

# Experimental Design B/C

## National SO Resources:

<https://www.soinc.org/experimental-design-c>

<https://www.soinc.org/experimental-design-b>

**Event Objective:** This event will determine a team's ability to design, conduct, and report the findings of an experiment actually conducted on site.

## Equipment Needs:

- Equipment for the experiments. You will need one kit per competing team, or one kit per team per hour if the items are reusable. Example experimental design objectives will be included at the end of this document.
- Red pens for scoring
- A stapler for students to put together their report at the end of the time period
- Enough blank copies of the scoring rubric (available from [www.soinc.org](http://www.soinc.org)) for every team
- **Students are allowed to bring the following:**
  - A measuring device (ruler, meter stick, etc.)
  - A timer
  - A non-graphing calculator

**Number of Volunteers Needed:** You are going to want several volunteers to help score the event and monitor the students during the competition period. ***This event is very time consuming to grade, but the rubric is very helpful. Be sure to train the volunteers on the rubric early in the day to ensure consistent scoring.***

- For the state tournament, you will be provided contact info for your volunteers and YESS team. It is required that you contact them prior to the tournament to relay any event-specific information.

**Prior to the Event:** Before the event, you need to determine the topic of the experiment that the students will complete. You are encouraged to pick a topic broad enough that several different variables could be tested. The topic must be the same for all teams and allow the participants to conduct experiments involving relationships between independent and dependent variables (rule 3a).

Once you have picked your topic, get the materials needed for the experiment organized and into groups of either one kit per team or one kit per team per hour if the items are reusable.

***Do not select experiments that use equipment/chemicals that require safety clothing as this is not allowed by the rules (rule 2).***

**Scoring of Individual Teams:** Scoring is done by the rubric available on [www.soinc.org](http://www.soinc.org). Ties are broken according to the following order, with high score winning the tiebreaker (rule 4d):

- Variables Section
- Procedure Section
- Analysis of Results of Section
- Graph Section
- Data Table Section

**Day of the Competition:** Set up the kits on separate tables for each team. Cover door windows and other windows with newspaper and masking tape to avoid teams competing later in the day from watching. No spectators are allowed. Consider using the following script:

- Welcome to Experimental Design.
- Listen carefully to the instructions I will describe for you.
- You will have 50 minutes to complete your assigned ED task. Read your instructions carefully. The event supervisors will write and announce the time remaining during the event.
- You must have vented safety goggles and a writing instrument. If you do not have vented safety goggles, understand that you would be disqualified at the state meet. (if have extra goggles or safety glasses, provide).
  - For state, we do not supply goggles or any equipment/materials to teams (unless you have enough to provide this to every team).
- You may also have a ruler, timer and a non-graphing calculator. You may not use cell phones for any reason.
- You will be given a packet of instructions and completion sheets. Make sure your Team Name/Number and your names are recorded on your packet.
- You will use this packet for all your write-ups. You may take apart your packet if helpful but please staple it back in the proper order when you are finished.
- Please write legibly; if I cannot read your writing, you may not receive the points you deserve for your work.
- If you have a question during the event, raise your hand and an event supervisor will come to you. Answers to any questions will be announced to all participants.
- If you do not collect data (dry lab) and do a write up without data, you cannot medal and will be scored lower than teams which did collect data.
- You must use at least two of the provided materials in your experiment.
- When I tell you to STOP, please stop all activities and writing.
- If I see any unsafe activities occurring, I will stop your team and instruct you to redesign your experiment.
- Make sure your Team Name/Number and your names are recorded on your packet.
- Please do NOT tell any other individuals or teams any information about this event after leaving.
- Are there any questions?

After the first session:

- Collect all answer sheets and make 100% sure team names/numbers are on each one. Staple packets in correct page order if students tore packet apart and students did not staple back together.

- Collect all leftover materials and hide from next group of students.
- Prepare room for next session.
- Review/scan the answer packets to get a sense of the responses.
- Using the rubric, grade write ups as time allows. Be as consistent as possible in scoring.

### **Scoring at End of Day:**

- Score the remaining write ups using the rubric.
- Have the second event supervisor review the scoring for consistency and fairness.
- If there is a tie, use tie breaking rules as described in rubric.
- Double check calculations and totals.
- Add up the scores and rank. School with most points is #1 rank.
- Put the scores onto the provided scorecard and take all completed reports and scorecard to scoring.

