

- The internal assessment criteria
- Guidance for the use of the internal assessment criteria

Assessed student work

- Overview
- Investigation 1: The real and the apparent positions of the stars in Orion (Database and spreadsheet)
- Investigation 2: Investigating the lift force of a toy helicopter (Hands-on)
- Investigation 3: Obtaining Wien's displacement law of electromagnetic radiation (Simulation)
- Investigation 4: Investigating the force on an electric charge moving through a magnetic field (Simulation)
- **Investigation 5: Determining solar characteristics using planetary data (Database)**
- Investigation 6: Physical and mathematical models of the greenhouse effect (Hands-on and mathematical models)
- Investigation 7: Exploring the relationship between the pressure of the ball and coefficient of restitution (Hands-on)
- Investigation 8: The exponential nature of a bouncing ping-pong ball (Hands-on and modelling)
- Investigation 9: Investigation water depth pressure (Hands-on)
- Investigation 10: How temperature affects the vibration rate of a tuning fork (Hands-on)

Appendix

- Changes in the syllabus content

Investigation 5: Determining solar characteristics using planetary data (Database)

To view the various elements of this example, please use the icons at the side of the screen.

Note: The comments in the annotated examples match the labelling on teacher forms.

Examiner comments

	Personal engagement	Exploration	Analysis	Evaluation	Communication	Total
	x/2	x/6	x/6	x/6	x/4	x/24
1	4	3	1	4	13	

Personal engagement

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

The evidence of personal engagement with the exploration is limited with little independent thinking, initiative or creativity.

- 1
- 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.

Moderator's comment

Moderator's award

1

Although the student says he or she is interested in this research project and that he or she is most familiar with our solar system, this alone does not demonstrate genuine interest, independent thinking, creativity or initiative in an investigation that is more like a homework assignment than a research project. There is little evidence, perhaps no evidence, of personal input in the design, implementation or presentation of the investigation. Nonetheless, the student selected appropriate sources of data and relevant (if rather simplistic) solutions to the research. The inappropriate nature of this investigation will affect assessment under the exploration criterion.

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 Diploma Programme level. Where appropriate, this criterion also assesses awareness of safety, environmental, and ethical considerations.

Mark	Descriptor
1–2	<ul style="list-style-type: none"> • 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.
3–4	<ul style="list-style-type: none"> • The topic of the investigation is identified and a relevant but not fully focused research question is described. • 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*.

Moderator's award Moderator's comment

4 There are really three rather simplistic research questions in this investigation. The teacher should have guided the student to approach one of them in a more serious, in-depth and interesting way. The methodology is mostly mere calculations, much like a homework assignment. Only in the first research question did the student come up with an interesting method; namely, determining the mass of the sun using data from the various planets in our solar system. The context of this investigation is touched upon superficially, basically by describing the quantities in the relevant equations. The student was not aware of assumptions, accuracy and precision in the data, errors and uncertainties. These aspects are important when explaining a method or techniques for analysis. The moderator finds it hard to assess the exploration criterion although with some benefit of doubt, the final mark was awarded.

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	Descriptor
1–2	<ul style="list-style-type: none"> The report shows evidence of little consideration of the impact of measurement uncertainty on the analysis.
3–4	<ul style="list-style-type: none"> 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 processed data is interpreted so that a broadly valid but incomplete or limited conclusion to the research question can be deduced.

Moderator's comment

Moderator's award
3 Although the first research question made use of sufficient data, the other two used only a single value. This limitation does not qualify as sufficient data to support a detailed and valid conclusion. The first calculation was processed in a relevant and appropriate way (taking averages, although a graphical approach would have been preferred); the other two calculations were simply "plug-in-the-numbers" calculations. The lack of any awareness of assumptions, errors, uncertainties, precision, accuracy or even significant figures is a fault under the analysis criterion.

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	Descriptor
1–2	<ul style="list-style-type: none"> • A conclusion is outlined which is not relevant to the research question or is not supported by the data presented. • 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.
3–4	<ul style="list-style-type: none"> • A conclusion is described which makes some relevant comparison to the accepted scientific context.

Moderator's comment

Moderator's award	<p>The student correctly goes through the motions of comparing his or her calculated results with the values of the three research queries using (probably) the same authoritative database. The student even expressed the differences as a percentage, but no attempt was made to evaluate the quality of the data in terms of uncertainties or assumptions. The conclusions as such are properly described but only partially justified. There is no attempt at addressing the methodology or technique of this investigation and improvements or extensions have not been addressed; this was an influencing factor in deciding the final mark.</p>
1	

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	Descriptor
	<p>The presentation of the investigation is clear. Any errors do not hamper understanding of the focus, process and outcomes.</p>
3–4	<ul style="list-style-type: none"> • 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.
Moderator's award	Moderator's comment
4	<p>The student's writing style and report structure clearly communicate the focus, the process and the outcomes of the three investigations. The few vague comments and the</p>

few digressions do not hamper the expression of the research investigation. The weakness of this internal assessment does not lie with communications but rather with scientific interest.



[Student work \(PDF\)](#)



[Annotated student work \(PDF\)](#)



[Examiner comments](#)

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