



Universiti Teknologi MARA  
Fakulti Sains Gunaan

## A Physical Science Activity

Name: \_\_\_\_\_ HP: \_\_\_\_\_ Final Lab Exam:

### STUDENT ACTIVITIES

In a group of not more than 3, you will spend about 30 minutes brainstorming and planning on how you will do the investigation to answer each of the research questions. At the end of the planning session, you will describe your investigation methods and data analysis techniques to your lab instructor and convince him that your method is systematic and can be implemented to answer the research questions.

#### Brainstorming and Planning Meeting: (30 minutes)

- How will you answer your question?
- What are the materials you need?
- How much materials do you need?
- What are the instruments you need?
- What are the variables you will control?
- What are the independent and dependent variables?
- Who will take what data?
- How will you organize the data?
- What is the most efficient way of collecting and organizing the data?
- What will you do to the data to form conclusions?
- How will you present the data to clearly show your conclusions?

#### Perform the investigation: (One hour)

Once your lab instructor gave you the green light, you will proceed to perform your investigation. You have to collect, organize and analyze data (including the error analysis) all at once in order to save time. All investigations must be completed in 1 hour. Hence, the group tasks for each group member must be clearly identified during the planning session. (Hint: Excel).

#### Class Presentation: (80 minutes)

Upon completion of the activity, each group will be given 5 minutes to present the method, result and conclusion of their investigation. Each member of the group will have to present according to the agreed tasks. Members in the audience given 2 minutes to seek for clarification or even scrutinize the findings and conclusion of the investigation. Your conclusion is based on the question you answer. (Copy your completed EXCEL file to the presentation laptop before presentations starts.)

#### Evaluate Your Results & Conclusion: (10 minutes)

As a group, evaluate the feedback and suggestions given during your presentation.

- How can you make your argument more convincing?
- Do you need a new experimental design? New data?
- New ways to analyze and present the data you took?
- New arguments in support of your conclusions?

#### Grading:

You will be graded based on both your journal log and your presentation.

The presentation will be scored by groups in the audience (peers) and by the lab instructor based on *practical work (rubrics follow the achievement of the 5 tasks in the introduction)* and the teamwork.

The journal will be scored based on

1. **Thoroughness:** Could an absent student understand what you did by reading the log? Could they follow the route you took towards making sense – the dead-ends you tried, reasons for ditching ideas, reasons for selecting ideas, problems you ran across? Did you use vocabulary that the class has defined?
2. **Persuasiveness.** Does your data support your conclusion? Did you determine and take into consideration your limitations in measurement and how well you know your data?
3. **Evaluation:** Do you have concrete suggestions for how you could improve each activity in the lab? Did your evaluation build on information from other groups during the presentation?

#### **Rubrics for Practical Skills & Teamwork**

Your practical tasks are: (the rubrics for practical tasks will be based on achievement of these tasks)

1. Propose experimental methods to answer the questions.
2. Identify the control, independent and dependent variables.
3. Setup the experiment, collect and organize data for the investigations.
4. Transform your data, graph the data using EXCEL (best if you plot ALL data on the same graph) & perform the necessary analysis.
5. Conclude by using your results to answer the research questions.

CREATED BY ASSOC. PROF. DR JAAFAR IANTAN aka Dr JJ. <http://drjj.uitm.edu.my>. Initial Draft copyright DrJJ-FSG-UiTM, April 2011.

