

Energy Transfer Machine on Video Rules

The *Energy Transfer (ET) Machine on Video* competition provides a hands-on opportunity for elementary, middle and high school students to use their STEM skills in a fun and creative way. Student teams are challenged to transform everyday materials into unusual, Rube Goldberg - type machines that accomplish a team-specified task at the **one minute** mark using a variety of energy transfers including power from one AA battery. The team must also videotape their ET Machine performing its various energy transfers and its final specified task from start to finish, and submit their video for judging as described below.

Competition Guidelines

1. The Energy Transfer Machine competition is comprised of three divisions: elementary (3rd – 5th grades), middle (6th – 8th grades), and high (9th -12th grades) school.
2. Teams are composed of at least two (2) and a maximum of six (6) students.
3. Two or more team members must be present to answer questions on the day of the competition.
4. Schools are limited to one (1) team.
5. This competition is limited to a total of 21 teams.
6. The team's ET Machine is not to be transported to the competition, therefore its size, shape and dimensions are not limited. However, it must be designed so that it is possible to videotape the performance of the ET Machine from start to finish from a single video camera without using cuts or edits in the taping.

Timing Machine Specifications

The machine shall:

1. perform a team-specified operation at the one (1) minute mark as the final step of the machine.
2. have a minimum of five (5) steps in completing its team-specified task with at least one (1) step powered by one (1) AA battery.
3. be any size, shape or dimension.
4. demonstrate a series of energy transfers. Identical transfers of energy in succession (such as a row of dominoes falling into each other) should be considered one step.
5. not use any actual timing devices manufactured for that purpose.
6. be constructed solely of parts provided by the team. Individualized components may be purchased, but the entire timing apparatus must be designed, assembled and when possible, fabricated by the students. All component and fabrication choices must also be made by student team members.
7. not include any electrical storage devices (including capacitors). The only electrical production device allowed on the machine is the one (1) AA battery.
8. not use animals, hazardous materials, explosives or flames.
9. not imply nor convey profane, indecent or lewd expressions.
10. be safe and not harm team members, spectators or equipment.

The machine may:

- use programmable logic controllers or any other electronic controller; however, the programmable logic controller must not use any internal timer.

Video Specifications

1. At least one team member is required to narrate and be on-screen in the introductory segment. (Non-team members on-screen will result in disqualification).
2. In the introductory segment, the narrator(s) will state the school name, division, project name and describe the various steps and energy transfers of their machine and what it will do as its final task at the 1 minute mark. As the steps and energy transfers are described, those areas of the machine pertaining to that step should be pointed to by the narrator (or other team member) and shown in the camera view. This sequence may not exceed 3 minutes in duration. At the beginning of the machine sequence of the video, the announcer will say, "Ready, Set, Go" for the official timing process to begin.
3. Team members must not interact with, interfere, or assist their machines once time has started.
4. No edits are allowed to the machine portion of the video from the point where the narrator says, "Ready, Set, Go" to the completion of the ET Machine's final task. A complete run must be documented in this fashion. **Any edits to this portion of the video will be grounds for disqualification.**
5. The clock will be stopped and time recorded when the team designated, one-minute final task occurs.
6. It is expected that the video of your most successful run (from start to finish – no edits) will be submitted for judging on competition day. Take advantage of the opportunity to videotape your machine multiple times to get the best run documented.
7. If the designated action does not occur by the end of two minutes, a DNF (did not finish) will be documented for the timing portion of the judging.
8. The video should be uploaded to **YouTube.com by 5:00 p.m., February 6, 2018** and the **YouTube link emailed to Sunsmart@fsec.ucf.edu** to be eligible for judging. A confirmation email stating that we have received your video link will be sent by the next business day.

Competition Specifications

Day of the competition:

1. Check-in between 7:00 – 7:45 am.
2. A minimum of two team members must report to the video screening room at the time indicated in their registration packet to be interviewed by the ET Machine judges and answer questions about their machine.

Energy Transfer Machine Awards

1st place awards will be given in each division for Best Design. These awards will be decided by points awarded for:

- number of energy transfer steps
- complexity and technical sophistication of machine
- use of the electricity from the battery
- precision - how close the team defined end task came to the one minute mark
- creativity, originality, unconventional material use and design aesthetics
- team knowledge and communication skills
- clarity of the video to effectively showcase the ET machine's operation