

**SCORE SHEET**  
**SKYLINE HIGH SCHOOL**  
**IB SPORTS, EXERCISE, AND HEALTH INTERNAL ASSESSMENT**

STUDENT NAME: \_\_\_\_\_

SESSION: \_\_\_\_\_

INVESTIGATION TITLE: \_\_\_\_\_

This investigation is (select one):

- ☐ A hands-on experiment
- ☐ A database analysis
- ☐ An analysis of a simulation or model

**Scoring Summary:**

Personal Engagement: \_\_\_\_ / 2

Evaluation: \_\_\_\_ / 6

Exploration: \_\_\_\_ / 6

Communication: \_\_\_\_ / 6

Analysis: \_\_\_\_ / 6

**TOTAL: \_\_\_\_ / 24**

*Marks are awarded on a "best fit" approach based on the levels awarded for each aspect of a given criteria.*

*Estimated IB Grade, based on 2016 mark ranges:*

<b>Grade:</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>Mark range:</b>	<b>0 - 3</b>	<b>4 - 6</b>	<b>7 - 10</b>	<b>11 - 13</b>	<b>14 - 16</b>	<b>17 - 19</b>	<b>20 - 24</b>

**STUDENT DECLARATION:**

I confirm that this is my own work and this is the final version. I have acknowledged use of the words and ideas of another person, whether written, oral or visual.

SIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_

**TEACHER COMMENTS:**

**TEACHER DECLARATION:** *(check box before signing)*

- ☐ I can authenticate that the work was performed by the student as described.

SIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_

## SCORE SHEET

### PERSONAL ENGAGEMENT

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

MARK	ASPECT		
	Independent Thinking	Personal Significance	Initiative
<b>0</b>	The students report does not reach a standard described by the descriptors below.		
<b>1</b>	The evidence of personal engagement with the exploration is limited with little independent thinking, initiative or creativity.	The justification given for choosing the research question and/or the topic under investigation does not demonstrate personal significance, interest or curiosity.	There is little evidence of personal input and initiative in the designing, implementation or presentation of the investigation.
<b>2</b>	The evidence of personal engagement with the exploration is clear with significant independent thinking, initiative or creativity.	The justification given for choosing the research question and/or the topic under investigation demonstrates personal significance, interest or curiosity.	There is evidence of personal input and initiative in the designing, implementation or presentation of the investigation.
<b>Evidence</b> <i>Unlike other criteria, in personal engagement there just has to be a point of evidence against an aspect, it does not have to comprehensively meet all mark points.</i>	<p><b>Independent Thinking:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Research question is novel and/or unusual.</li> <li><input type="checkbox"/> Creativity in data collection methods or technique.</li> <li><input type="checkbox"/> Arguments and discussion show independent thinking, considering data, published sources and observations together in a unique way.</li> <li><input type="checkbox"/> Exceptional depth in the understanding of the limitations of the investigation or in the improvement or extension of the investigation</li> <li><input type="checkbox"/> Other</li> </ul> <p><b>Personal Significance:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Research question is based on authentic personal interest or curiosity.</li> <li><input type="checkbox"/> Explanation of personal significance is not contrived (for example, "I have always been interested in...")</li> <li><input type="checkbox"/> Research question is relevant to local issues, with explanation.</li> <li><input type="checkbox"/> Other:</li> </ul> <p><b>Initiative:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Topic is of suitable complexity.</li> <li><input type="checkbox"/> Novel or innovative approach to address the research question, with explanation.</li> <li><input type="checkbox"/> Method uses known protocol, but adapts them for good reason, with explanation.</li> <li><input type="checkbox"/> Novel or innovative approach to presentation of results, with explanation.</li> <li><input type="checkbox"/> Evidence of tenacity in collection of data</li> <li><input type="checkbox"/> Other:</li> </ul>		

