Biology
&
CS (Biology)

SBA Annual Conference

(26 Oct 2019)

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Time	Event	Speaker
9:00 – 9:10	Registration	-
9:10 – 10:15	Introduction New Initiatives	Mr Tsui (HKEAA)
10:15-10:30	Break	
10:30– 11:45	Supervisor's remark	Prof Lau Kwok Chi (CUHK)
11:45 – 12: 00	Meeting with DCs (In-classroom)	District Coordinators

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General Observations

- Biology : 12978 students (440 schools) submitted SBA marks
- CS(Bio) : 374 students (28 schools) submitted SBA marks

- Moderation (statistical methods and professional judgment)
- Biology: 72.3% of schools within expected range
  17.3% of schools higher than expected
  10.4% of schools lower than expected
- CS (Bio): 69.2% of schools within expected range
  28.2% of schools higher than expected
  2.6% of schools lower than expected

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Outlier detection and follow-up actions

Statistic	DC's comment	Action
↑	Strict	Adopt statistic result
↓	Lenient	Adopt statistic result
-	Appropriate	Adopt statistic result
↑	Lenient	Supervisor review
↓	Strict	Supervisor review
↑	Appropriate	Supervisor review
↓	Appropriate	Supervisor review
-	Lenient / Strict	Supervisor review

Correlation with written exam

Exam Year	Paper 1	Paper 2
2012	0.64	0.60
2013	0.73	0.64
2014	0.72	0.68
2015	0.74	0.69
2016	0.74	0.69
2017	0.76	0.70
2018	0.75	0.71
2019	0.76	0.70

SBA work plan for 2019-20

Month/Year	Events
26 Oct 2019	SBA annual conference
Sep 2019 – Jun 2020	S6 and S5 SBA activities to be conducted by schools
8 Jan – 7 Feb 2020	Online Submission of SBA marks, Student work samples, and 'S5 and S6 Lists of experiments' for 2020 Exam (Use experiment list template provided at HKEAA website: SBA → Forms → SBA Mark Templates)
Mar – May 2020	Moderation of S6 SBA marks by the HKEAA
May – Jun 2020	Email 'S5 Lists of experiments for 2021 Exam' to District Coordinator
8 Jul 2020 (tentative)	Release of 2020 HKDSE results
Sep – Oct 2020	Provision of feedback on the outcome of the SBA moderation of 2017 HKDSE to schools

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S5 + S6

Requirements

香港考試及評核局
Hong Kong
Examinations and
Assessment Authority

SBA Requirements

	Minimum Number of Assessment Per Student			
Bio	S5*		S6*	
	Practical Skills (A)	Report Writing (B)	Practical Skills (A)	Report Writing (B)
	1	1	1	1
CS (BIO)	S5 & S6			
	Practical Skills (A)		Report Writing (B)	
	1		1	

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SBA requirements for repeater / transfer candidates

- There might be School Repeaters, Switching of Courses / Transfer Students for S6 submission, i.e. mininum 1 practical skills and 1 report for both Bio and CS Bio. For details, please see Chapter 2 of the SBA Teachers' Handbook.

Final SBA Mark

	Display shown in SBA Software	%
Bio	A1: Best mark from area A among S5 & S6 marks	4
	A2: 2nd Best mark from area A among S5 & S6 marks	4
	B1: Best mark* from area B among S5 marks	6
	B2: Best mark* from area B among S6 marks	6
	* The two marks should come from different topics	
CS (BIO)	A: Best mark from area A	4
	B: Best mark from area B	6

The SBA system will select the best marks and calculate the final mark.

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Final SBA Mark – System Check

In SBA system, the following checks will be done during mark submission:

Biology:

- At least 1 A mark and 1 B mark per student in S5
- At least 1 A mark and 1 B mark per student in S6
- B marks selected in S5 and S6 are of different topics

CS Biology:

- At least 1 A mark and 1 B mark per student

Assessment rubrics

Mark range	Performance
9-10	Most basic performance + many good performance
6-8	Most basic performance + some good performance
3-5	Some basic performance + a few good performance
1-2	A few basic performance

- Both full report and guided report share the same rubrics
- Marks awarded based on the performance shown by the report
  - If only simple and straightforward questions and responses are observed, the reports will only fulfill basic performance and will not score high marks.
- Guiding questions should allow the demonstration of good performances

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Requirements for 2021 Exam (Same as 2015)

- Please refer to 2021 SBA Teachers' Handbook.

