2025 OCPS Super STEM Saturday
Energy Transfer Machine
RULES

What is the ETM competition?

Energy Transfer Machine (ETM) requires teams to transform everyday materials into unusual, Rube Goldberg-type machines to accomplish a team-specified task using a variety of energy transfers including power from a battery. The team must also record a video of their ET Machine performing its various energy transfers from start to finish, and submit their video for judging on a team-created web page.

Who May Compete?

ETM is open to teams of 1-6 students in grades 3-8. The competition is divided into two divisions. Teams of mixed grade levels will compete in the division of the highest grade level student.

- Elementary (3rd - 5th grade)
- Middle School (6th - 8th grade)

Important Dates

Events	Date
Project Webpages Due	November 24, 2025 5pm
Super STEM Saturday	December 6, 2025

Requirements

Each team creates a machine that uses at least five energy transfers, including power from a battery in at least one step of its operation. The machine is to perform a team specified task as the culminating event as close to the **one minute mark** as possible. The size, shape and dimensions of the ET Machine are not limited.

The Energy Transfer Machine (ETM) shall:

- ☐ perform a team-specified operation as the final step of the machine.
- ☐ have a minimum of five (5) steps in completing its team-specified task with at least one (1) step powered by electricity provided by batteries (not to exceed a total of 9 volts).
- ☐ demonstrate a series of energy transfers. Identical transfers of energy in succession (such as a row of dominoes falling into each other) are considered one step.
- ☐ not use any actual timing devices manufactured for that purpose.
- ☐ be designed so that it is possible to take a video of the performance of the ET Machine from start to finish from a single camera without using cuts or edits.
- ☐ be safe and not pose harm to anyone or anything.
- ☐ not use animals, hazardous materials, explosives or flames.

- be constructed solely of parts chosen and provided by the team members. Individualized components may be purchased, but the entire machine must be designed, assembled and when possible, fabricated by students.
- not imply nor convey profane, indecent or lewd expressions.

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

Note: *If reusing components from a previous year, the new design must be at least 50% different from entries submitted in a previous year. Projects that are deemed unsafe will be disqualified.*

Project Web Page

This web page will be used to evaluate the ET Machine and will include the video of the machine's best run. It will also be viewed by other students and the public. The web page **must be submitted by the project webpage deadline and include the following** (minimum requirements):

1. Photo & Basic Info	
	Team, project or machine name
	Name of the School
	First name(s) and **last initials** of student(s) on the team (**no last names on the public page**)
	Grade level of each team member
	A still photo, possibly a close-up of one section of the ET Machine (thumbnail for your webpage)
2. Design Documentation	
	Photos - a minimum of four close-up photos of the machine parts that you want to showcase
	A list of the steps/energy transfers that your machine uses
	A list of parts used in construction, including any recycled parts
3. Video of the Machine Performance	
The video will be hosted on our Vimeo site and included in your web page. The **two parts** of the video **(introduction and machine run)** may be posted separately or edited together into one video.	
A. Introductory Segment - may be edited and/or pieced together and may not exceed 3 minutes or points will be deducted. At least one team member must clearly narrate and be on-screen in the introductory segment. A non-team member may do the recording; non-team members on-screen will result in disqualification.	

	Narrator(s) will state:
	School name
	Project or machine name
	How electricity is used in their machine
	The various steps and energy transfers in their machine, as they or other team members point to each corresponding machine part as its shown in camera view
	What the machine will do as its final task
B. Machine Run – No edits allowed to this portion of the video	
	The announcer will say, "Ready, Set, Go" for the official ET Machine timing process to begin.
	The clock will be stopped and time recorded when the team designated, final task occurs.
	If any team member interacts with, interferes, or assists their machine once time has started, the machine timing (for the precision score) will stop at that point, but other judging aspects will continue as the machine run completes its course.
	Submit your ETM's most successful run from start to finish (no edits) for judging by the due date.

Note: Teams are encouraged to use the judging criteria as a guide to what extras they may want to include in their webpage (above the minimum requirements). Some ideas follow:

- an explanation of the theme used in the machine
- extra photos of the construction process
- team explanation of the challenges encountered while building or testing their machine
- drawings made during the planning stage of the layout of the machine
- list of internet sites and/or videos watched to get ideas for their machine
- explanation of unusual parts or segments constructed by the team members
- any items that will showcase the complexity of the machine.

Tips for better quality ETM videos:

- Turn your phone on its side. Wide videos look better on screen.
- Speak loudly and clearly. Pretend you are on stage with an audience listening.
- Light it up! Turn on all lights. If videoing outside, the sun should be behind the videographer.
- Record the video at the largest size and highest quality settings available.
- When exporting your video, don't over compress it. Upload a large file to maintain quality.

What Happens at STEM Day?

All ETM teams should be prepared to answer questions about their ETM project. **Note:** During the week prior to STEM Day, all ETM pages will be available for public viewing. Students are encouraged to share their web page address with family and friends, and to visit other team pages.

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Judging Criteria

Overall **1st - 3rd Place Awards** will be given in each division, as well as one combined division **1st place Precision Award.** The **1st Place Precision** award (combined divisions) will be given to the team whose machine's final action happens the closest (+/-) to the one minute mark.

The judges will base their scores on the following:

CATEGORY	CRITERIA	MAX POINTS
Amount of transfers:	How many energy transfers does the machine use? Was there diversity in the types of energy transfers within the machine?	15
Complexity:	How complex is the machine? (A Rube Goldberg type machine should do a simple task in a very complex way) Does the machine make use of more complex energy transfers than just domino runs and marble ramps?	15
Battery Usage:	Was the electric power a major step/part of the workings of the machine? Does the machine use the electricity in an unusual way?	10
Craftsmanship:	How well is the machine constructed? Is the machine visually appealing?	10
Creativity:	How creative is the machine? Does it use unusual materials? Does the machine have a theme? Is it interesting?	10
Interview/ Communication:	Did the team explain their device clearly? Was the description easy to follow and understand?	10
Precision:	How close to the 1 minute mark was the machine run?	10
Video:	Is the video clear, easy to watch, and close enough to see what is happening? Is the audio clear? Did the team fulfill the video requirements?	10
Web Page:	Does the web page effectively showcase the team's project? Is the web page arranged attractively? Does it show creativity? Is it enjoyable?	10
	SCORE	100

GOOD LUCK TO ALL ETM PARTICIPANTS!