



Rules

The Tech Challenge 2017: Rock the Ravine

Important Notes

Clarifications and additions to the rules may be made. When changes occur, registered teams will be alerted by email. In addition, changes (identified in red font) will be posted on The Tech Challenge website. Teams are encouraged to monitor the [website](#) for changes. The website also includes answers to [Frequently Asked Questions](#). FAQs are updated periodically.



Spirit of the Challenge

The Tech Challenge emphasizes the importance of developing engineering solutions that would be practical in real life, otherwise known as the Spirit of the Challenge. Judges will be looking for compliance with this idea and will ask teams questions such as, "How would your design work in real life?" They will also look to a team's engineering journal for evidence of real-world application of the team's solution.

Store-bought solutions are not in the Spirit of the Challenge. Teams are encouraged to design and build devices using their own ideas and creativity. Use of existing plans for reference and inspiration is allowed. All plans, and the source of those plans, must be documented in the engineering journal.

Challenge Scenario

Design and build a device to help explorers cross an ice field with multiple ravines.

Challenge Details

Explorers must cross each ravine, bringing their entire device across for future use.

Self-powered aerial solutions such as planes, drones, lighter-than-air vehicles or helicopters are prohibited.

The challenge has two parts:

Part One: Starting from Table One cross a ravine to Table Two of the same height. See Figure 1.

Part Two: Starting from Table Two cross a ravine to Table Three that is higher. See Figure 1.

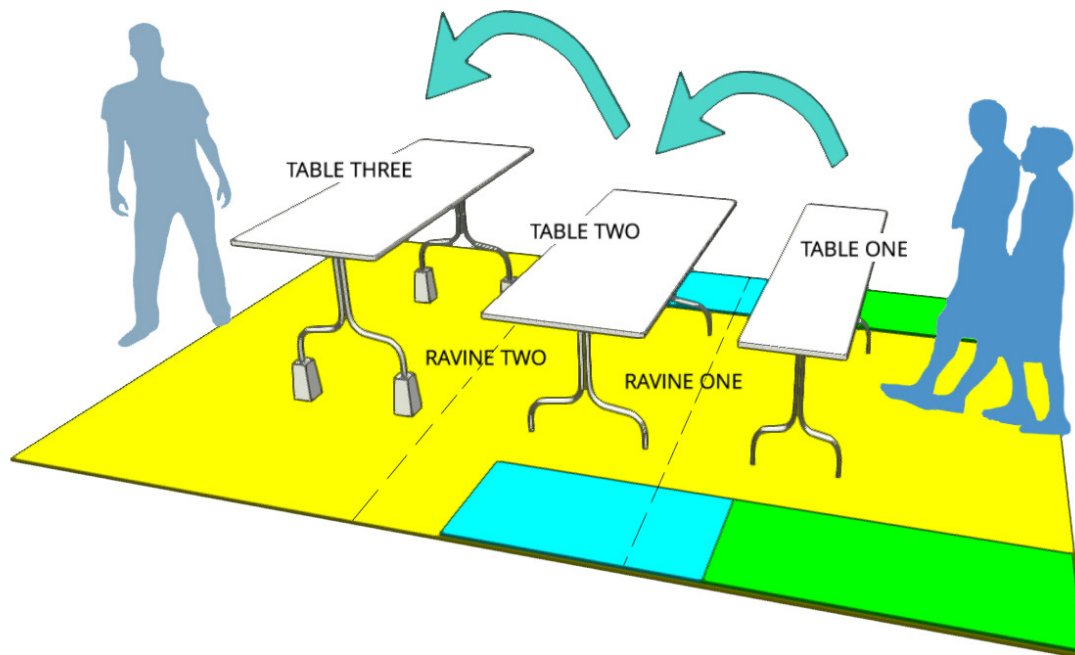


Figure 1. Test Rig Concept



Test Rig Specifications (shown in Figure 2)

Ravine One (level crossing)

1. Table One tabletop width is 18 inches.
2. Table Two tabletop width is 30 inches.
3. Ravine One width:
 - a. 16 inches wide for Grades 4-8.
 - b. 20 inches wide for Grades 9-12.

Ravine Two (step crossing)

1. Table Two and Table Three tabletop widths are 30 inches.
2. Ravine Two is 20 inches wide.
3. Table Three is 8 inches higher than Table Two.