HKEAA will inform schools requesting teachers to email to District Coordinators the '*List of Experiments Performed in S5 and task sheets*' around May 2020.

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S6 Submission

What to submit?

- S5 and S6 marks
- Work samples (reports of 6 students selected by the system, only assessed reports are required)
- Teacher documents (S5 and S6 experiment lists and task sheets of assessed reports)

When to submit?

- 7 Jan – 7 Feb 2020
- SBA marks, work sample and teacher documents submitted in the same period
- Please submit SBA marks to principal for endorsement in advance to allow sufficient time for completion of other submissions

Points to note before submission

- **Formal approval from HKEAA** is required for exemption of SBA marks. If a student has fulfilled the minimum requirements, exemption is not required. No need to enter any symbol in the respective mark cell(s).

Points to note about student work

- Only reports with marks submitted
- Use dark ball pen
- Black and white scanning
- All images should be upright
- Mark should be of 10 point scale
- Attached task sheet to student work
- Put all reports of the student in one tif/pdf file

For students with Special Educational Needs (SEN)

- **Accommodation**
- **Applying for exemption (if applicable)**

Accommodation

- Provide necessary assistance to the student concerned and perform a FAIR assessment

- e.g. assigning a technician / classmate / teacher to tell the student the colour of the reacting mixture

- Provide alternative task (but same level of difficulty) and perform a FAIR assessment (e.g. making reference to School's SEN policy, soliciting advice from school management / Psychologist / Therapist)

Exemption

- Formal approval from the HKEAA required
- Application form: https://www.hkdse.hkeaa.edu.hk
- Apply at the beginning of school year

Supporting documents

- School's recommendation for exemption

- Relevant Medical supports
  Psychologist's supports
  Attendance record (such as record of extended sick leaves)

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Reminder:

- Contact the SBA Team of the HKEAA for questions related to logistical arrangements
- Discuss with your District Coordinator for subject-related questions
  Explain to the student the accommodation, or why no accommodation is necessary
  Mark in the student work the kind of accommodation / exemption involved if being selected to be submitted to the HKEAA

Coming events

- SBA of Biology and Combined Science (Biology Part) - Induction Course for New Teachers
  - 25 October and 1 November, 2019 (need to attend both sessions)
  - E246, 2/F, West Block, Education Bureau Kowloon Tong Education Services Centre
  - Please bring along the 2021 SBA handbook which is available from HKEAA website

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Coming events

- Briefing Sessions on Performance of Candidates in 2019 Exam
  - 13 or 25 November, 2018 (Identical Sessions)
  - Lecture theatre, 4/F, West Block, EDB Kowloon Tong Education Services Centre
  - Please bring along the 2019 Question Papers (with comments on candidates' performance) which is available on sale

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Important dates for public exam

Event	Date
Markers Recruitment	Mid Nov – Mid Dec, 2019
Exam Day	20 April, 2020
Markers' Meeting	29 April, 2020 (tentative)
OSM Training	30 April, 2020 (tentative)
Marking Period	30 April – 20 May, 2020 (tentative)

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New Initiatives for 2022 SBA

(S4 of this school year)

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Hong Kong Examinations and Assessment Authority

New Initiatives for 2022 SBA

Apply to this year S4 students

Current Practice	Proposed Changes
• Select one best B mark from S5 and one best B mark from S6 • The two best marks should come from reports of different topics • Assessments should be spread across years (i.e. minimum 1 assessment in S5 and 1 assessment in S6)	• Select two best B marks across years • The two best marks should come from reports of different topics • Assessment should be spread across years (i.e. minimum 1 assessment in S5 and 1 assessment in S6)

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New Initiatives for 2023 SBA

S4 of Next School Year

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Current observations in SBA

- Teachers tend to submit reports involving simple tasks for feared that their students may fail to come up with workable experiments
- 10 marks for the report as a whole, not fine enough to distinguish students' performance
- The procedures in the stratified samples are more or less the same

Current observations in public exam

Strengths:

- can give straightforward descriptions about data and trends
- can draw simple conclusions

