

Internal assessment rubric

Your internal assessment investigation is worth 20% of your IB grade and will consist of:

- your selection of a relevant physics investigation.
- researching the scientific content of your topic.
- defining a workable research question.
- adapting and/or designing a methodology.
- obtaining, processing, and analyzing data.
- addressing errors, uncertainties, and limits of data.
- submitting a typewritten scientific report that is 6-12 A4 pages in length and uploaded to *TurnItIn.com*.
- having your report assessed using the criteria shown here (and in detail, below).

Criterion assessed	Maximum marks	Percent of total	Earned marks
Personal engagement	2	8	
Exploration	6	25	
Analysis	6	25	
Evaluation	6	25	
Communication	4	17	
TOTAL	24	100	

These are the types of investigations you may conduct:

Traditional hands-on experiments using real objects and measuring devices. You may want to measure the acceleration of gravity by adjusting the angle of inclination of a track, and looking at its limit. You may want to look at videotaped freefall experiments to analyze the drag force.

Database investigations. There are many scientific databases from which you can obtain data with which you can investigate things that might interest you, such as yearly variation in CO₂, or average temperature over the millennia.

Simulations. You can use open-ended computer simulations to gather data of your own design.

Spreadsheet. You can use a spreadsheet to design a simulation of your own.

Personal engagement – 2 marks

This criterion assesses the extent to which the student engages with the exploration and makes it their own. Personal engagement may be recognized in different attributes and skills. These could include addressing personal interests or showing evidence of independent thinking, creativity or initiative in the designing, implementation or presentation of the investigation.

Mark	Descriptor
0	<input type="checkbox"/> The student's report does not reach a standard described by the descriptors below.
1	<input type="checkbox"/> The evidence of personal engagement with the exploration is limited with little independent thinking, initiative or creativity. <input type="checkbox"/> The justification given for choosing the research question and/or the topic under investigation does not demonstrate personal significance, interest or curiosity . <input type="checkbox"/> There is little evidence of personal input and initiative in the designing, implementation or presentation of the investigation.
2	<input type="checkbox"/> The evidence of personal engagement with the exploration is clear with significant independent thinking, initiative or creativity. <input type="checkbox"/> The justification given for choosing the research question and/or the topic under investigation demonstrates personal significance, interest or curiosity . <input type="checkbox"/> There is evidence of personal input and initiative in the designing, implementation or presentation of the investigation.

Exploration – 6 marks

This criterion assesses the extent to which the student establishes the scientific context for the work, states a clear and focused research question and uses concepts and techniques appropriate to the Diploma Programme level. Where appropriate, this criterion also assesses awareness of safety, environmental, and ethical considerations.

Mark	Descriptor
0	<input type="checkbox"/> The student's report does not reach a standard described by the descriptors below.
1-2	<input type="checkbox"/> The topic of the investigation is identified and a research question of some relevance is stated but it is not focused . <input type="checkbox"/> The background information provided for the investigation is superficial or of limited relevance and does not aid the understanding of the context of the investigation. <input type="checkbox"/> The methodology of the investigation is only appropriate to address the research question to a very limited extent since it takes into consideration few of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. <input type="checkbox"/> The report shows evidence of limited awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation* .
3-4	<input type="checkbox"/> The topic of the investigation is identified and a relevant but not fully focused research question is described. <input type="checkbox"/> The background information provided for the investigation is mainly appropriate and relevant and aids the understanding of the context of the investigation. <input type="checkbox"/> The methodology of the investigation is mainly appropriate to address the research question but has limitations since it takes into consideration only some of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. <input type="checkbox"/> The report shows evidence of some awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation* .
5-6	<input type="checkbox"/> The topic of the investigation is identified and a relevant and fully focused research question is clearly described. <input type="checkbox"/> The background information provided for the investigation is entirely appropriate and relevant and enhances the understanding of the context of the investigation. <input type="checkbox"/> The methodology of the investigation is highly appropriate to address the research question because it takes into consideration all, or nearly all, of the significant factors that may influence the relevance, reliability and sufficiency of the collected data. <input type="checkbox"/> The report shows evidence of full awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation* .

* This indicator should only be applied when appropriate to the investigation. See exemplars in teacher support material.