## EXPLORATION

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	ASPECT			
	Research Question	Background	Methodology	Safety, Ethics and Environmental Issues
<b>0</b>	The students report does not reach a standard described by the descriptors below.			
<b>1-2</b>	The topic of the investigation is identified and the research question is somewhat relevant but not focused.	Background information provided for the investigation is superficial or of limited relevance and does not aid the understanding of the context of the investigation	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.	The report shows evidence of limited awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation.
<b>3-4</b>	The topic of the investigation is identified and the research question is relevant but not fully focused.	Background information provided for the investigation is mainly appropriate and relevant and aids the understanding of the context of the investigation.	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.	The report shows evidence of some awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation.
<b>5-6</b>	The topic of the investigation is identified and the research question is relevant and fully focused.	Background information provided for the investigation is entirely appropriate and relevant and enhances the understanding of the context of the investigation.	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.	The report shows evidence of full awareness of the significant safety, ethical or environmental issues that are relevant to the methodology of the investigation.

**Research Question:**

- ☐ The research question is clearly stated and precisely formulated.
- ☐ The research question is clearly biology in focus
- ☐ Research question includes clear and specific MV and RV (for example, "How does mass of sucrose affect..." NOT "how does amount of sugar affect...")
- ☐ Research question includes scientific name of organism, if relevant (*Genus species*).
- ☐ The research question is used to formulate a hypothesis predicting the relationship between the MV and RV.
- ☐ Hypothesis explanation is scientifically accurate

**Background:**

- ☐ The background sets the research question into context; need and importance are clear.
- ☐ Appropriate and relevant background biology of the entity being investigated is correctly described and explained.
- ☐ Background research includes scientific name of organism, if relevant (*Genus species*).
- ☐ Background research on the manipulated variable supports and explains manipulation of the variable.
- ☐ Background research on the responding variable indicates it is a good variable to measure response to manipulation.
- ☐ Research into research methods is well described and selected methods are justified.
- ☐ Known differences or relationships between variables are described.
- ☐ Citations relevant to the research question are used.
- ☐ Background information is used to form a hypothesis.
- ☐ Null and alternative hypothesis given if a statistical test of significance is used.
- ☐ If relevant, a predicted graph is used to illustrate the hypothesis

**Methodology:**

- ☐ MV correctly identified with units and levels, including how the levels were chosen.
- ☐ Minimum of five levels of MV over a suitable range (unless comparing populations or correlating variables without manipulation).
- ☐ RV (as directly recorded and/or calculated) correctly identified with units.
- ☐ RV is quantifiable
- ☐ Important CV identified, with the potential impact of each discussed. Validity measures and/or control group are not misunderstood as CV.
- ☐ List or photographs of apparatus and materials including size, graduation and uncertainty.
- ☐ Reference to preliminary trials, if completed.
- ☐ Method to change and measure MV fully detailed (including tools, units and uncertainty).
- ☐ Method for measuring RV data fully detailed (including tools, units and uncertainty).
- ☐ Sufficient repeats of RV measurement to ensure reliability and allow for statistics (typically 5 minimum)
- ☐ Sample size is appropriate for the investigation: typically, 5-15 is a very small sample, 15-30 is a small sample, 30+ is considered a large sample.
- ☐ If relevant, collection of data from other students or sources is explained and referenced.
- ☐ If sampling only a portion of a population, include the method for ensuring the sample was randomly selected.
- ☐ Method for maintaining and measuring CV is detailed (including tools, units and uncertainty).
- ☐ Method includes validity measures to ensure experimental measurements are valid and consistent.
- ☐ Method is clear, specific and easily replicated as described.
- ☐ Full citation of a published protocol (or elements of), if used.
- ☐ Photographs of experimental setup and data collection are included and referenced in the text.

**Safety, Ethics and Environmental Issues:**

- ☐ Safety issues fully considered, including safe handling of chemicals or equipment.
- ☐ Mindful of the reasonable consumption and use of chemicals and materials.
- ☐ Use of human consent forms if needed (i.e. for physiology experimentation).
- ☐ Ethical issues fully considered (including animal experimentation policy if needed).
- ☐ Environmental issues fully considered (such as disposal of chemicals).
- ☐ Attempts to minimize impact of the investigation on field sites.