**10<sup>th</sup> Annual Boyceville Invitational**  
**Saturday, December 3, 2016**  
**Experimental Design - Division C**

You have 50 minutes to design, conduct, and report on the findings of an experiment related to inclined planes. The experiment must give you numerical data. Safety goggles are not needed for this experiment. You may use any of the materials that are listed below. *Not conducting an experiment is a violation of the spirit of the event.* Please do not disrupt others with your experiments! Your station must be cleaned up and the packet turned in at the end of the 50 minutes. Have fun and be creative!

You may use the following materials if you brought them:

- Calculator
- Ruler
- Timepiece

You may use any of these provided materials (but do not need to use all of them):

- One (1) marble
- Three (3) wooden blocks
- Three (3) feet of masking tape
- Three (3) popsicle sticks
- Five (5) paper clips
- Three (3) sheets of printer paper

**Important Notes:**

- Fill out the cover page and write your team number at the top of each page
- Additional paper for the report will be provided if needed
- Partial credit will be awarded. It is in your best interest to attempt every section.
- When you are done writing your lab report, staple pages together and hand the packet to an event

supervisor. Please staple the pages in the following order:

1. Cover Page
2. Lab Report

- Leave all unused materials neatly on the desk. Please throw away all trash.
- You will have 50 minutes for this event. You must stop writing when we call time.
- If you need any clarifications, please ask the event supervisors.
- Good Luck and Have Fun!

# Science Olympiad

**Experimental Design - Division C**

**10<sup>th</sup> Annual Boyceville Invitational  
December 3, 2016**

**School Name:** \_\_\_\_\_

**Team Number:** \_\_\_\_\_

**Student Names:** \_\_\_\_\_

\_\_\_\_\_

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**1. STATEMENT OF PROBLEM (4 Points)**

