EXPERIMENTAL DESIGN B

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

1. **DESCRIPTION:** Participants will be assessed on the ability to design, conduct, and report the findings of an experiment entirely on-site.

   A TEAM OF UP TO: 3 **APPROXIMATE TIME:** 50 minutes

   EYE PROTECTION: C **CALCULATOR:** Class II

2. **EVENT PARAMETERS:**
   a. Participants must bring goggles and writing utensils. Experiments will not require any other safety equipment.
   b. Teams may bring one timepiece, one linear measuring device, and one Class II calculator. Teams CANNOT use any of these as part of the experiment - they must only be used for their intended function.
   c. The Event Supervisor will provide each team with identical sets of materials either at a distribution center or in an individual container.
   d. The Event Supervisor must provide the 2-part student report form posted on the event page at soinc.org for teams to record their experimental information and data. This student report form must be printed single-sided to facilitate separation by individual team members.

3. **THE COMPETITION:**
   a. The teams must design, conduct, and report the findings of an experiment conducted on site that addresses the assigned question/topic area provided by the Event Supervisor. The assigned question/ topic area should be the same for all teams and allow the participants to conduct experiments involving relationships between independent and dependent variables (i.e., height vs. distance).
   b. During the first 20 minutes of the event, participants will receive the assigned question/topic area, materials, and Part I of the student report form. Participants will focus on designing and conducting their experiment.
   c. After the first 20 minutes, participants will receive Part II of the student report form and will focus on analyzing their experiment and reporting findings. Participants may continue experimenting throughout the entire event.
   d. The identity of the materials will be unknown until the start of the event.
   e. When a team finishes, all materials must be returned to the Event Supervisor including both parts of the student report form.

4. **SCORING:**
   a. High Score wins. Scoring will be done using the Experimental Design Checklist found on the Science Olympiad website (soinc.org).
   b. Points will be awarded depending upon the completeness of the response. Zero points will be given for no responses as well as illegible or inappropriate responses.
   c. Ties will be broken by comparing the point totals in these areas of the checklist in the following order:
      i. Analysis of Claim/Evidence/Reasoning
      ii. Procedure and Set-Up Diagrams
      iii. Variables
      iv. Data Table
      v. Graph
   d. Any participant not following proper safety procedures will be asked to leave the room and will be disqualified from the event.
   e. Any team not following clean-up procedures will have their final score multiplied by 0.95.
   f. Any team not addressing the assigned question/topic area will have their final score multiplied by up to 0.75 based on the extent to which the report deviates from the assigned topic.
   g. Any team not collecting data by conducting an experiment on-site or falsifying/making up fake data will have their final score multiplied by 0.25.

B

EXPERIMENTAL DESIGN B CHECKLIST

See General Rules, Eye Protection & other Policies on www.soinc.org as they apply to every event.

2027 Experimental Design Division B Checklist

(Note: The maximum points available for each task are shown. Consider using the electronic checklist on www.soinc.org)

Shaded cells are included only at the State/National levels.

Part I. Design and Construction of the Experiment (51 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 IV & DV
2 1 0	Statement gives specific direction to the prediction
2 1 0	A rationale is given for the hypothesis

C. Variables (15 pts)

a. Independent (IV) and Dependent (DV) Variables

3 2 1 0	IV correctly identified and operationally defined
3 2 1 0	Levels of IV given
3 2 1 0	DV correctly identified and operationally defined

b. Controlled Variables (CV)

2 1 0	1st CV correctly identified and relevant
2 1 0	2nd CV correctly identified and relevant
2 1 0	3rd CV correctly identified and relevant

D. Materials (4 pts)

2 1 0	All materials used are listed and quantified
2 1 0	No unused or extra materials are listed

E. Procedure and Set-Up Diagrams (13 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
3 2 1 0	Procedure detailed enough to repeat experiment accurately

F. Qualitative Observations (6 pts)

2 1 0	Observations about set-up provided
2 1 0	Observations about the procedure provided
2 1 0	Observations about the results provided

G. Quantitative Data - Data Table (5 pts)

3 2 1 0	All raw data provided with units and labels
2 1 0	Condensed data table with only the data to be graphed is provided, one sample calculation per derived variable

Part II. Data, Analysis, and Conclusions (55/67 pts)

H. Graph (12 pts)

4 3 2 1 0	Appropriate graph is provided
4 3 2 1 0	Graph properly titled and labeled
4 3 2 1 0	Appropriate scale and units included

I. Statistics (9/11 pts)

3 2 1 0	Statistics of Central Tendency used
2 1 0	One example calculation is given for each statistic with units, done on level of IV
2 1 0	Statistics of variation are included
2 1 0	One example calculation is given for each statistic with units, done on level of IV
2 1 0	Two additional accurately calculated statistics included

J. Possible Experimental Errors (6 pts)

3 2 1 0	1st specific error is identified & effect on results discussed
3 2 1 0	2nd specific error is identified & effect on results discussed

K. Analysis of Claim/Evidence/Reason (CER) (12/18 pts)

2 1 0	Data trend claim completed logically
2 1 0	Data trend evidence completed logically
2 1 0	Data trend reasoning completed logically
2 1 0	Outliers claim completed logically
2 1 0	Outliers evidence completed logically
2 1 0	Outliers reasoning completed logically
2 1 0	Variation claim completed logically
2 1 0	Variation evidence completed logically
2 1 0	Variation reasoning completed logically

L. Conclusion (8 pts)

2 1 0	Hypothesis is restated
2 1 0	Hypothesis claim completed logically
2 1 0	Hypothesis evidence completed logically
2 1 0	Hypothesis reasoning completed logically

M. Applications and Recommendations for Further Use (8/12 pts)

4 3 2 1 0	Suggestions to improve experiment with rationale provided
4 3 2 1 0	Suggestions for practical applications of experiment provided
4 3 2 1 0	Suggestions for future experiments are provided

# of 4s	# of 3s	# of 2s	# of 1s	# of 4s	# of 3s	# of 2s	# of 1s

Team Name

Team Number

Tiebreakers in Order:
K: CER
E: Procedure
C: Variables
G: Data Table
H: Graph

Multipliers:
0.95 Non Clean Up
Up to 0.75 - Off Topic
0.25 - Non Lab/Fake/Falsified Data

Total Score

Multiplier

Final Score

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