Problem No. 4:

Stack Attack
Introduction

For decades Odyssey of the Mind teams have creatively designed balsa wood structures that held weight while undergoing a variety of unique “stress tests.” Strategic thinking had to be applied in both creating and testing their solutions—from selecting who would build the structure, to picking a design, in developing a theme for the performance, and even when deciding the next weight to use when testing the structure. This year, the risk and reward for strategy has never been greater: teams will need to practice and know exactly how long it takes to stack — and unstack — weights. The reason? Teams will determine their maximum limit for score and “Attack the Stack” to add more weight.

A. The Problem

The team’s problem is to design, build, and test a single structure, made only of balsa wood and glue that will balance and support as much weight as possible. The team will test its structure by placing weight onto it, making a First Stack. The team may remove the weights from the First Stack and start a new round of weight placement to make a Second Stack. The team will present a performance that has a theme about “Attacking the Stack” that includes testing the structure and a team-created special effect device.

The creative emphasis of the problem is on the integration of placing the weights, attacking the stack in the theme, and the team-created special effect device.

The Spirit of the Problem is to design and build a structure of balsa wood and glue that is tested by placing weights onto it, removing them, and creating a second stack of weights for additional score. The weight placement and removal will be integrated into a performance with a theme about “Attacking the Stack” that includes a team-created special effect device.

B. Limitations (Italicized words/terms are defined in the 2015-2016 Odyssey of the Mind Program Guide.)

1. General Rules: Read the 2015-2016 Odyssey of the Mind Program Guide. This manual is updated each year and includes basic limitations for this problem and the forms required for competition. This problem cannot be solved without referring to the Program Rules section of the guide.

2. Problem Clarifications: The Odyssey of the Mind Program Guide explains the types of questions about the rules that will be clarified and the ways to submit those questions. General problem clarifications can be accessed at www.odysseyofthemind.com/clarifications/. Problem clarifications submitted after February 15, 2016, will not be answered. CCI may find it necessary to issue clarifications after that date, so continue to check for them after February 15 and before each competition.

3. The time limit for this problem is 8 minutes. This starts when the Timekeeper says, “Team begin” and includes setup, Style, and the presentation of the problem solution.

4. The cost limit for this problem is $145 (U.S.). The combined value of the materials used during the demonstration of the team’s solution, including Style, must not exceed this amount. The Odyssey of the Mind Program Guide explains the cost limit and lists items that are exempt from cost.

5. The team’s solution will be presented in an original performance that:
   a. includes a single structure made of only balsa wood and glue. All pieces of wood must be adhered to other pieces of wood.
   b. tests the structure by placing weights onto it to form Stack One, removing those weights and placing weights again to form Stack Two.
   c. includes a team-created special effect device.
   d. has a theme about “Attacking the Stack” that integrates placing and removing weights, and the special effect device.
6. The **structure**:
   a. must be a single solution that is designed and built by team members without any outside influence (see B18).
   b. must be made of only balsa wood and glue. It must not be artificially strengthened, and no other materials can be part of the structure.
   c. may be assembled using other items and/or devices; however, these must be removed before weigh-in at the competition.
   d. must weigh no more than 15 grams.
   e. must be a minimum of 8" (20.32 cm) in height when resting on the Tester base and supporting the Crusher Board (see Figure B) and another weight. Extension pieces used for meeting height limitations only are not allowed.
   f. must fit entirely within the perimeter of the Tester base without touching the corner supports of the Tester.
   g. must have an open area running the entire height that will accept a column that is 2" (5.1 cm) in diameter. Therefore, the opening in the structure must be greater than 2". This will be measured at weigh-in. The safety pipe must be in the opening of the structure during weight placement (see Figure A).