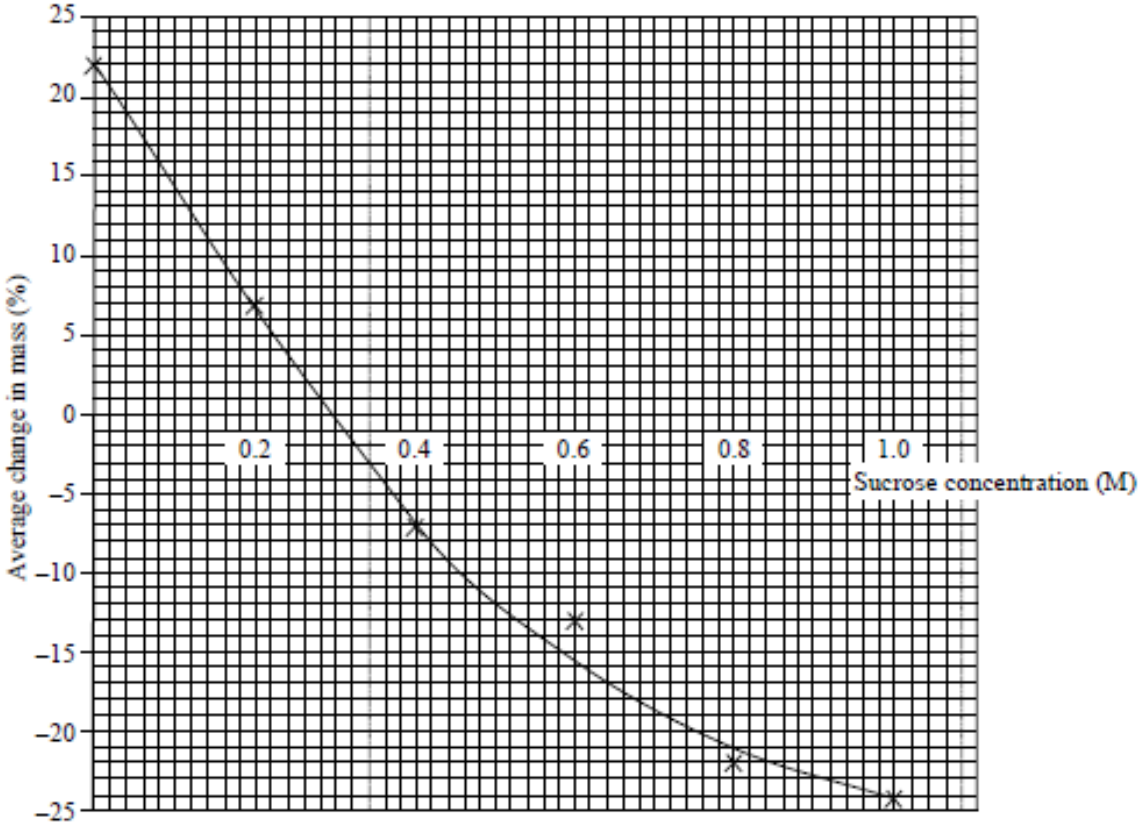
Weaknesses:

- fail to relate the differences in the results with the treatments
- fail to provide clear and logical explanations
- fail to distinguish between accuracy and reliability

6. Johnny conducted an experiment to determine the water potential of potato tuber cells. He measured the masses of fresh potato cylinders before and after immersing them in sucrose solutions at different concentrations (0M, 0.2M, 0.4M, 0.6M, 0.8M, and 1.0M). Below shows the major steps in the experiment:

Step 1: Cut potato tubers into cylinders
Step 2: Blot dry the surface of the potato cylinders
Step 3: Weigh the potato cylinders (initial mass)
Step 4: Immerse three potato cylinders in each concentration of sucrose solution for two hours
Step 5: Remove and blot dry the surface of the potato cylinders
Step 6: Reweigh the potato cylinders (final mass)
Step 7: Calculate the average percentage change in mass of the potato cylinders in each solution

The results are shown in the graph below:



(a) With reference to the graph, which sucrose solution concentration has the same water potential as the potato cells? Explain your answer. (3 marks)