## ANALYSIS

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	ASPECT			
	Raw Data	Data Processing	Impact of Uncertainty	Interpretation of Processed Data
0	The students report does not reach a standard described by the descriptors below.			
1-2	The report includes insufficient, relevant raw data to support a valid conclusion to the research question.	Some basic data processing is carried out but is either too inaccurate or too insufficient to lead to a valid conclusion.	The report shows evidence of little consideration of the impact of measurement uncertainty on the analysis.	The processed data is incorrectly or insufficiently interpreted so that the conclusion is invalid or very incomplete.
3-4	The report includes relevant but incomplete quantitative and qualitative raw data that could support a simple or partially valid conclusion to the research question.	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.	The report shows evidence of some consideration of the impact of measurement uncertainty on the analysis.	The processed data is interpreted so that a broadly valid but incomplete or limited conclusion to the research question can be deduced.
5-6	The report includes sufficient relevant quantitative and qualitative raw data that could support a detailed and valid conclusion to the research question.	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.	The report shows evidence of full and appropriate consideration of the impact of measurement uncertainty on the analysis.	The processed data is correctly interpreted so that a completely valid and detailed conclusion to the research question can be deduced.

# E V I D E N C E

## Raw Data:

- ☐ Data is collected for a minimum of 5 levels over a suitable range of the MV.
- ☐ Data is collected for a minimum of 5 repeats (for SD, more for correlations).
- ☐ Data is collected to show consistency of CV.
- ☐ Insightful and thorough qualitative data (maps, sketches, observations and/or photos with annotations).
- ☐ All data are recorded correctly and honestly.

## Data Processing:

- ☐ Per trial calculations to determine RV, if necessary (i.e. rate or percent change)
- ☐ Mean and standard deviations included, where appropriate.
- ☐ Calculations and/or significance tests appropriate to investigation are performed.
- ☐ Justification of the data processing method and statistical test.
- ☐ All calculations are mathematically correct.
- ☐ Statistical tests include full details including null and alternative hypothesis, DF, critical values and probability levels.
- ☐ Formula, Excel formula, worked example or screenshot of calculations given.
- ☐ Appropriate choice of graph with variables on the appropriate axis

## Impact of Uncertainty:

- ☐ Correct uncertainty reported for raw measurements.
- ☐ Uncertainties justified and/or explained.
- ☐ Correct and consistent number of digits throughout.
- ☐ Discussion of the size of uncertainties compared to the data collected.
- ☐ SD error bars included and labeled on graphs.

## Interpretation of Processed Data:

- ☐ Patterns in the data related to the RQ stated.
- ☐ Data points joined to illustrate the trend (unless comparing qualitative IV).
- ☐ Patterns and trends in data described with reference to graphs.
- ☐ Implications of the variation (i.e. SD) within the data discussed.
- ☐ Correct conclusion of significance is drawn.

## EVALUATION

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	ASPECT			
	Conclusion	Scientific Context	Limitations	Suggestions
0	The students report does not reach a standard described by the descriptors below.			
1-2	A conclusion is outlined which is not relevant to the research question or is not supported by the data presented.	The conclusion makes superficial comparison to the accepted scientific context.	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.	The student has outlined very few realistic and relevant suggestions for the improvement and extension of the investigation.
3-4	A conclusion is described which is relevant to the research question and supported by the data presented.	A conclusion is described which makes some relevant comparison to the accepted scientific context.	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.	The student has described some realistic and relevant suggestions for the improvement and extension of the investigation.
5-6	A detailed conclusion is described and justified which is entirely relevant to the research question and fully supported by the data presented.	A conclusion is correctly described and justified through relevant comparison to the accepted scientific context.	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.	The student has discussed realistic and relevant suggestions for the improvement and extension of the investigation.

# E V I D E N C E

## **Conclusion:**

- ☐ The conclusion refers back to the research question.
- ☐ The conclusion given is correct and clearly supported by the interpretation of the data.
- ☐ Key data from the analysis is given and trends in the data are discussed.
- ☐ Strengths of the investigation are considered
- ☐ The extent to which the hypothesis is supported by the data is explained (avoiding “proves”).
- ☐ The level of support (strong, weak, none or inconclusive) for the hypothesis/conclusion is identified, correct and justified.

## **Scientific Context:**

- ☐ Scientific explanation for the results is described.
- ☐ Comparison is made with published data and theoretical texts (with citations).

