

Ramp and Roll

1. **DESCRIPTION:** Teams will build a ramp and vehicle to travel a certain distance and stop as close to the finish line as possible at the tournament.
2. **ESSENTIAL STANDARDS ALIGNMENT:** 3.P.1, 5.P.1, Science as Inquiry
3. **TEAM OF UP TO:** 2
4. **MAXIMUM TIME:** up to 30 minutes to build and test before the official scoring.
5. **TEAMS:** Teams MUST bring something to write with, their box full of K'nex materials, and a ramp. **Teams may bring only 1 picture no larger than 8.5" x 11" of their device. This must be 1 picture, not a collage.** No other resources are allowed.
6. **EVENT LEADERS:** Event leaders will provide the score sheets and any measuring devices needed.
7. **SAFETY REQUIREMENTS:** None
8. **IMPOUND:** Yes. Teams must drop off the challenge box and the ramp at the time and place specified by the tournament director. The box and ramp must be clearly labeled with the school/team name and team designation (Varsity, JV, etc.). The ramp must have a soft protective covering on the bottom or it cannot be impounded.
9. **THE CHALLENGE BOX:**
 - a. All materials and tools for the vehicle must be brought in a box with a lid; the volume of the box with lid in place can be no greater than 33,000 cm³ (example: a common 10 ream copy paper box with the lid on meets this requirement). With all materials and tools in the box, the lid must fit all the way on the box and close completely.
 - b. Teams may construct their own box or repurpose a box that is within the specified dimensions, made from any material. The box must not be used as a part of the device.
 - c. Varsity and JV teams from the same or different schools must not share the same challenge box nor materials or tools in the challenge box.
 - d. **BUILDING MATERIALS:** Teams may only bring the following building materials:
 - i. K'nex pieces. No K'nex motors or other electronic components may be used. No other brands or kinds of building materials may be used. Pieces can't be preassembled in box. Event leaders will disassemble or remove any pieces not allowed by these rules.
 - ii. String – any size, brand, or quantity.
 - iii. Copy paper, any size.
 - iv. Tape, any size or kind.
 - v. Toothpicks, any size or kind.
 - e. Teams should make a reasonable effort to organize the supplies within the box neatly for efficient check-in and ease of inspection by the event leader. Teams may organize box supplies in labeled clear plastic bags or other clear containers. The bags and containers must not be used as building materials.
 - g. **TOOLS:** Tools must not be used as part of the device. All tools must also fit within the closed box. Teams may include (any quantity) scissors, rulers, tape measures, and a stopwatch in the box.
 - h. Any items that are not allowed will be removed by the event leader at impound and can be picked up after the competition.
 - i. Team members must build the device on site using only the materials brought in their box.
10. **THE CHALLENGE:**
 - a. Once teams enter the event area to compete, they may not leave the area or receive outside assistance, materials or communication until they are finished competing. Only participants and event leaders will be allowed in the event area while teams are competing. Teams violating this rule will be disqualified.

- b. **The Vehicle:** Teams will build on site a wheeled vehicle powered by gravity (a ramp) to travel either 4.0, 4.5, 5.0, 5.5, or 6.0 meters.
- i. The vehicle must be powered solely by the gravitational energy of rolling down a ramp. No additional sources of energy are allowed.
 - ii. Mechanical braking systems that automatically engage are the only type of braking system allowed, if a braking system is used (i.e. no remote controls or tethered stopping system).
 - iii. Non-electronic sighting devices are allowed on the vehicle and/or ramp for alignment purposes.
 - iv. The vehicle must have a fixed point (toothpick or K'nex piece) extending from the front edge of the vehicle, close to the track surface, that all measurements will be made from.
- c. **The Ramp:** Teams will build, in advance, a ramp for their vehicle to roll on. The ramp, with the vehicle in the ready to roll position, must fit within a 60.0 cm x 60.0 cm starting box. There is no height restriction. The ramp **MUST** have felt feet or some sort of protective covering on the bottom that will protect the floor from any protruding nails, screws, or other rough edges. Teams without protective material on the bottom of their device will **NOT** be allowed to compete.
- i. The ramp can be adjusted in shape, slope, etc during the build and test time.
- d. **The Track:** The track must be a relatively smooth, hard surface. The starting box must be marked with tape. A finish line target point will be marked and announced after impound is completed, at either 4.0, 4.5, 5.0, 5.5, or 6.0 meters. A center mark will be made on both the front edge of the starting box and the finish line.
- e. Structures must be free standing and cannot be attached to a table, floor or any other support.
- f. Team members will not be allowed to stand on chairs, tables, ladders or anything else to construct or operate the device.
- g. Teams will have a **maximum of 30 minutes** to construct the specified device. Teams must not modify their device after the construction period has ended. Teams that complete construction early may be judged early.
- h. The team can practice with their vehicle in their allotted space during the build time.
- i. **Official runs:** Teams will be given a 5-minute time period to make 2 official runs.
- i. When the team is ready for official testing, they will carry their vehicle and ramp to the area designated by the event leaders. The students will set up their ramp within the 60cm x 60cm starting square. The team may position the vehicle and ramp in any way as long as the entire structure remains within the square.
 - ii. Teams may opt to calibrate and/or adjust their vehicle and/or ramp to achieve the intended distance during the 5-min testing period. Pieces can be removed from the vehicle, but no additional pieces can be added to the vehicle.
 - iii. Teams are not allowed to roll the vehicle down the track in advance of the run.
 - iv. Teams will do a simple release of the vehicle to start the run.
 - v. Teams may not chase their vehicle down the track, they must wait until they are called by the event leader to retrieve the vehicle.
 - vi. Timing will stop while event leaders make official measurements
- j. Event leaders will measure from the intended stopping point to the fixed point on the front of the vehicle. If there is no fixed point, judges will measure to the center of the front edge of the vehicle.

11. SCORING:

- a. Teams will be ranked based on the single run where the straight-line distance from the fixed point on the vehicle to the center mark of the finish line is the closest, measured to the nearest tenth of a cm.
- b. Teams will be ranked into tiers based on adherence to the challenge instructions. Within each tier, teams will be ranked based on the scoring criteria for the challenge.
 - Tier 1: Teams with no violations
 - Tier 2: Teams whose device violates any part of sections 9 or 10. Examples would be:
 - i. If the ramp is larger than 60cm x 60cm
 - ii. If the device is not impounded on time
 - iii. If the box of materials is too big
- c. Ties will be broken by the best combined score of both runs.
- d. Any team that impounds a box but fails to attempt the build will be considered a “No Show.”

12. RESOURCES: See the Event Resources tab on our website at www.sciencenc.com for instructions, videos and more.