Mark	% of Candidates
3	51%
2	28%
1	8%
0	11%
Blank	2%

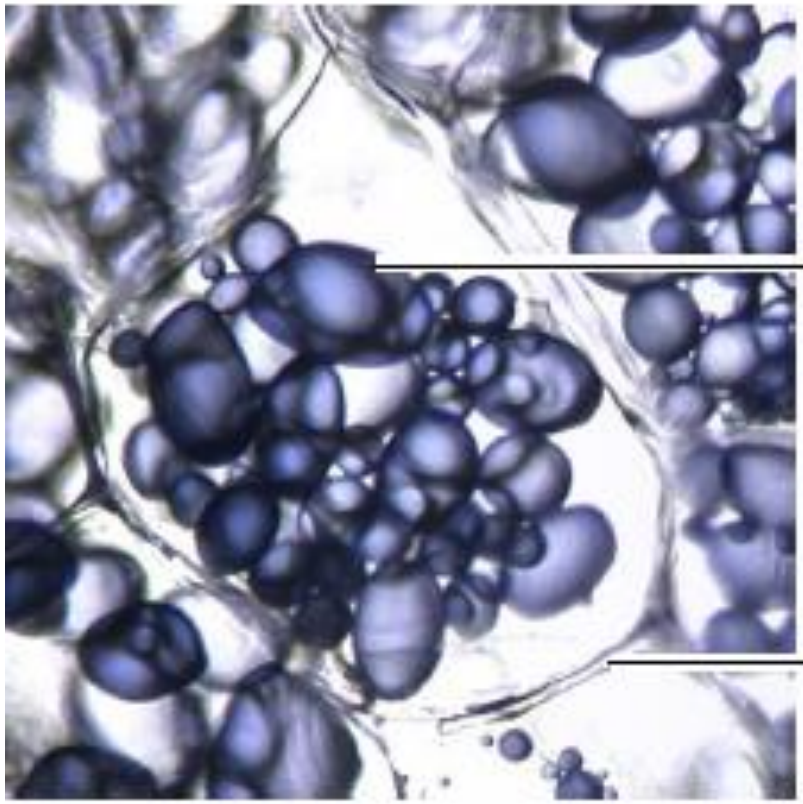
(b) If Johnny skipped step 2 by mistake for all samples, how would this affect the curve and the deduced value of the concentration of the sucrose solution in (a)? Sketch a curve on the graph on the facing page to show the effect. (1 mark)

Mark	% of Candidates
1	24%
0	69%
Blank	7%

(c) In terms of experimental design, what is the importance of putting three potato cylinders in each concentration of sucrose solution? (1 mark)

Mark	% of Candidates
1	9%
0	89%
Blank	2%

(d) Johnny prepared a slide of freshly sectioned potato cylinder and stained it with iodine solution. The photomicrograph below shows the section. Label structures X and Y. (2 marks)

