IB Chemistry Internal Assessment

Individual Investigation

1. Purpose of Internal Assessment

Internal assessment is an integral part of the course and is compulsory for both SL and HL students. It enables students to demonstrate the application of their skills and knowledge, and to pursue their personal interests, without the time limitations and other constraints that are associated with written examinations. The internal assessment should, as far as possible, be woven into normal classroom teaching and not be a separate activity conducted after a course has been taught.

The internal assessment requirements are the same for biology, chemistry and physics. The internal assessment, worth 20% of the final assessment, consists of one scientific investigation. The individual investigation should cover a topic that is commensurate with the level of the course of study.

Student work is internally assessed by the teacher and externally moderated by the IB. The performance in internal assessment at both SL and HL is marked against common assessment criteria, with a total mark out of 24.

2. General Questions to Consider

A. Why are you conducting this investigation? (Personal Engagement)
B. What are you going to test either through experimentation or a model?
C. How will you collect data and what data will you collect?
D. What conclusion will you come to? (What is your hypothesis?)

In addition to the criteria outlined in the rubric, you will also be evaluated through discussions with respect to the originality of your investigation. You will have discussions with me after break to work through logistics of your investigation. At the very end you will submit a hard copy for grading.

3. Guidance and Authenticity

The work submitted for internal assessment must be the student's own work. However, it is not the intention that students should decide upon a title or topic and be left to work on the internal assessment component without any further support from the teacher. The teacher should play an important role during both the planning stage and the period when the student is working on the internally assessed work. It is the responsibility of the teacher to ensure that students are familiar with:

- the requirements of the type of work to be internally assessed
- the IB animal experimentation policy

- the assessment criteria—students must understand that the work submitted for assessment must address these criteria effectively.

Teachers and students must discuss the internally assessed work. Students should be encouraged to initiate discussions with the teacher to obtain advice and information, and students must not be penalized for seeking guidance. As part of the learning process, teachers should read and give advice to students on one draft of the work. The teacher should provide oral or written advice on how the work could be improved, but not edit the draft. The next version handed to the teacher must be the final version for submission.

It is the responsibility of teachers to ensure that all students understand the basic meaning and significance of concepts that relate to academic honesty, especially authenticity and intellectual property. Teachers must ensure that all student work for assessment is prepared according to the requirements and must explain clearly to students that the internally assessed work must be entirely their own. Where collaboration between students is permitted, it must be clear to all students what the difference is between collaboration and collusion.

All work submitted to the IB for moderation or assessment must be authenticated by a teacher, and must not include any known instances of suspected or confirmed academic misconduct. Each student must confirm that the work is his or her authentic work and constitutes the final version of that work. Once a student has officially submitted the final version of the work it cannot be retracted. The requirement to confirm the authenticity of work applies to the work of all students, not just the sample work that will be submitted to the IB for the purpose of moderation.

Authenticity may be checked by discussion with the student on the content of the work, and scrutiny of one or more of the following:

• the student's initial proposal
• the first draft of the written work
• the references cited
• the style of writing compared with work known to be that of the student
• the analysis of the work by a web-based plagiarism detection service such as http:/ www.turnitin.com.

The same piece of work cannot be submitted to meet the requirements of both the internal assessment and the extended essay.

4. Guidance for the use of the internal assessment criteria

The internally assessed component of the course is divided into five sections.

- Personal engagement
- Exploration
- Analysis
- Evaluation
- Communication

Each section aims to assess a different aspect of the student's research abilities. The sections are differently weighted to emphasize the relative contribution of each aspect to the overall quality of the investigation. As the investigations, and therefore the approaches to the investigation, will be specific to each student, the marking criteria are not designed to be a tick-chart markscheme and each section is meant to be seen within the context of the whole. As such, a certain degree of interpretation is inevitable. The following tips are designed to help focus on the intention of each section, rather than be seen as a definitive approach.