**2. HYPOTHESIS (8 Points)**

**3. VARIABLES**

**a. INDEPENDENT VARIABLE (6 Points)**

**b. DEPENDENT VARIABLE (6 Points)**

**c. CONTROLLED VARIABLES (8 Points)**

**4. EXPERIMENTAL CONTROL (STANDARD OF COMPARISON-SOC) (4 Points)**

**5. MATERIALS (6 Points)**

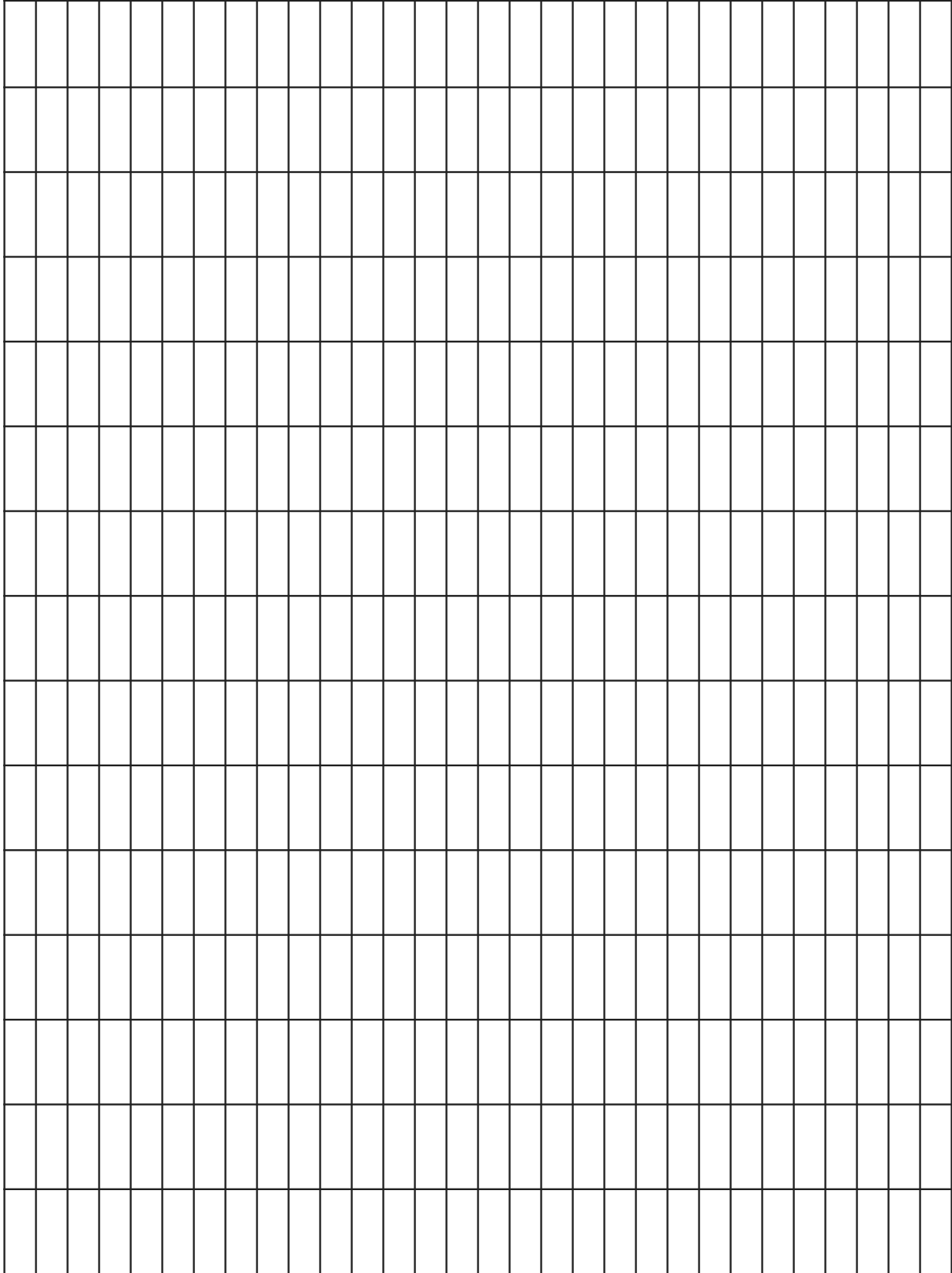
**6. PROCEDURE (12 Points)**



**7. QUALITATIVE OBSERVATIONS (8 Points)**

**8. DATA TABLE - QUANTITATIVE DATA (12 Points)**

**9. GRAPH(S) (10 Points)**





**11. ANALYSIS OF RESULTS (8 Points)**

**12. POSSIBLE EXPERIMENTAL ERRORS (6 Points)**

**13. CONCLUSION (8 Points)**

## 14. APPLICATIONS AND RECOMMENDATIONS FOR FURTHER USE (8 points)

### 9<sup>th</sup> Annual Boyceville Invitational Saturday, December 5, 2015 Experimental Design - Division C

You have 50 minutes to design, conduct, and report on the findings of an experiment related to paper airplanes. The experiment must give you numerical data. Safety goggles are not needed for this experiment. You may use any of the materials that are listed below. *Not conducting an experiment is a violation of the spirit of the event.* Please do not disrupt others with your experiments! Your station must be cleaned up and the packet turned in at the end of the 50 minutes. Have fun and be creative!

You may use the following materials if you brought them:

- Calculator
- Ruler
- Timepiece

You may use any of these provided materials:

- Five (5) Sheets of Construction Paper
- Five (5) Sheets of Standard Typing Paper
- Assorted Newspaper
- Five (5) Paperclips
- Up to 12 inches of masking tape
- Up to 10 staples
- Scissors can be used to cut but cannot be used in plane

### Important Notes:

- Fill out the cover page and write your team number at the top of each page
- Additional paper for the report will be provided if needed
- Partial credit will be awarded. It is in your best interest to attempt every section.
- When you are done writing your lab report, staple pages together and hand the packet to an event supervisor. Please staple the pages in the following order:
  1. Cover Page
  2. Lab Report
- Leave all unused materials neatly on the desk. Please throw away all trash.
- You will have 50 minutes for this event. You must stop writing when we call time.
- If you need any clarifications, please ask the event supervisors.
- Good Luck and Have Fun!

**8<sup>th</sup> Annual Boyceville Invitational**  
**Saturday, December 6, 2014**  
**Experimental Design - Division C**

You have 50 minutes to design, conduct, and report on the findings of an **experiment related to pendulums and simple harmonic motion**. The experiment must give you numerical data. Safety goggles are not needed for this experiment. You may use any of the materials that are listed below. ***Not conducting an experiment is a violation of the spirit of the event.*** Your station must be cleaned up and the packet turned in at the end of the 50 minutes. Have fun and be creative!

**You may use the following materials if you brought them:**

- Calculator
- Ruler
- Timepiece



**You may use any of these provided materials:**

- 5 Hex Nuts
- 5 Paperclips
- Your Table
- 3 Dixie Cups
- 10 Feet of Cotton String
- 5 Feet of Masking Tape
- 10 Popsicle Sticks

**Important Notes:**

- Fill out the cover page and write your team number at the top of each page
- Additional paper for the report will be provided if needed
- Partial credit will be awarded. It is in your best interest to attempt every section.
- When you are done writing your lab report, staple pages together and hand the packet to an event supervisor. Please staple the pages in the following order:
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