7. The **balsa wood** used in the structure:
   a. must come from only **commercially produced** strips of balsa wood with four-sided end cuts as described in B7b. No other type of wood or any variation of balsa wood may be used. Balsa wood may be purchased through [www.odysseyofthemind.com/shop/](http://www.odysseyofthemind.com/shop/) — any balsa purchased from here during the 2015-16 program year will be considered as being within limitations. Teams must provide an invoice from CCI that shows the purchase information including the date of the transaction.
   b. must have a rectangular cross section no greater than 1/8" wide x 1/8" deep (0.32 cm x 0.32 cm). Some commercial cuts vary, so the maximum allowed of either dimension is actually .135" (0.33 cm), which is slightly greater than 1/8".
   c. must be in strips at least 36" (0.91m) long when the team receives it.
   d. is not allowed to be hand-picked by anyone other than the team members. Team members may request wood to be from a commonly known grade, but no one else may sort and pick specific pieces.
   e. must be cut by the team. The only exceptions are the perpendicular end cuts of the original strip as defined in B7a & b.
   f. may be marked and/or colored. However, it cannot be artificially strengthened in any way.

8. If **glue** is used in the structure:
   a. it must be a commercial brand that has the word “glue,” “epoxy,” “cement,” or “adhesive” printed by the manufacturer on the tube, container, box, or accompanying material. More than one type of glue may be used.
   b. it must be used as purchased. That is, nothing may be added to it, nor may it be mixed with anything unless the manufacturer specifies that the ingredients, sold together, combine to form the glue.
   c. the use of an accelerant is considered artificial strengthening and is not allowed. Applying hot or cold air is the only allowed modification of the drying process.
   d. must only be used to adhere pieces of balsa wood together to form a single structure. Glue used only for connecting two or more pieces of balsa wood that are not adhered is not allowed.

9. Judgments dealing with measurements, weight, wood, the “open area” (see Figure A) and artificial strengthening will take place at the Weigh-In Site. Judges not associated with weigh-in may bring certain matters to the attention of the Weigh-In Judges. Penalties may be given before and/or after a team has competed.

10. **Placing the weights**:
    a. After the team places the crusher board onto the structure it can begin placing weights to make the First Stack. Rules for the First Stack:
        (1) If the structure supports the Crusher Board the team will begin weight-placement.
        (2) The team may remove weights at any time to make adjustments. Removed weights will not count for score unless they are placed back onto the stack and are supported by the structure.
        (3) The team will place weights onto the First Stack until it decides to stop, the structure breaks, or time ends. At this time the First Stack is considered completed.
        (4) When the First Stack is completed the team will signal the judges and audience by using an “Attack the Stack” effect from the team-created special effect device.
A judge will track and record the weight-held as each weight is placed onto the First Stack. Teams will receive score for half of the weight held in the First Stack.

If the team plans to create a Second Stack, it must remove all but the first weight placed on the Crusher Board in the First Stack after signaling the judges. (The Tournament Director will provide a designated area to place the removed weights.) If the structure breaks as the team removes weights from the First Stack, all of those weights will count for score as long as they were supported by the structure for 3 seconds.

b. If the structure is not broken, and time remains, the team may repeat weight-placement and create a Second Stack. Rules for the Second Stack:

1. Only the Crusher Board and bottom weight from the First Stack may be on the structure when starting the Second Stack.

2. Once all of the weights are removed, except the crusher board and bottom weight, the team will use a different effect from the special effect device to signal the judges and audience that it is starting a Second Stack. If there is no Second Stack attempt, the team can still use a second special effect in the performance for score.

3. After the second signal, the team can begin placing weights for the second time to qualify for score in D2a. Teams can use the weights they removed from the first stack or take from the original pile.

4. The maximum possible weight-held score for the Second Stack is two times the weight held in the First Stack. The judges will not stop weight placement if the Second Stack is greater than two times the weight held in the First Stack, but additional weight held will not count for score.

5. Placing weights to make the Second Stack will end when time ends or the structure breaks.

6. The team will receive 50% score for the total weight held for the First Stack and 100% of the score for the total weight held for the Second Stack. For example:

   First Stack weight held is 50 pounds = 25 pounds weight-held score.

   Therefore, the Second Stack’s maximum score can be 100 pounds. Fifty pounds held in the First Stack multiplied by two (50 x 2 = 100).

   The total combined maximum weight-held score would be 125 pounds — 1/2 of the First Stack’s 50 = (25) plus the weight held in the Second Stack = 100 (maximum possible in this example).