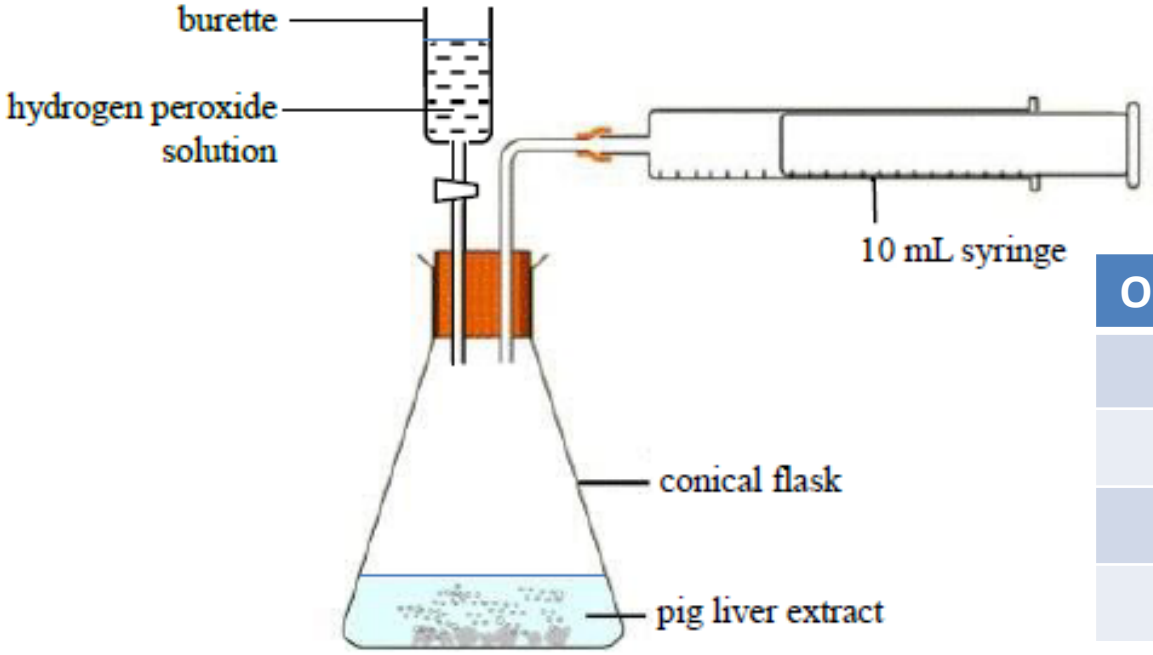


X: _____

Y: _____

Mark	% of Candidates
2	14%
1	58%
0	25%
Blank	2%

Directions: Questions 9 and 10 refer to the diagram below, which shows an experimental set-up prepared by a student to investigate the effect of temperature on catalase activity. Pig liver extract contains catalase which speeds up the breakdown of hydrogen peroxide into oxygen and water. A fixed volume of hydrogen peroxide solution was added to the liver extract and a 10 mL syringe was used to collect the oxygen gas released from the reaction mixture.



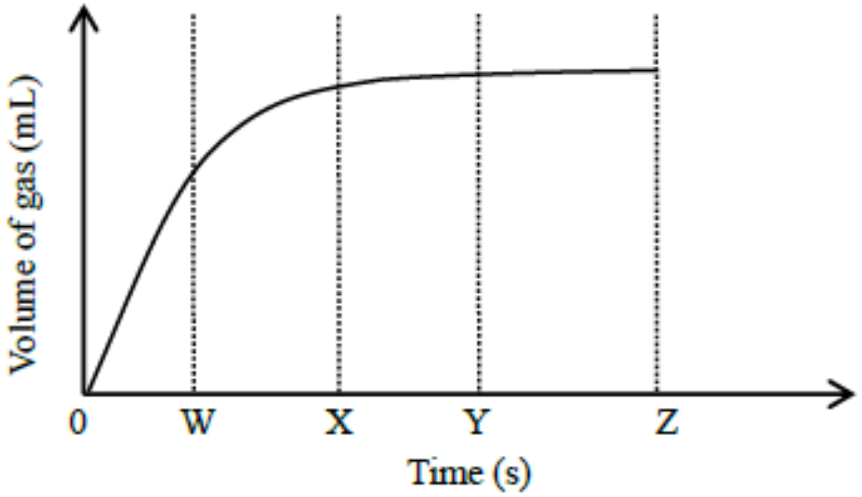
Options	% of Candidates
A	10%
B	72%
C	5%
D	13%

9. In the trial run conducted at room temperature, the student found that the volume of oxygen released was greater than the maximum collection volume of the syringe. How should he modify the set-up in order to collect valid data when repeating the experiment at different temperatures?

(1) use a larger syringe
(2) use a larger conical flask
(3) reduce the volume of the hydrogen peroxide solution added

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

10. After modifying the set-up, the following graph was obtained which shows the volume of gas collected over time at room temperature:



The student planned to use the volume of gas collected over a fixed period of time as the dependent variable to study the effect of different temperatures on catalase activity. Which of the following is the most suitable time period for the measurement?

A. 0 – W
B. 0 – X
C. 0 – Y
D. 0 – Z

Options	% of Candidates
A	22%
B	23%
C	33%
D	22%

Proposed changes for 2023 SBA

- Apply to S4 of next school year

Current Practice	Proposed Changes
• Students have to complete the design and procedures of the experiment under teacher supervision	• Remove the requirement for writing up the procedures • teachers **may** supply procedures with specific guiding questions on experiment and/or discussion (data analysis and conclusion)
• 10 marks for area B	• 10 marks for B1: experimental design • 10 marks for B2: results and discussion • Equal weighting for B1 and B2 • Assessment should be spread across years. • Mark selection: best two marks for B1 across years and best two marks for B2 across years

Provision of procedures

- Relieve teachers' worry about students' failing to come up with a workable design
- Allow exposure to more complex experimental designs, widen their learning experiences
- Reduce the workload of both students and teachers
- Some labs in Microbiology and Biotechnology involve standards protocols

B1 and B2 instead of marking whole report

- There are various types of experiments / investigations in Biology
- Some with more learning and teaching opportunities in the area of experimental designs, some with more opportunities in the area of data interpretations
- Teachers have the flexibility to choose suitable experiments for the assessment of B1 only, B2 only, or both B1 and B2

B1 and B2 instead of marking whole report

Assessment	Submitted samples should include
B1 only	• Task sheet • Student work on experimental design (include results as evidence)
B2 only	• Task sheet • Student work on results and discussion
B1 and B2	• Task sheet • Student work on experimental design, results and discussion (procedures are not necessary)

Scenario 1 – B1

What has happened to the banana?

