Student's Name	*First:*	*Family:*	
Title of Assessment	Investigating Resistance	Criteria assessed: B & C	
Date Due		Teacher	

Criterion B: Inquiring and designing

Level awarded …….

Strand	Level 1/2	Level 3/4	Level 5/6	Level 7/8
Problem	**state** a problem or question to be tested by a scientific investigation	**outline** a problem or question to be tested by a scientific investigation	**describe** a problem or question to be tested by a scientific investigation	**explain** a problem or question to be tested by a scientific investigation
Hypothesis	**outline** a testable hypothesis	**formulate** a testable hypothesis **using scientific reasoning**	**formulate and explain** a testable hypothesis **using scientific reasoning**	**formulate and explain** a testable hypothesis **using correct scientific reasoning**
Variables	**outline** the variables	**outline** how to manipulate the variables, and **outline** how **relevant data** will be collected	**describe** how to manipulate the variables, and **describe** how **sufficient, relevant data** will be collected	**explain** how to manipulate the variables, and **explain** how **sufficient, relevant data** will be collected
Design scientific investigations	**design** a method, **with limited success**	design a **safe method** in which he or she **selects materials and equipment**.	design a **complete and safe method** in which he or she selects **appropriate materials and equipment**.	**design** a **logical, complete and safe method** in which he or she **selects appropriate materials and equipment**.

Criterion C: Processing and evaluation

Level awarded …….

Strand	Level 1/2	Level 3/4	Level 5/6	Level 7/8
Data presentation and processing	**collect and present** data in numerical and/or visual forms	**correctly collect and present** data in numerical and/or visual forms	**correctly collect, organize and present** data in numerical and/or visual forms	**correctly collect, organize, transform and present** data in numerical and/ or visual forms
Data interpretation and conclusion	**interpret** data	**accurately interpret** data and **explain** results	**accurately interpret** data and **explain** results **using scientific reasoning**	**accurately interpret** data and **explain** results **using correct scientific reasoning**
Validity of the hypothesis	**state** the validity of a hypothesis based on the outcome of a scientific investigation	**outline** the validity of a hypothesis based on the outcome of a scientific investigation	**discuss** the validity of a hypothesis based on the outcome of a scientific investigation	**evaluate** the validity of a hypothesis based on the outcome of a scientific investigation
Validity of the method	**state** the validity of the method based on the outcome of a scientific investigation	**outline** the validity of the method based on the outcome of a scientific investigation	**discuss** the validity of the method based on the outcome of a scientific investigation	**evaluate** the validity of the method based on the outcome of a scientific investigation
Improvements and extensions	**state** improvements or extensions to the method.	**outline** improvements or extensions to the method that would benefit the scientific investigation.	**describe** improvements or extensions to the method that would benefit the scientific investigation.	**explain** improvements or extensions to the method that would benefit the scientific investigation.

Investigating electrical resistance

Global Context:

Statement of inquiry:

Electrical resistance is both good and bad. It is good because electrical resistance has heating effect which allows us to use electricity for heat and light. It is bad because it causes energy loss when electricity is being transmitted over distances.

Being able to understand the properties of electrical resistance allows us to have better control of electric currents and its application. Hence, this investigation aims for you to have a better understanding of electrical resistance.

Your tasks are

- ✓ to design and carry out an investigation on a factor that affects the electrical resistance of one of the following:
  - putty (playdoh)
  - conducting paper
  - a wire at different temperatures
  - an LDR
  - an ionic solution.
- ✓ to determine the relationship between your chosen factor and electrical resistance.
- ✓ to show evidence whether the substance/component investigated is ohmic or not.
- ✓ to write a scientific report of your investigation. The written report will be assessed using MYP criteria B and C.

Note: Some of these investigations may require you to use some Physics app which you may need to download to your smart phone. Two apps that are useful are *Phyphox* and *Physics Toolbox.* They both have the Android and OS versions. They are both easy to use. *Phyphox* has some investigations in their website.

Report writing. You will have roughly 2 weeks to write the report.

