

EXPERIMENTAL DESIGN

DESCRIPTION: This event will determine a team's ability to design, conduct, and report the findings of an experiment actually conducted on site. Not conducting an experiment is a violation of the spirit of the event.

EVENT PARAMETERS: Students must bring safety goggles and a writing instrument. Students may also bring a timepiece, a ruler, and a non-programmable calculator.

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

1. Supervisors will provide teams with all the materials at a distribution center or in a container. The materials will be listed on the board or placed on a card for each team. Both the card and the container could be considered part of the materials. The identity of the materials is to remain unknown until the start of this event and will be the same for each team. The students must use at least two of the provided materials to design and conduct an experiment.
2. The event supervisor will assign a question or topic area that determines the nature of the experiment. The assigned question or topic area should be the same for all teams and allow students to conduct experiments involving relationships between independent and dependent variables (like height vs. distance).
3. The students will be given an outline (patterned after the scoring rubrics) to follow when recording/reporting their experiment.
4. When the teams are finished, all materials will be returned to the event supervisor along with all written materials. The content of the report must be clearly stated and legible.

SCORING: Scoring of the event will be done using the scoring rubric at the bottom of this page. Zero (0) points will be given for an inappropriate or for no response. Points will be awarded dependent upon the completeness of the response. Ties will be broken by comparing the point totals in the scoring areas in the following order: 1) Total points for variables, 2) Procedure, 3) Total Points for Analysis of Results, 4) Graph, 5) Data Table. Any student not following proper safety procedures will be penalized up to four points for each infraction. Any student not addressing the assigned question or topic area will be ranked behind those who do.

EXPERIMENTAL DESIGN REPORTING FORM/RUBRIC

1. Statement of Problem: Experimental Question (2 Points)
2. Hypothesis: Including prior knowledge that contributed to hypothesis (4 Points)
3. Variables:
 - Independent Variable: Factor being manipulated (3 Points)
 - Dependent Variable: Factor which responds (3 Points)
 - Constants: (Controlled Variables) Factors that are purposefully kept the same (4 Points)
4. Experimental Control: (Standard of Comparison) (3 Points)
5. Materials and Procedure: Including Diagrams (8 Points)
6. Qualitative Observations During Experiment & Summary of Results: (4 Points)
7. Data Table: (Including Use of Significant Figures Division C) (6 Points)
8. Graph(s): (6 Points)
9. Statistics: Div. B: Including the Average and other relevant statistic such as median, mode, range, or drawn in line of best-fit (2 Points). Div. C: Including a measure of central tendency (mean), a measure of variation (range or standard deviation), regression analysis (line of best-fit), and any other relevant statistics (4 Points)
10. Analysis of Results: Interpretation (4 Points) Division B; (10 Points) Division C
11. Possible Experimental Errors (3 Points)
12. Conclusion: Include why your results did or did not support the hypothesis: (4 Points)
13. Recommendations for Further Experimentation Based on Your Data & Practical Applications: (4 Points)



HINTS: 1. Statement of problem should not have a yes or no answer. It should be specific to the experiment being conducted and is not the same as the assigned topic area. 2. Experiments should consist of repeated trials. 3. The variables should be operationally defined. 4. Experiments should be simple and have only one independent and one dependent variable. Recommended Reference: Students and Research, Kendall Hunt, J. Cothron, R. Giese, R. Rezba, Kendall Hunt