Bananas are usually harvested when they are green. These bananas are not yet ripe and taste flat. However, after storing for several days, they turn yellow and become sweet in taste.

What biochemical changes do you think have taken place during the period of storage?

Carry out an investigation to test your hypothesis.

- Let students try out different ways of determining starch and sugar content
- In their design, ask them discuss the limitations of different methods of measurement
- Ask them to design how to take samples

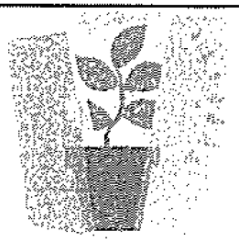
Scenario 2 – B1

Does photosynthesis take place in green stem as well?

Ada notices that the stems of the *coleus* plant grown at home are also green in colour. She is wondering if the stems of the plant can undergo photosynthesis.

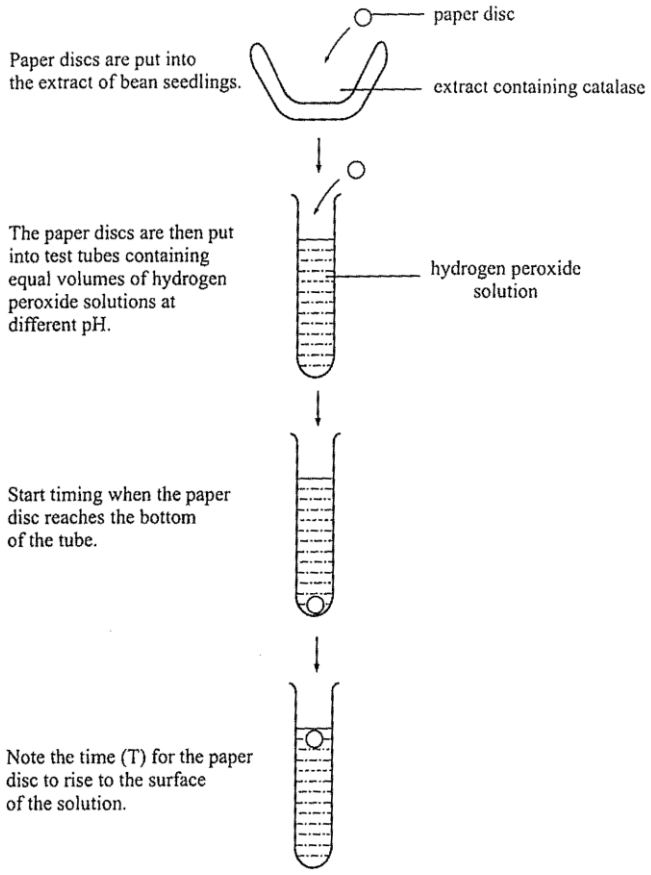
What do you think about this?

Carry out an investigation to test your hypothesis.



- Problem to be solved: how to show photosynthesis has taken place in stem?
- Instead of asking students to plan, can we ask student to try out and work out the method?
- The result is simply yes or no for whether photosynthesis.

Scenario 3 – B2



Provide procedures and ask students to conduct the experiment

- Tabulate results of different pHs
- Graph plotting?
- Replicates
  - May have anomalous results
- Calculation of rate (1/T)
- Apply knowledge to explain results
- Limitations

Scenario 4 – B2

Scenario 1 – B1

5. Finding the osmotic potential of plant cells and the molarity of sucrose solution X (1995 Group 5)

You are provided with the following:

- a standard sucrose solution (0.6 M)
- a filamentous alga

(a) Determine the osmotic potential of the cells of the filamentous alga and the molarity of sucrose solution X.

Provide procedures and ask student to conduct the experiment

- Tabulate results - plasmolysed cell count, conversion to %
- Graph plotting (50% plasmolysed)
- Sampling size, concept of osmosis, statistics

Scenario 5: B1 and B2

Comparing the fat content of different types of milk

- Give procedures, ask question about the design (may build in anomalous results)
- Results and discussion
- Link with milk vs dairy products

Scenario 6: B1 and B2

Water potential of potato cells

- Give procedures, ask question about the design (may build in anomalous results)
- Results and discussion
- Accuracy, reliability and validity about measurement (length vs weight)

Work to do in this school years

- Develop sample tasks, invite schools to try out
- Revise rubrics based on students work
- Develop exemplars to illustrate how to apply the rubrics