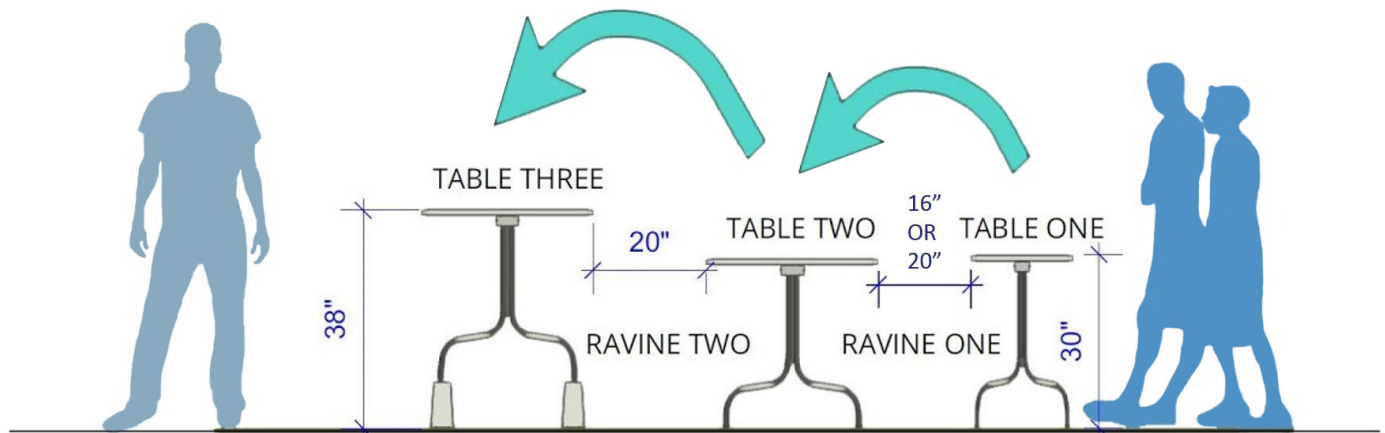


Figure 2. Test Rig Dimensions

Device Specifications

1. Initial device size:
 - a. 18 x 36 inch footprint by 36 inches high for Grades 4-6.
 - b. 18 x 30 inch footprint by 36 inches high for Grades 7-8.
 - c. 18 x 24 inch footprint by 24 inches high for Grades 9-12.
2. Maximum weight: 10 pounds.
3. Controls are not considered part of the device.
4. No sharp edges are allowed.
5. Each team must have its own device. Devices may not be shared with other teams.
6. Devices must be clearly marked with the team number.

Remember: Store-bought solutions are not in the Spirit of the Challenge. Teams are encouraged to design and build devices using their own ideas. Use of existing plans for reference and inspiration is allowed. All plans, and the source of those plans, must be documented in the engineering journal.

Setup and Performance Rules

1. Team will have 4 minutes to accomplish setup and performance of both parts of the challenge (crossing both ravines).
2. Part One must be accomplished before the team can attempt Part Two.
3. During setup teams can access all sides of the tables and the ravines. While device is crossing Ravine One, students must remain in the green area. While device is crossing Ravine Two, students must remain in the green or blue area. Teams may only stand in the ravines during setup. See Figure 3.

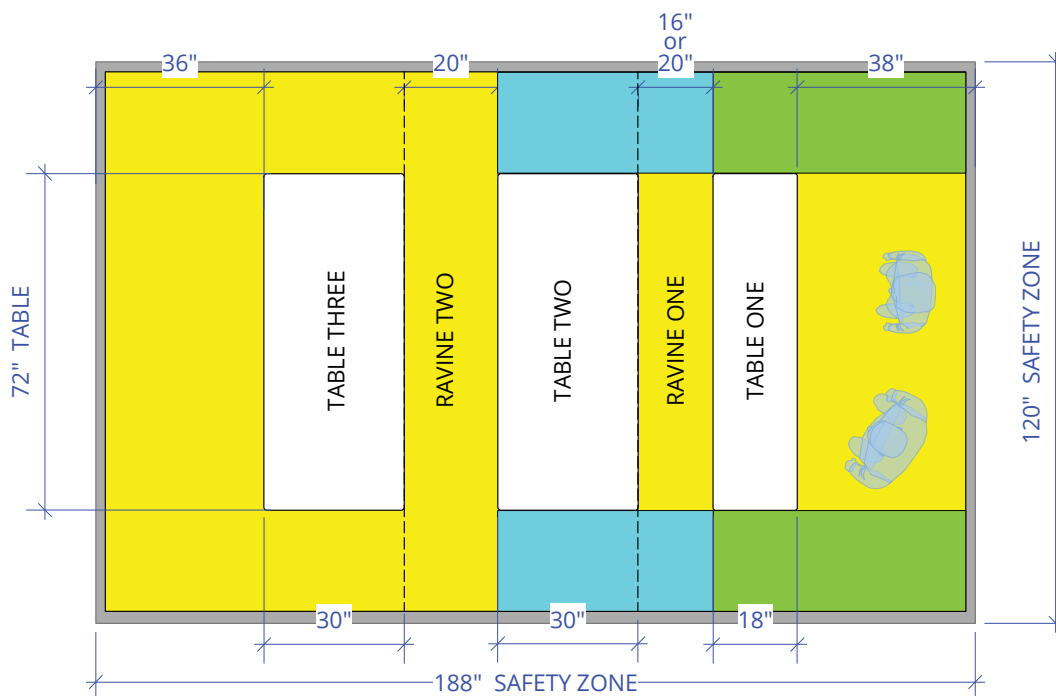


Figure 3.