Analysis – 6 marks	
This criterion assesses the extent to which the student's report provides evidence that the student has selected, recorded, processed and interpreted the data in ways that are relevant to the research question and can support a conclusion.	
Mark	Descriptor
0	<input type="checkbox"/> The student's report does not reach a standard described by the descriptors below.
1-2	<input type="checkbox"/> The report includes insufficient relevant raw data to support a valid conclusion to the research question. <input type="checkbox"/> Some basic data processing is carried out but is either too inaccurate or too insufficient to lead to a valid conclusion. <input type="checkbox"/> The report shows evidence of little consideration of the impact of measurement uncertainty on the analysis. <input type="checkbox"/> The processed data is incorrectly or insufficiently interpreted so that the conclusion is invalid or very incomplete.
3-4	<input type="checkbox"/> The report includes relevant but incomplete quantitative and qualitative raw data that could support a simple or partially valid conclusion to the research question. <input type="checkbox"/> Appropriate and sufficient data processing is carried out that could lead to a broadly valid conclusion but there are significant inaccuracies and inconsistencies in the processing. <input type="checkbox"/> The report shows evidence of some consideration of the impact of measurement uncertainty on the analysis. <input type="checkbox"/> The processed data is interpreted so that a broadly valid but incomplete or limited conclusion to the re-search question can be deduced.
5-6	<input type="checkbox"/> The report includes sufficient relevant quantitative and qualitative raw data that could support a detailed and valid conclusion to the research question. <input type="checkbox"/> Appropriate and sufficient data processing is carried out with the accuracy required to enable a conclusion to the research question to be drawn that is fully consistent with the experimental data. <input type="checkbox"/> The report shows evidence of full and appropriate consideration of the impact of measurement uncertainty on the analysis. <input type="checkbox"/> The processed data is correctly interpreted so that a completely valid and detailed conclusion to the research question can be deduced.

Evaluation – 6 marks	
This criterion assesses the extent to which the student's report provides evidence of evaluation of the investigation and the results with regard to the research question and the accepted scientific context.	
Mark	Descriptor
0	<input type="checkbox"/> The student's report does not reach a standard described by the descriptors below.
1-2	<input type="checkbox"/> A conclusion is outlined which is not relevant to the research question or is not supported by the data presented. <input type="checkbox"/> The conclusion makes superficial comparison to the accepted scientific context. <input type="checkbox"/> Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are outlined but are restricted to an account of the practical or procedural issues faced. <input type="checkbox"/> The student has outlined very few realistic and relevant suggestions for the improvement and extension of the investigation.
3-4	<input type="checkbox"/> A conclusion is described which is relevant to the research question and is supported by the data presented. <input type="checkbox"/> A conclusion is described makes some relevant comparison to the accepted scientific context. <input type="checkbox"/> Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are described and provide evidence of some awareness of the methodological issues * involved in establishing the conclusion. <input type="checkbox"/> The student has described some realistic and relevant suggestions for the improvement and extension of the investigation.
5-6	<input type="checkbox"/> A conclusion is described and justified which is relevant to the research question and is supported by the data presented. <input type="checkbox"/> A conclusion is correctly described and justified through relevant comparison to the accepted scientific context. <input type="checkbox"/> Strengths and weaknesses of the investigation, such as limitations of the data and sources of error, are discussed and provide evidence of a clear understanding of the methodological issues * involved in establishing the conclusion. <input type="checkbox"/> The student has discussed realistic and relevant suggestions for the improvement and extension of the investigation.
*See exemplars in teacher support material for clarification.	

Communication – 4 marks	
This criterion assesses whether the investigation is presented and reported in a way that supports effective communication of the focus, process and outcomes.	
Mark	Descriptor
0	<input type="checkbox"/> The student's report does not reach a standard described by the descriptors below.
1-2	<input type="checkbox"/> The presentation of the investigation is unclear, making it difficult to understand the focus, process and outcomes. <input type="checkbox"/> The report is not well-structured and is unclear: the necessary information on focus, process and outcomes is missing or is presented in an incoherent or disorganized way. <input type="checkbox"/> The understanding of the focus, process and outcomes of the investigation is obscured by the presence of inappropriate or irrelevant information. <input type="checkbox"/> There are many errors in the use of subject-specific terminology and conventions*.
3-4	<input type="checkbox"/> The presentation of the investigation is clear. Any errors do not hamper the understanding of the focus, process and outcomes. <input type="checkbox"/> The report is well-structured and is clear: the necessary information on focus, process and outcomes is present and is presented in a coherent way. <input type="checkbox"/> The report is relevant and concise, thereby facilitating a ready understanding of the focus, process and outcomes of the investigation. <input type="checkbox"/> The use of subject-specific terminology and conventions is appropriate and correct. Any errors do not hamper understanding.
*For example, incorrect/missing labeling of graphs, tables, images; use of units, decimal places. For issues of referencing and citations refer to the "Academic honesty" section.	