<b>RUBRICS FOR ASSESSING LABORATORY PRACTICAL EXAM AND LAB-RELATED ASSESSMENT TASKS</b>						
CRITERIA		STANDARDS				
		5	4	3	2	1
PRACTICAL SKILLS	METHOD	All of the following were CLEARLY described: The steps or strategies used in sample preparation, the measurement tools selected, the experimental setup, the measurement or data collection techniques employed, the precautionary measures taken, the independent variables and dependent variables chosen.	Four of the following were clearly described and the other was disorganised: The steps or strategies used in sample preparation, the measurement tools selected, the experimental setup, the measurement or data collection techniques employed, the precautionary measures taken, the independent variables and dependent variables chosen.	Three of the following were clearly described while the others were quite disorganised.: The steps or strategies used in sample preparation, the measurement tools selected, the experimental setup, the measurement or data collection techniques employed, the precautionary measures taken, the independent variables and dependent variables chosen.	Most of the following were NOT CLEARLY described. :The steps or strategies used in sample preparation, the measurement tools selected, the experimental setup, the measurement or data collection techniques employed, the precautionary measures taken, the independent variables and dependent variables chosen.	Sample preparation strategies, measurement tools selected, the experimental setup, the measurement or data collection techniques employed, precautionary measures taken, independent and dependent variables chosen were NOT described or minimally described.
PRACTICAL SKILLS	DATA	Data collected is relevant and sufficient to answer the question. Data was tabulated in EXCEL. Each column was labeled with the appropriate quantity, units and prefixes (if required).	Data collected is relevant and sufficient to answer the question. Data was tabulated in EXCEL. Some columns were NOT labeled with the appropriate quantity, units and prefixes (if required).	Data collected is relevant and sufficient to answer the question. Data was tabulated in EXCEL. Columns were NOT labeled with the appropriate quantity, units and prefixes (if required).	Data collected is relevant and but NOT sufficient to answer the question. Data was tabulated in EXCEL. Columns were NOT labeled with the appropriate quantity, units and prefixes (if required).	Data collected was NOT relevant and NOT sufficient to answer the question. Data was tabulated in EXCEL. Columns were NOT labeled with the appropriate quantity, units and prefixes (if required).
PRACTICAL SKILLS	ANALYSIS	All collected data was transformed. Equation used to transform data is CLEARLY indicated in the cells. Data or transformed data is graphed where appropriate with the axis CLEARLY labeled along with the units and prefixes (if needed). Slope of initial graph, area under the graph, regression or best fit including regraphing of slopes obtained from each data point or other appropriate information is obtained/calculated and CLEARLY shown.	All collected data was transformed. Equation used to transform data was CLEARLY indicated in the cells. Data or transformed data was graphed where appropriate with the axis CLEARLY labeled along with the units and prefixes (if needed). Slope of initial graph, area under the graph, regression or best fit including regraphing of slopes obtained from each data point or other appropriate information is obtained/calculated.	All collected data was transformed. Equation used to transform data is CLEARLY indicated in the cells. Data or transformed data was graphed where appropriate but the axis, units and prefixes (if required) were NOT labeled. Slope of initial graph, area under the graph, regression or best fit including regraphing of slopes obtained from each data point or other appropriate information was NOT obtained/calculated.	All collected data was transformed. Equation used to transform data is CLEARLY indicated in the cells. Data or transformed data was NOT graphed. Slope of initial graph, area under the graph, regression or best fit including regraphing of slopes obtained from each data point or other appropriate information was NOT obtained/calculated.	Collected data is NOT transformed.
PRACTICAL SKILLS	Conclusion	Conclusion is EXCELLENT and derived from the collected and analysed data and not from other sources. Conclusion CLEARLY answers the research questions or problem statement/s.	Conclusion is GOOD and derived from the collected and analysed data and not from other sources and directly answer the research questions or problem statement/s.	Conclusion is GOOD and derived from the collected and analysed data and not from other sources but did not directly answering the research questions or problem statement/s.	Conclusion is derived from the collected and analysed data but is NOT answering the research questions or problem statement/s.	No attempt was made to conclude. Research questions were not answered.
Teamwork		Team showed great cohesion and interaction. Team members shared the tasks equally and utilizing abilities of each team member. Tasks were completed on time and with great results.	Team showed great cohesion and interaction. Team members did not share the tasks equally and did not utilize abilities of each team member. Tasks were completed on time and with good results.	Team showed good cohesion and interaction. Team members did not share the tasks equally and did not utilize abilities of each team member. Tasks were completed on time with satisfactory results.	Team demonstrated some cohesion and interaction. Most work was done by only 1 member of the team. Tasks were completed on time but with unsatisfactory results.	Team showed poor cohesion and poor interaction. Only 1 person did all the work. Tasks were NOT completed.