (Topic I(e); *investigation - qualitative practical work; suitable for group work; for both areas A & B*)
 - Transpiration (Topic III(a); *investigation; semi-quantitative practical work; suitable for group work; for both areas A & B*)
 - Vitamin C content (Topic III(b); *investigation - quantitative practical work; suitable for group work; for both areas A & B*)
 - Dicotyledonous stem – free-hand sectioning & making of temporary mount (Topic III(a); *recipe type practical work; for individual work; for area A*)
 - Type (b) & (e) :
 - Skin & body defence (Topic IV(c) [not included in Combined Science (Biology part)]; microscopic examination & biological drawing; *for area A*)
 - Type (c) : dissection
 - Breathing system of a rat (Topic III(b); dissection of animal ; *for area A*)
 - *Type (d) Ecology fieldwork*

Points to note in designing & assessing practical tasks involving group work

- The task should allow all the group members to participate, preferably with repeated / similar steps for each group member to carry out.
 - Extracting fruit juice from different fruits (Vitamin C content in fruits)
 - Treating the pineapple and kiwi cubes (Presence of pineapple / kiwi fruits)
 - Cutting transverse sections of the leafy shoots to reveal the heights of the eosin solution has reached in different cases (Transpiration)
- Class size? *(FAQ 3)*
- Group report instead of individual report? *(FAQ 4)*

[On making assessment]

- Mark scale – 10 point scale
 - applicable to different ability areas and tasks in the SBA
 - **Marks Quality of work**

9-10	Excellent
6-8	Good
3-5	Fair
1-2	Poor
- Must the teacher use assessment checklist?
(FAQ 2)

Assessment must be fair and students' work must be original.

Moderation of SBA mark

- a **statistical moderation** method will be adopted
- The “school” would be used as the unit for moderation
- the **average** and the **spread** of SBA scores of students in a given school will be adjusted with reference to the public examination scores of the same group of students
- students’ SBA marks may be adjusted but the **rank order determined by the school will remained unchanged**
- district coordinators will also inspect samples of the students’ assessed work to assist moderation and make adjustments if necessary
- details of the moderation mechanism to be adopted will be provided in the booklet **“Statistical Moderation of School-based Assessment Scores in the HKDSE”**, which is scheduled to be published in 2010

Major events for 2012 Biology & Combined Science (Biology Part) examinations (tentative)

Sept 2009	SBA Handbooks distributed to schools
Sept – Nov 2009	SBA Conference
June 2010	Professional development course – Non-practical related tasks
Sept – Nov 2010	SBA Conference
Sept 2010 – June 2011	Teachers to conduct SBA activities School visits by district coordinators
June 2011	Re-run of Professional Development programmes on SBA
May – June 2011	Schools to submit S5 SBA marks to the HKEAA (Biology only)
July 2011	Sample inspection of students' work by district coordinators

Major events for 2012 Biology & Combined Science (Biology Part) examinations (tentative)

Sept – Nov 2011	SBA Conference
Sept 2011 – Jan 2012	Teachers to conduct SBA activities School visits by district coordinators
Jan – Feb 2012	Schools to submit to the HKEAA <ul style="list-style-type: none">■ S6 SBA marks for Biology■ S5 & S6 SBA marks for Combined Science (Biology part)
March – May 2012	SBA marks analysed & moderated by the HKEAA Schools to submit samples of work of S6 students for inspection
July 2012	Release of 2012 HKDSE results
Oct 2012	Schools to receive feedback on the outcome of moderation

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Thank You