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Physics 2025 v1.2

IA2: Sample assessment instrument

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

Student name	sample only
Student number	sample only
Teacher	sample only
Issued	sample only
Due date	sample only

Marking summary

Criterion	Marks allocated	Provisional marks
Forming	5	
Finding	5	
Analysing	5	
Interpreting and Evaluating	5	
Overall	**20**	

Conditions

Technique	Student experiment
Unit	Unit 3: Gravity and electromagnetism
Topic/s	Topic 1: Gravity and motion Topic 2: Electromagnetism
Duration	Approximately 10 hours of class time
Mode / length	Written: up to 2000 words
Individual / group	Individual
Other	Students use a practical or simulation performed in class as the basis for their methodology and research question.
Resources	School science laboratory and library (online: internet and school intranet, databases, journals)

Context

You have completed the following practicals in class:

- conduct an experiment to determine the horizontal distance travelled by an object projected at various angles from the horizontal
- conduct an experiment to investigate the force acting on a conductor in a magnetic field
- conduct an experiment to investigate the strength of a magnet at various distances.

Task

Modify (i.e. refine, extend or redirect) an experiment relevant to Unit 3 subject matter to address your own related hypothesis or question.

You may use a practical performed in class, a related simulation or another practical related to Unit 3 (as negotiated with your teacher) as the basis for your methodology and research question.

To complete this task, you must:

- identify an experiment to modify
- develop a research question to be investigated
- research relevant background scientific information to inform the modification of the research question and methodology
- conduct a risk assessment and account for risks in the methodology
- conduct the experiment
- collect relevant qualitative data and/or quantitative data to address the research question
- process and present the data appropriately
- analyse the evidence to identify trends, patterns or relationships
- analyse the evidence to identify uncertainty and limitations
- interpret the evidence to draw conclusion/s to the research question
- evaluate the reliability and validity of the experimental process
- suggest possible improvements and/or extensions to the experiment
- communicate findings in an appropriate scientific genre, e.g. report, poster presentation, journal article, conference presentation.

You may collaborate with other students when:

- identifying an experiment
- developing a research question
- conducting a risk assessment
- conducting the experiment
- collecting data.

Checkpoints

☐ Term 2, Week 3: Select experiment and identify proposed modifications

☐ Term 2, Week 4: Perform experiment and process data

☐ Term 2, Week 6: Analyse and evaluate evidence

☐ Term 2, Week 7: Submit draft

☐ Term 2, Week 9: Submit final response

Authentication strategies

- You will be provided class time for task completion.
- You will provide documentation of your progress at indicated checkpoints.
- Your teacher will collect and annotate a draft.
- You will use plagiarism-detection software to submit your response.
- You must acknowledge all sources.
- Your teacher will compare the responses of students who have worked together in groups.

Scaffolding

The response must be presented using an appropriate scientific genre (i.e. scientific report) that contains:

- a research question
- a rationale for the experiment
- reference to the initial experiment and identification and justification of modifications to the methodology
- raw and processed qualitative data and/or quantitative data
- analysis of the evidence
- conclusion/s based on the interpretation of the evidence
- an evaluation of the methodology and suggestions of improvements and extensions to the experiment
- a reference list.

Example of how a practical could be modified to develop a research question

Practical that will be modified: Conduct an experiment to investigate the parallel component of the weight of an object down an inclined plane at various angles.

Research question: What is the relationship between the angle of inclination and the magnitude of the frictional force for a given rectangular-based wooden object on a given wooden surface?

Developing the research question:

Steps	Details
Identify the independent variable to be investigated.	Angle of inclination.
Identify the dependent variable.	Magnitude of the frictional force acting parallel to the inclined surface.
Identify the methodology to be used.	A rectangular wooden object will be placed on an inclined plane. The angle of inclination will be modified and the parallel component of the object's weight will be measured using a data-logger force meter. This measured force will be subtracted from the theoretically expected value of the parallel-to-the-surface component of the weight to determine the magnitude of the frictional force acting parallel to the inclined surface.
Draft research questions.	What is the relationship between angle of inclination and the frictional force on an inclined surface?
Present research question to teacher for approval.	What is the relationship between the angle of inclination and the magnitude of the frictional force for a given rectangular-based wooden object on a given wooden surface?

Note: You cannot use this sample research question for your experiment.

Instrument-specific marking guide (IA2): Student experiment response (20%)

Forming	Marks
The student response has the following characteristics:	
• a considered rationale for the experiment • justified modifications to the methodology • a specific and relevant research question • a methodology that enables the collection of sufficient and relevant data • appropriate use of genre and referencing conventions	4–5
• a reasonable rationale for the experiment • feasible modifications to the methodology • a relevant research question • a methodology that enables the collection of relevant data • use of basic genre and referencing conventions	2–3
• a vague or irrelevant rationale for the experiment • inappropriate modifications to the methodology • an inappropriate research question • a methodology that causes the collection of insufficient and irrelevant data • inadequate use of genre and referencing conventions.	1
The student response does not match any of the descriptors above.	0

Finding	Marks
The student response has the following characteristics:	
• considered management of risks/ethical issues/environmental issues • collection of sufficient and relevant raw data • fluent and concise use of scientific language and representations	4–5
• management of risks/ethical issues/environmental issues • collection of relevant raw data • competent use of scientific language and representations	2–3
• inadequate management of risks/ethical issues/environmental issues • collection of insufficient and irrelevant raw data • simplistic use of language and representations.	1
The student response does not match any of the descriptors above.	0

Analysing	Marks
The student response has the following characteristics:	
• correct and relevant processing of data • thorough identification of relevant trends/patterns/relationships • thorough and appropriate identification of the uncertainty and limitations of evidence	4–5
• basic processing of data • identification of obvious trends/patterns/relationships • basic identification of uncertainty and/or limitations of evidence	2–3
• incorrect or irrelevant processing of data • identification of incorrect or irrelevant trends/patterns/relationships • incorrect or insufficient identification of uncertainty and limitations of evidence.	1
The student response does not match any of the descriptors above.	0

Interpreting and Evaluating	Marks
The student response has the following characteristics:	
• justified conclusion/s linked to the research question • justified discussion of the reliability and validity of the experimental process • suggested improvements and extensions to the experiment that are logically derived from the analysis of evidence	4–5
• reasonable conclusion/s relevant to the research question • reasonable description of the reliability and/or validity of the experimental process • suggested improvements and/or extensions to the experiment that are related to the analysis of evidence	2–3
• inappropriate or irrelevant conclusion/s • cursory or simplistic statements about the reliability and validity of the experimental process • ineffective or irrelevant suggestions.	1
The student response does not match any of the descriptors above.	0