11. The team may begin testing the structure at any time during its 8-minute competition time.

12. The team must use only the weights and Tester supplied by the Tournament Director. These can be used only in the normal process of placing weights; for example, the weights cannot be used for Style, the Tester cannot be decorated, etc.

13. Team members must place weights one at a time onto the structure. The first weight must be the Crusher Board supplied by the Tournament Director. This counts toward the total weight held in the first stack only.

14. Division I teams may have an adult (18 years of age or older) assist* at least one team member in placing weights heavier than 20 pounds. Division II teams may have an adult assist* at least one team member in placing weights heavier than 40 pounds. In Divisions III and IV, team members must place all of the weights themselves. For all divisions, the team must decide the order in which it will place the weights.

*The adult can help to lift and place these weights only. A team member must select the weight and be actively involved in bearing and aligning the weight as it is placed on the stack. An adult cannot have his or her hands on the weight stack unless a team member is touching it as well. The adult and team member must carry the weight together and place it on the stack.
15. Team members must wear safety goggles, eyeglasses with plastic lenses, or other protective eyewear (approved by the judges) if they are within the Safety Area with their head is below the level of the Crusher Board while the structure is supporting weight. This applies to everyone in the Safety Area (see E10).

16. A weight must be held on the stack for at least 3 seconds to count in the total weight held.

17. It is the team’s responsibility to add an extension pipe to the safety pipe, if provided and needed.

18. A reminder about outside assistance: Team members are responsible for building an original structure. No one beyond the team is allowed to provide ideas, tips, and information on how to build and/or improve a structure. This includes photographing other teams’ solutions for reference. Also, team members are not allowed to discuss with others how they solved this problem until after World Finals. Sharing ideas with other participants or in a public forum is considered outside assistance. Anyone doing this puts their team and the team of anyone who receives the information in position for a penalty. Failure to report such an occurrence could bring a significant penalty or lead to disqualification or suspension (see the 2015-2016 Odyssey of the Mind Program Guide).

19. The special effect device must:
   a. produce effects able to be seen/heard by the judges and audience. The effects can be anything the team wishes.
   b. be an original team creation.
   c. be used at least two times in the performance, producing two different effects, to receive score in D2a.

20. The theme of the performance can be about anything as long as it incorporates “Attacking the Stack” and the special effect device. These elements may be incorporated in any way.

C. Site, Setup and Competition

1. If possible, the Tester will be on a solid, level floor. The Tester will be positioned in the center of the Safety Area, a 60” x 60” taped square, which will serve as a guide to keep team members aware of their proximity to the Tester and as a reminder of where they must wear safety glasses. The team is not allowed to move the Tester.

2. At least 45 minutes before its scheduled competition time, the team must report to the Weigh-In Site with its structure to have it checked for specifications.

3. If the structure does not meet specifications, Weigh-In Judges will try to give the team an opportunity to bring it into specification or submit a different structure before the team’s competition time. In most cases, corrections should be completed no less than 20 minutes before competition time. There is no penalty if the structure is brought into specification before completing the weigh-in process.

4. Once the structure is weighed and measured, a judge will place it into a bag and keep it at the Weigh-In Site until the team picks it up for competition. The judges at Weigh-In will supply the bag. The team must return to pick up its structure no earlier than 25 minutes before its scheduled competition time.

5. The judge will attach a Weigh-In Checklist to the bag containing the structure. The team cannot remove the Weigh-In Checklist until directed to do so by the Staging Area Judge. If the Weigh-In Checklist has been removed, the bag tampered with, or the structure removed, the team may have to repeat the weigh-in process. Depending on the situation, the team could receive a Spirit of the Problem penalty.

6. Team members must report to the competition site with everything they will use in their solution at least 20 minutes before they are scheduled to compete.