Personal engagement

The emphasis within this section is on individuality and creativity within the investigation. The question to ask is, has the chosen research question been devised as a result of the personal experience of the student? The question could be a result of observations made in the student's own environment or ideas that the student has had as the result of learning, reading or experimenting in class. The investigation does not have to be ground-breaking research, but there should be an indication that independent thought has been put into the choice of topic, the method of inquiry and the presentation of the findings. The topic chosen should also be of suitable complexity. If the research question is very basic or the answer self-evident then there is little opportunity to gain full marks for exploration and analysis as the student will not have the opportunity to demonstrate his or her skills.

Exploration

The issue here is the overall methodology. Students need to take their individual ideas and translate them into a workable method. Students must also demonstrate the thinking behind their ideas using their subject knowledge. The information given must be targeted at the problem rather than being a general account of the topic matter, in order to demonstrate focus on the issues at hand.

What needs to be seen is a precise line of investigation that can be assessed using scientific protocols. It is then expected that the student gives the necessary details of the method in terms of variables, controls and the nature of the data that is to be generated. This data must be of sufficient quantity and treatable in an appropriate manner, so that it can generate a conclusion, in order to fulfill the criteria of analysis and evaluation. If the method devised

does not lead to sufficient and appropriate data, this will lead to the student being penalized in subsequent sections where this becomes the crux of the assessment.

Health and safety is a key consideration in experimental work and forms part of a good method. If the student is working with animals or tissue, it is reasonable to expect there to be evidence that the guidelines for the use of animals in IB World Schools have been read and adhered to. The use of human subjects in experiments is also covered by this policy. If the student is working with chemicals, some explanation of safe handling and disposal would be expected. Full awareness is when all potential hazards have been identified, with a brief outline given as to how they will be addressed. It is only acceptable for there to be no evidence of a risk assessment if the investigation is evidently risk-free—such as in investigations where a database or simulation has been used to generate the data.

Analysis

At the root of this section is the data generated and how it is processed. If there is insufficient data then any treatment will be superficial. It is hoped that a student would recognize such a lack and revisit the method before the analysis is arrived at. Alternatively, the use of databases or simulations to provide sufficient material for analysis could help in such situations.

Any treatment of the data must be appropriate to the focus of the investigation in an attempt to answer the research question. The conclusions drawn must be based on the evidence obtained from the data rather than on assumptions. Given the scope of the internal assessment and the time allocated, it is more than likely that variability in the data will lead to a tentative conclusion. This should be recognized and the extent of the variability considered. The variability should be demonstrated and explained and its impact on the conclusion fully acknowledged. It is important to note that, in this criterion, the word "conclusion" refers to a deduction based on direct interpretation of the data, which is based on asking questions such as: What does the graph show? Does any statistical test used support the conclusion?

Evaluation

Although it may appear that the student is asked to repeat the analysis of the data and the drawing of a conclusion again in the evaluation, the focus is different. Once again the data and conclusion come under scrutiny but, in the evaluation, the conclusion is placed into the context of the research question. So, in the analysis, it may be concluded that there is a positive correlation between x and y; in the evaluation, the student is expected to put this conclusion into the context of the original aim. In other words, does the conclusion support the student's original thinking in the topic? If not, a consideration of why it does not will lead into an evaluation of the limitations of the method and suggestions as to how the method and approach could be adjusted to generate data that could help draw a firmer conclusion.

Variability of the data may well be mentioned again in the evaluation as this provides evidence for the reliability of the conclusion. This will also lead into an assessment of the limitations of the method. It is the focus on the limitations that is at issue in the evaluation, rather than a reiteration that there is variability.

Communication

The marking points for communication take the entire write-up into consideration. If a report is clearly written and logically presented there should be no need for the teacher to re-read it. The information and explanations should be targeted at the question in hand rather than being a general exposition of the subject area; in other words, the report should be focused. The vocabulary should be subject-specific and of a quality appropriate to diploma level. The subject-specific conventions that can be expected are the correct formats for graph and tables and cell headings, correct use of units and the recording of errors. This is not to say that the presentation needs to be faultless to gain full marks. Minor errors are acceptable as long as they do not have a significant bearing on understanding or the interpretation of the results.