PA Experimental Design Rubric for 2022 State Tournament

(Note: The maximum points available for each task are shown.)

School:_____ **Team#**_____

Part I – Design and Construction of the Experiment (65 pts)

A. Statement of the Problem (2 pts)

②　①　⓪　Statement addresses the experiment including variables (Not a yes/no question)

B. Hypothesis (6 pts)

②　①　⓪　Statement predicts a relationship between the independent and dependent variables

②　①　⓪　Statement gives specific direction to the prediction(s) (i.e., a stand is taken)

②　①　⓪　A rationale is given for the hypothesis.

C. Variables (20 pts)

a. Independent (IV) & Dependent (DV) Variables (12 pts)

④　③　②　①　⓪　IV Correctly identified & defined

④　③　②　①　⓪　Levels of IV given

④　③　②　①　⓪　DV Correctly identified & defined

b. Controlled Variables (CV) & Constants (8 pts)

②　①　⓪　First CV identified & explained

②　①　⓪　Second CV identified & explained

②　①　⓪　1st Constant identified & explained

②　①　⓪　2nd Constant identified & explained

D. Experimental Control (Standard of Comparison) (4 pts)

②　①　⓪　SOC logically identified for the experiment

②　①　⓪　Reason given for selection of SOC

E. Materials (4 pts)

③　②　①　⓪　All listed and quantified with instrument precision

①　⓪　No extra materials are listed

F. Procedure and Set-up Diagrams (14 pts)

②　①　⓪　Procedure is presented in list form

②　①　⓪　Procedure is in a logical sequence

②　①　⓪　Steps for repeated trials are included

②　①　⓪　Multiple diagrams of setup are provided

②　①　⓪　All diagrams are appropriately labeled

④　③　②　①　⓪　Procedure detailed enough to repeat experiment accurately

G. Qualitative Observations (5 pts)

③　②　①　⓪　Observations throughout the procedure

②　①　⓪　Observations about the results provided

H. Quantitative Data - Data Table (10 pts)

②　①　⓪　All raw data is provided

②　①　⓪　Condensed data table with only the data to be graphed is provided

②　①　⓪　Tables and columns labeled properly

②　①　⓪　All data has units

②　①　⓪　Example calculations for derived variables are given

(revised 3/20//22)

Part II – Data, Analysis and Conclusions (68 pts)

I. Graph (12 pts)

④　③　②　①　⓪　Appropriate Graph is provided

④　③　②　①　⓪　Graph properly titled & labeled

④　③　②　①　⓪　Appropriate scale & units

J. Statistics (16 pts)

④　③　②　①　⓪　Statistics of Central Tendency used (ex. best fit, median, mode, mean, or percent error)

④　③　②　①　⓪　One accurate example given for above statistic with units

④　③　②　①　⓪　Statistics of variation are included (ex. min, max, range, standard deviation, or relative deviation)

④　③　②　①　⓪　One accurate example of each statistic with units

K. Significant Figures (6 pts)

②　①　⓪　Data is reported using correct significant figures

②　①　⓪　Graph completed using correct significant figures

②　①　⓪　Statistics are reported using correct sig figs

L. Analysis of Claim/Evidence/Reason (CER) (12 pts)

②　①　⓪　**Precision** Claim completed logically (i.e., precise, not precise)

②　①　⓪　Evidence using statistics completed logically

②　①　⓪　Reasoning completed logically

②　①　⓪　**Data Trend** Claim completed logically

②　①　⓪　Evidence using statistics completed logically

②　①　⓪　Reasoning completed logically

M. Possible Experimental Errors (8 pts)

④　③　②　①　⓪　1st specific error is identified and the effect on results discussed.

④　③　②　①　⓪　2nd specific error is identified and the effect on results discussed.

N. Conclusion (8 pts)

②　①　⓪　Hypothesis is re-stated

②　①　⓪　Hypothesis Claim completed logically

②　①　⓪　Hypothesis Evidence completed logically

②　①　⓪　Hypothesis Reasoning completed logically

O. Applications & Recommendations for Further Use (6 pts)

②　①　⓪　Suggestions to improve the experiment as performed

②　①　⓪　Suggestions for practical applications of experiment

②　①　⓪　Suggestions for future experiments

Point Total: _____/133

Deduction multiplier(s): _____

Non-clean up (0.95)

Off topic (0.75)

Not following PA rubric (0.90)

Non-lab (0.25)

Final Score: _____