



NATIONAL YOUNG ENGINEERS CHAMPIONSHIP

2025

TECHNICAL DETAILS

Competition process, task, evaluation criteria

TASK

The task of the **STEAM TEAM National Young Engineers Championship** is to create a functional **Rube Goldberg machine** integrating engineering solutions.

Rube Goldberg (1883–1970) was a Pulitzer Prize-winning American cartoonist, inventor, and innovator. A machine named after Goldberg is a complex mechanical device designed based on the domino principle, where one process initiates another and continues until the final action is completed. In the STEAM TEAM championship, we encourage participants to use both **engineering thinking and creativity** to design the most interesting and complex solution for a Rube Goldberg machine. The functionality of the machine encourages deeper thinking about mechanized processes, devices, and technologies, as well as their applications.

Competition Stages: Semifinals and Final

- During the event, participants are given **2 hours** to assemble their pre-designed and tested 😊 functional **Rube Goldberg machine**.
- After the assembly time ends, teams will introduce themselves (presentation time: **up to 3 minutes**) and demonstrate their machines to the jury.

Tip! While preparing for the championship, test your machine multiple times and correct possible errors. Ideally, after bringing your machine's parts to the event and assembling them on-site, it should successfully function from start to finish on the first attempt.



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TECHNICAL REQUIREMENTS FOR THE TASK (SEMIFINALS)

FOR STUDENTS (GRADES 5–8)

- The machine's structure must include **at least 6 interconnected action sequences** (machine links). Be creative – use various connection methods, mechanisms, and materials (**prohibited**: flammable or hazardous chemicals).
- The machine must have a clear idea: **What story does your machine tell?** Does it depict something, produce an object, solve a global challenge, or serve a specific function? Introduce this idea during your team's presentation.
- The final action of the machine must **activate at least one visible electrical device**. Additional devices can be used, but their voltage must not exceed **24V**.
- The machine must fit within a **3 x 3 m** area, with no height restrictions.
- The machine's operation time must be at least **30 seconds**.
- A **successful demonstration** means that the team initiates the machine with **one initial touch**, and it completes its action without **further intervention**.
- If a team member interferes with the machine's process, **5 points** will be deducted per intervention.

FOR HIGH SCHOOL STUDENTS (GRADES 9–12)

- The machine must include **at least 8 interconnected action sequences** (machine links). Be creative – use various connection methods, mechanisms, and materials (**prohibited**: flammable or hazardous chemicals).
- The machine must tell a **story** or serve a specific purpose, which the team must present. **What story does your machine tell?** Does it depict something, produce an object, solve a global challenge, or serve a specific function? Introduce this idea during your team's presentation.
- The final action must activate **at least one electrical device** (voltage limit: **24V**).
- The machine must fit within a **3 x 3 m** area, with no height restrictions.
- The operation time must be **at least 40 seconds**.
- A **successful demonstration** means that the team initiates the machine with **one initial touch**, and it completes its action without **further intervention**.
- Each **intervention** results in a **5-point deduction**.



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TECHNICAL REQUIREMENTS FOR THE TASK (FINAL)

FOR STUDENTS (GRADES 5–8)

- The machine's structure must include at least **7 interconnected machine stages/action sequences**. Be creative– use various connection methods, mechanisms, and materials (**prohibited**: flammable or hazardous chemicals).
- Your machine must have a clear idea: **What story does your machine tell?** What does it depict or reveal? Does it produce something, solve a global challenge, or serve a specific function? Present your machine's concept during your team's introduction.
- During the machine's operation, at least **2 electrical devices** must be activated. More can be used, but the voltage of any device must not exceed **24 volts**.
- The machine's operating mechanism must fit within a **3 x 4 m** area, with no height restrictions.
- The machine's operation time must be at least **40 seconds**.
- A **successful demonstration** means that the team's representative **initiates the machine's operation with a single touch** at the starting position, and the machine completes its function without **any additional team intervention**.
- If a team member intervenes during the machine's operation, **5 points** will be deducted per intervention.

FOR HIGH SCHOOL STUDENTS (GRADES 9–12)

- The machine's structure must include at least **9 interconnected machine stages/action sequences**. Be creative – use various connection methods, mechanisms, and materials (**prohibited**: flammable or hazardous chemicals).
- Your machine must have a clear idea: **What story does your machine tell?** What does it depict or reveal? Does it produce something, solve a global challenge, or serve a specific function? Present your machine's concept during your team's introduction.
- During the machine's operation, at least **2 electrical devices** must be activated. More can be used, but the voltage of any device must not exceed **24 volts**.
- The machine's operating mechanism must fit within a **3 x 4 m** area, with no height restrictions.
- The machine's operation time must be at least **50 seconds**.
- A **successful demonstration** means that the team's representative **initiates the machine's operation with a single touch** at the starting position, and the machine completes its function without **any additional team intervention**.
- If a team member intervenes during the machine's operation, **5 points** will be deducted per intervention.