7. The team may place the structure onto the tester any time after the Timekeeper says “Team Begin.”

8. Once on the Tester, the team may adjust the structure, including removing it from and replacing it on the Tester. Team members may continue touching the structure while placing the Crusher Board onto it. No one can touch the structure once the team begins to place weights onto the Crusher Board. If team members wish to adjust the structure they must remove all weights except the Crusher Board. Team members may then touch the structure before resuming weight placement.
9. If the team ends weight placement for its First Stack, it must signal the judges and audience using the special effect device before removing weights to start a Second Stack. After all the required weights are removed from the first stack and before it starts placing weight for the Second Stack, teams will use a different signal from the special effect device. If the structure breaks before these required uses of the device take place, any two uses will allow it to be eligible for score.

10. If any of the following occur, all weight-placement will end.
   a. the Crusher Board or any part of the structure touches any corner post.
   b. any part of the structure touches anything other than the surface of the Tester base and the bottom of the Crusher Board in such a way that judges determine that it is helping to support the weight stack.
   c. the top weight rests against the safety pipe and the judges determine that the pipe is helping to support the weight stack. If time remains, the team will be given an opportunity to adjust that weight and continue weight placement.
   d. a weight extends beyond the height of the full length of the safety pipe, including the extension pipe.

11. The team has 8 minutes to test its structure, create and remove stacks, and present its performance. The team must stop all activity when the judge calls “time.” Or, the team may give a signal indicating the performance is over.

12. The team should inform the Staging Area judge if it expects to continue its performance after the structure breaks. Should the team finish its performance before the structure breaks and has given the signal to end the performance, the team will be allowed to continue placing weights until any one of the criteria from C10 or C11 occurs.

13. Teams should bring cleaning utensils to clean up any mess. Should a team take an unreasonable amount of time to clean the site, or leave a mess, the judges will assess an Unsportsmanlike Conduct penalty. Others not on the team’s roster may help the team clear the site and remove the team’s props. The competition area must be left clean and dry for the next competing team.

D. Scoring

1. Weight held (In each division, the team with the highest weight-held score will receive 150 points. All other structures will receive a corresponding score based on the percentage of weight held) ........................................................................................................................................... 1 to 150 points

2. Special effect device ............................................................................................................................................................................. 2 to 35 points
   a. Is used to signal the judges twice ............................................................................................................................................. 0 or 5 points
   b. Creativity of “Attack the Stack” effects ........................................................................................................................................... 1 to 15 points
   c. Overall effectiveness in the performance ........................................................................................................................................... 1 to 15 points

3. Creativity of how “Attacking the Stack” and the placement of the weights is integrated into performance ........................................................................................................................................... 1 to 15 points

   Maximum possible: 200 points

E. Penalties (Deduct penalty points from the percentaged score, not from total weight held.)

1. “Spirit of the Problem” violation (each offense) .......................................................................................................................... -1 to -100 points

2. Unsportsmanlike conduct (each offense) ........................................................................................................................................... -1 to -100 points

3. Incorrect or missing membership sign ........................................................................................................................................... -1 to -15 points

4. Outside assistance (each offense) .................................................................................................................................................. -1 to -100 points

5. Having someone other than team members cut pieces of wood, or glue joints ........................................................................................................................................... “weight held” score of zero

6. Over cost limit ........................................................................................................................................................................... -1 to -100 points

7. Artificially strengthened structure ........................................................................................................................................... -5 points to “weight-held” score of zero

8. Structure does not meet specifications and is not corrected before completing weigh-in*:
   a. **Overweight Structure** (Weight will be determined by the official gram scale for each competition.): Any structure weighing more than 15 grams will receive -5 points for every .1 gram overweight up to 1.50 or more grams over (zero score for weight held). The penalty must not exceed the calculated “weight-held” score.
b. **Oversized Wood:** any piece exceeds 1/8"x1/8" (.135" x .135") at its cross section (not assessed if it is an irregularity of that piece and the rest is within limitations)................................................................................................................................. “weight-held” score of zero

c. **Undersized Structure:**
   1. *Less than 8" but more than 7-7/8" high* .................................................................................................................. -100 points
   2. *7-7/8" or less* ............................................................................................................................................... “weight-held” score of zero

9. “Open area” does not accept the 2” diameter column through its entire height .................................................................................................................................................................................. -100 points

10. If any team member is not wearing safety glasses while inside the Safety Area with their head below the Crusher Board, the team must stop weight placement until that team member puts on safety glasses. Time will continue.