## **Limitations:**

- ☐ Appropriately addresses data collection errors.
- ☐ Discusses ways the investigative design may have introduced limitations.
- ☐ The variation in results is reported, showing the strength of the conclusion.
- ☐ The appropriateness of the apparatus in obtaining relevant data is commented on.
- ☐ Weaknesses in the methodology are discussed.
- ☐ The reliability of the data is commented on.
- ☐ The quantity of the data is commented on (both MV and RV).
- ☐ The precision, accuracy and uncertainty in the data is commented on.
- ☐ Outlier data or irregularities in the data are addressed and explained.
- ☐ Relative impact of data collection errors and limitations on results is explained

## **Suggestions:**

- ☐ Realistic and specific improvements are proposed.
- ☐ Improvements effectively and specifically address the limitations.
- ☐ Improvements are given which are possible within the context of a school laboratory.
- ☐ Provides possible ideas for future studies.
- ☐ Connects the research study to possible real-world applications.



## COMMUNICATION

This criterion assesses whether the investigation is presented and reported in a way that supports effective communication of the focus, process and outcomes.

MARK	ASPECT			
	Presentation	Structure	Focus	Terminology & Conventions
0	The students report does not reach a standard described by the descriptors below.			
1-2	The presentation of the Investigation is unclear, making it difficult to understand the focus, process and outcomes.	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.	The understanding of the focus, process and outcomes of the investigation is obscured by the presence of inappropriate or irrelevant information.	There are many errors in the use of subject specific terminology and conventions.
3-4	The presentation of the Investigation is clear. Any errors do not hamper understanding of the focus, process and outcomes.	The report is well structured and clear: the necessary information on focus, process and outcomes is present and presented in a coherent way.	The report is relevant and concise thereby facilitating a ready understanding of the focus, process and outcomes of the investigation.	The use of subject specific terminology and conventions is appropriate and correct. Any errors do not hamper understanding.
EVIDENCE	<p><b>Presentation:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> A consistent linguistic style is maintained throughout the writing (i.e. past tense, active voice).</li> <li><input type="checkbox"/> Minimal spelling or grammar errors are present.</li> <li><input type="checkbox"/> Legible and academically appropriate font style and size are used.</li> <li><input type="checkbox"/> Use of color in images or graphs is appropriate.</li> <li><input type="checkbox"/> Citations given for all material taken from sources.</li> <li><input type="checkbox"/> Does NOT include use of whole pages for titles, contents or blank data tables</li> </ul> <p><b>Structure:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> There are clear headings for each section, with consistent formatting.</li> <li><input type="checkbox"/> Paragraphs are logically organized and connected.</li> <li><input type="checkbox"/> Graphs, tables, images sequentially titled (i.e. "Figure 1...").</li> <li><input type="checkbox"/> Narrative text references figures and tables.</li> <li><input type="checkbox"/> Graphs, tables and images included as close as possible to its first reference.</li> <li><input type="checkbox"/> Tables and graphs do not break across pages.</li> <li><input type="checkbox"/> Parenthetical in-text references/citations are given in consistent format.</li> <li><input type="checkbox"/> A Works Cited List with consistent formatting is given at the end of the report.</li> <li><input type="checkbox"/> Sources are written in alphabetical order by author's last name.</li> <li><input type="checkbox"/> Paper is 6-12 pages in length.</li> </ul> <p><b>Focus:</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> All data, graphs and images are relevant to the RQ.</li> <li><input type="checkbox"/> All citations are relevant to the RQ.</li> <li><input type="checkbox"/> All analysis and discussion are relevant to the RQ.</li> </ul>			

**Terminology and Conventions:**

- ☐ If included, scientific name of organisms is formatted as *Genus species*
- ☐ Metric measurement units are used
- ☐ Table is well organized, with specific and clear title, headings and units.
- ☐ Data is tables is well organized either by groups or types of data.
- ☐ Table column headers are present and correct (IV in first column).
- ☐ Graph is well organized, with specific and clear title, labeled axis (with unit) and appropriately scaled axis.
- ☐ Images annotated to add information of value to the investigation.
- ☐ Avoid excessive use of jargon.
- ☐ Non-standard technical terms are explained and used in the correct context.