Tools for the task: Championship participants – teams with mentors – **independently design and construct their Rube Goldberg machines before the semifinals**. Use your own materials and tools to build the machine. At the event venue, **basic additional materials** will be available for use as needed, including **cardboard sheets, hot glue, string, adhesive tape, scissors, paper, etc.**



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EVALUATION CRITERIA

Evaluation of the teams' presentations (fluency, interest, originality). Presentation time: up to 3 minutes (for ALL)

Semi-finals and final

Team presentation (0-2 points):

- 0 points – no team members and no team name presented.
- 1 point – partially presented (lack of creativity, clarity, fluency, etc.).
- 2 points – smooth, interesting and creative presentation of the team, its members, the team's experience in developing the Goldberg machine or other details of teamwork.

Presentation of the idea of a Goldberg machine (0-2 points):

- 0 points – the team's Goldberg machine has no idea or is presented in a vague, unrevealing way.
- 1 point – the team's Goldberg machine has a name and an idea, but the presentation is not fully developed, lacks clarity and creativity.
- 2 points – the team presented the Goldberg machine in a smooth and interesting way with an original and creative idea.

Presentation of the technical solutions chosen, the tools used, the different links / phases, and the reasoning behind them (0-2 points):

- 0 points – the team did not present the technical solutions, tools of the machine.
- 1 point – the team mentions the technical solutions of the machine, but no / lack of reasoning.
- 2 points – the team presented the most important technical solutions of the machine, justified the tools used, mentioned the total number of links and commented on the most important links, which is worthy of the attention of the jury during the demonstration of the machine.

Exceeding 3 minutes presentation time (-1 point).

Innovativeness of engineering solutions, complexity of the machine: use of in-house designed and manufactured solutions; use of mechanical, e-solutions (ALL)

Semi-finals and final

- 1 point – no use of original, authentic, in-house designed components or innovative mechanical solutions.
- 2 points – a few original and authentic solutions designed and manufactured by the participants.
- 3 points – three or more original and authentic components, innovative solutions, complex design.



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Number of initiating a demonstration: no more than 3 times (for ALL)

Semi-final	Final
10 points – number of demonstrations 1 5 points – number of demonstrations 2 3 points – number of demonstrations 3 0 points – failing 3 attempts	10 points – number of demonstrations 1 5 points – number of demonstrations 2 3 points – number of demonstrations 3 0 points – failing 3 attempts
During the demonstration, intervention by a team representative is allowed, but for each intervention during the machine operation (-5 points).	

Goldberg machine lifetime for students (GRADES 5–8)

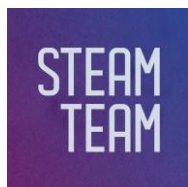
Semi-final	Final
0 points – <30 sec. 1 point – 30 sec. 2 points – 40 sec. 3 points – 50 sec. 4 points – 60 sec. 5 points – 70 seconds or more Duration more than 100 sec. (-1 point), more than 120 sec. (-2 points)	0 points – <40 sec. 1 point – 40 sec. 2 points – 50 sec. 3 points – 60 sec. 4 points – 70 sec. 5 points – 80 seconds or more Duration more than 120 sec. (-1 point), more than 130 sec. (-2 points)

Goldberg machine lifetime for high school students (GRADES 9–12)

Semi-final	Final
0 points – < 40 sec. 1 point – 40 sec. 2 points – 50 sec. 3 points – 60 sec. 4 points – 70 sec. 5 points – 80 seconds or more Duration more than 100 sec. (-1 point), more than 120 sec. (-2 points)	0 points – < 50 sec. 1 point – 50 sec. 2 points – 60 sec. 3 points – 70 sec. 4 points – 80 sec. 5 points – 90 seconds or more Duration more than 120 sec. (-1 point), more than 130 sec. (-2 points)

Has an electrical appliance been triggered? (FOR ALL)

Semi-final	Final
3 points if it worked 0 points if it did not work	3 points if 2 devices are triggered 2 points if 1 device is triggered 0 points – if not triggered



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Number of different machine links/stages to integrate for students (GRADES 5–8)

Semi-final	Final
1 point – 6 stages 2 points – 7 stages 3 points – stages 8-9 5 points – 10 or more	1 point – 7 stages 2 points – 8 stages 3 points – stages 9-10 5 points – 11 or more stages

Number of different machine links/stages of integration for high school students (GRADES 9-12)

Semi-final	Final
1 point – 8 stages 2 points – 9 stages 3 points – stages 10-11 5 points – 12 or more	1 point – 9 stages 2 points – 10 stages 3 points – stages 11-12 5 points – 13 or more

BONUS points – support from the audience / other teams (ALL)

Semi-final and final
1 – low support, no support team or passive support. 2 points – there is a support team, posters or other means of support are visible. 3 points – high support, support team with original posters, team actively supporting by shouting, clapping, chanting etc.

Additional: in the event of a tie, the President of the Jury shall decide. The tasks will be evaluated by a panel of experts appointed by LINPRA.

In the semi-finals, we recommend that teams listen carefully during the presentation of the Goldberg machines and analyse the solutions of the other teams - all this information can help the winners of the semi-finals in the next stage, when preparing their machine for the finals and for the performance in the finals.

GOOD LUCK! 😊