1. You will work independently in out-of-class time to analyse the data and write a report.
   a. You must organize yourself so that you do NOT write everything the night before the deadline.
   b. You will be assessed on how well your investigation report compare against the Assessment Criteria: **B** (*Inquiring and designing*) and **C** (*Processing and evaluating*). *See page 1 for details of the assessment criteria.*
   c. See the checklist on page 3. You are advised to use the same headings for your investigation report.
   d. Your report must have the following format:
      - Arial 11 pt font
      - 1 inch or 2.5 cm margins
      - do not exceed 10 pages.
   e. You will submit an electronic copy (doc/docx/pdf) of your report to Turnitin.com on or before the due date.
2. On the due date, you must hand-in a hard copy your report **and** this instruction packet.

√	**Investigation Check List Grade 9 and 10 Science**
Aim:	*Criterion B Inquiring and Designing*
	State a clear focused problem or research question that links the independent and dependent variables.
	Give a brief explanation of how you intend to identify the link between these variables.
Hypothesis:	*Criterion B Inquiring and Designing*
	Formulate a testable hypothesis that describes how you expect the dependent variable to be affected by changes to the independent variable. You will need to use terms like "proportional","directly proportional" or "exponential" etc.
	Justify your hypothesis with a scientific explanation.
	Sketch expected graphical outcome. If appropriate discuss expected gradient or area. [include references]
Variables:	*Criterion B Inquiring and Designing*
	State the independent variable (variable you are changing). Explain how it will be changed. Give range of values with units.
	State the dependent variable (the variable you are measuring). Give units and explain how it will be measured.
	Note all other possible variables that will need to be controlled to ensure the experiment is "fair". You should explain how and why each of these variables needs to be controlled.
Materials/Equipment and Diagrams:	*Criterion B Inquiring and Designing*
	The materials list should be bullet point with numbers/volumes/masses of the materials/equipment required.
	The labeled diagram should be simple and well drawn. (ruler/pencil). The diagram can help with clarifying the method.
Method:	*Criterion B Inquiring and Designing*
	The method must have numbered points and be easily followed by another student to achieve similar results/conclusion.
	Do not say "Gather all the equipment...."
	The variables/diagram/method descriptions should combine to describe how the data is collected and processed and should allow for collecting an appropriate amount of data.
	Outline any safety considerations in your experiment.
	Explain how sufficient, relevant data will be collected and how it will be processed.
Results Table: see handout	*Criterion C Processing and evaluating*
	The data table should: have a title (see aim), be fully labeled with column headings and units. It should be neatly presented. Table headings and units should not be repeated within a table. Column 1 should be independent variable.
	The table should have a "mean average column" for multiple data entry.
	An obvious anomalous trial outcome can be circled and ignored for inclusion in the mean average calculation.
Graphs: see handout	*Criterion C Processing and evaluating*
	Graphs should: have a title (see Aim), be as large as possible to ensure less gradient error, have clearly labeled axis with units, points drawn as X or ⊙
	Draw line of best fit which could be a smooth curve, a straight line (use ruler) or a combination of these.
	Usually the independent variable would be drawn on the 'x' axis.
	Any gradient or area calculations should be done on the graph.
Conclusion:	*Criterion C Processing and evaluating*
	Describe the trend, pattern or relationship you get from your graph.
	Can you determine a quantitative relationship between your independent and dependent variables (use graph)?
	Can you derive a formula for the relationship?
	Draw a clear conclusion based on the correct interpretation of your data.
	Explain your conclusion using scientific reasoning. [include references]
	Do your results agree with the scientific explanation of your hypothesis?
	Identify anomalous results and possible reasons. (this would include a discussion on controlled variables.)
Evaluation of the Method:	*Criterion C Processing and evaluating*
	Evaluate the validity of the hypothesis based on the outcome of the investigation.
	Evaluate the validity of your method based on the outcome of your investigation.
	Explain improvements to the method that would benefit the investigation.
	Explain extensions to the investigation that would benefit the investigation.
	Write a paragraph explaining how your investigation relates to the statement of inquiry.