4. The bottom of the ravine (floor) cannot be used.
5. After device setup, human power may start movement by releasing a trigger or starting a motor but cannot be used to push, pull or lift the device. Human power may only be used to control the device.
6. The device may be autonomous or controlled (steered, started, stopped) by the team. Control may be wireless or with attached control wires or lines. Wires or lines cannot be used to push or pull the device. While radio control is allowed, The Tech cannot guarantee the competition area is free of radio frequency interference.



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7. Initially the device must start out within the device footprint and height limits listed in the Summary of Key Numbers and Dimensions (page 7) without extending beyond the edges of Table One.
 8. During the ravine crossing, the device must momentarily touch both tables at the same time.
 9. All parts of the device must cross the ravine, transfer to the next table **and stop**.
 10. Multiple attempts may be made to achieve success within the 4-minute performance period. Teams requiring fewer device resets after initial setup on each table will score higher.
 11. After the first ravine is crossed, the device may be reset on Table Two in order to cross the second ravine to Table Three.
 12. Note that for the second crossing, the device must start on Table Two but does not need to be within the initial device footprint and height limits.
 13. A team's device cannot damage the rig, nor can any residue be left behind.

Success Criteria

Device must end up fully supported by the table on the far side of the ravine after each crossing. No part of the device can be left behind on the original table.

Bonus Success Criteria

1. A team will score higher if the device ends up entirely on the table, meaning no part of the device extends over any table edge.
2. Teams not requiring a reset for the second ravine crossing will score higher.
3. High school only: Still within the 4-minute performance period and after successfully completing the forward crossing of both ravines, teams able to repeat the challenge going in the opposite direction (i.e. crossing from Table Three to Table Two and from Table Two to Table One) will score higher.

Safety

Safety is a high priority during all phases of The Tech Challenge.

1. Teams will be judged on safe design and implementation.
2. Judges will stop any activity they view as unsafe. The judges' word is final.
3. Each team will identify a safety officer who will ensure safety from design through implementation.
4. Teams must provide their own ANSI-approved eye protection (i.e. glasses, goggles, masks) and wear eye protection at all times when in designated areas around test rigs or when constructing/testing their device.
 - a. Teams will not be allowed to participate at test trials or the showcase unless all members have required eye protection.
 - b. Regular eyeglasses do not provide the necessary level of eye protection and are not an acceptable substitute for ANSI-approved eye protection.



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5. Teams may not use flammable liquids, flammable gases or unsealed lead/acid batteries.
 6. Teams may not use pressurized gases greater than 5 psi. Any team using pressurized gas must be able to demonstrate to judges, by using a gauge, that the pressure does not exceed 5 psi.
 7. No pressurized tanks/cylinders are allowed.
 8. The use of AC power is not permitted at test trials or the showcase.
 9. Closed-toe shoes are highly recommended.
 10. Teams must be able to transport their device safely without the assistance of others, including parents and advisers. The use of carts, wagons or other transport devices is encouraged since a great deal of device movement is required and judging times may be lengthy.
 11. Team members must remain on the ground at all times. They may not sit, stand, climb on or go under rigs, or be lifted by other team members during setup and performance. No ladders, step stools or other lifting equipment will be allowed.

Engineering Journal

1. How teams develop their solution is as important as the solution itself. The engineering journal is a record of this process and is included in judging of team success. The journal must be an organized and detailed notebook or binder.
2. At the showcase, each team must submit one engineering journal.
3. The engineering journal should be started at the beginning of the team's involvement in the program. Organized records should be kept of all team activities. The team's journal is a living document. More information on engineering journal requirements can be found in the online [Team Guide](#) under Engineering Journal.
4. Display boards like those used for science fairs and/or digital presentations are not a substitute for an engineering journal. However, these may be a useful part of a team's presentation to the judges. Due to the number of participants, the time allowed for digital presentations during the interview will be limited to two minutes.
5. Journals may be typed or handwritten. Legibility and organization are important.

Adviser

1. Teams must have an adult adviser. Team solutions must be designed, built and tested by team members.
2. The adviser role is to guide, facilitate and mentor.
3. The adviser may not be a Tech Challenge judge.
4. An adviser may work with more than one team. However, it is important that advisers ensure each team receives the necessary level of attention.
5. Click [here](#) for the Adviser Guide.

Summary of Key Numbers and Dimensions

Item	Numbers/Dimensions		
Combined setup and performance time	4 minutes		
Maximum weight of device	10 pounds		
	Grades 4-6	Grades 7-8	Grades 9-12
Maximum device footprint	18 x 36 inches	18 x 30 inches	18 x 24 inches
Maximum device height	36 inches	36 inches	24 inches
Ravine One width	16 inches	16 inches	20 inches
Ravine Two width	20 inches		
	Table One	Table Two and Table Three	
Tabletop width	18 inches	30 inches	
Table Three height	8 inches above Table One and Table Two		

In engineering, details are important! Did you read this document carefully, all the way to the end? Let us know by writing “Bob Grimm Tech Challenge Champion” at the bottom of the last page of your engineering journal — a small tribute to one of this program’s most passionate supporters. Grimm passed away in 2015.