11. If an adult selects a weight or places it without help from a team member, that weight does not count toward weight held score. The weight may be removed and placed properly for score. An official will warn the team and the adult. If this continues after two warnings, a 10-point Outside Assistance penalty will be assessed for each future occurrence, and the improperly placed weight will not count unless it is removed and placed properly.

* These penalties will be substituted with a weight-held score of zero if, in the aggregate, that is less of a penalty.

**F. Style** (Elaboration of the problem solution; use the Style Form from the Odyssey of the Mind Program Guide.)

1. Uniqueness of how a special effect entertains the audience.................................................................................. 1 to 10 points
2. Creative use of balsa wood in a team member’s costume...................................................................................... 1 to 10 points
3. (Free choice of team) ............................................................................................................................................... 1 to 10 points
4. (Free choice of team) ............................................................................................................................................... 1 to 10 points
5. Overall effect of the four Style elements in the performance.................................................................................. 1 to 10 points

**G. Tournament Director Will Provide**

*At the weigh-in site:*

a. a gram scale accurate to 1/10th of a gram.

b. a micrometer or other precision method of checking wood thickness.

c. a 2-inch diameter column-measuring device.

d. an accurate ruler or device to measure the structure’s size requirements.

e. a bag to hold the team’s structure.

f. tape to attach the Weigh-In Checklist to the bag.

*At each competition site:*

a. a three-prong electrical outlet.

b. a Tester and a 60” x 60” taped Safety Area.

c. an area for removed weights.

d. a 12-inch extension to the safety pipe.

e. three pairs of safety glasses: one to be used by a judge and two that are available to the team.

f. a judging team and all materials necessary to judge this problem.

g. a minimum of 400 lbs. of weights in assorted sizes, generally from 5 lbs. to 45 lbs., each with a hole 2” in diameter. When registering for a tournament, teams needing more weight should notify the Tournament Director.

*NOTE: Contact your Tournament Director for information regarding specific competition sites such as actual dimensions, amount and size of weights, weight of the Crusher Board, registration procedures, floor surface, etc. Do not submit a clarification request for this information.
H. The Team Must Provide

1. Four copies of its Style Form, one Cost Form, one Outside Assistance Form, and all of its team clarifications.
2. Safety glasses or other eye protection. However, the team may use up to two pairs of goggles provided by the tournament director.
3. Any necessary extension cords or adapters.
4. Cleanup materials as needed.

I. Metric Equivalency Chart

Lengths:

- 1 inch = 2.54 cm
- 1 cm = .39 inches
- 1 foot = 30.48 cm
- 1 meter = 3.28 feet

Weights:

- 1 ounce = 28.35 grams
- 1 gram = .035 ounces
- 1 pound = .45 kilograms
- 1 kilogram = 2.2 pounds

J. Problem Glossary

**Attacking the Stack** — Any type of repetitive action that produces a result or overcomes an obstacle as determined by the performance.

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**PRECAUTIONS**

- Use eye protection, e.g., a face shield, safety glasses, goggles, etc., when looking closely at a structure holding weight. Collapsing structures may project pieces of wood several feet.
- Keep your fingers on the sides of the weights when placing them onto the Crusher Board or onto other weights.
- Remain aware of the structure, the testing device, and the weight stack at all times to avoid injury in case of collapse.
- Do not stand too close to the structure, Tester, and weight stack unless necessary, and avoid bumping them accidentally.
- Use a safety pipe through the center hole of the weights to help prevent them from falling.
- Place a piece of plywood/hardboard or a tumbling mat under weights waiting to be placed onto the weight stack to help prevent damage to the floor.
- Super glues are extremely dangerous to use and some glues have dangerous fumes. Read and follow all precautions and directions on the manufacturer’s labels. Non-toxic model airplane wood glues are recommended. If toxic glue is used, proper precautions, such as adequate ventilation and parental supervision, are advised.

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