MESA DAY 2027



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https://www.nmmesa.org/wp-content/uploads/2026/08/2026-2027-MESA-Competitions-Handbook.pdf

MESA Day Handbook, page 3

MESA Day Track	
Extra Small School: <=15 profiles	Max number of teams=1
Small School: >=16 and <=25 profiles	Max number of teams=2
Medium School: >=26 and <=45 profiles	Max number of teams=3
Large School: >=46 and <=69 profiles	Max number of teams=5
Extra Large School: >=70 profiles	Max number of teams=7
MESA USA Track	
Small School: <= 30 profiles	Max number of teams=1
Large School: >=31 profiles	Max number of teams=2

(1) MESA USA Team is required if the program wants to have more than (1) MESA Day Team participate. Team names MUST be declared as follows: (Track)-(School) (Level) – (Team #). *Example: MESA USA-Mesaville High School – Team #1*

On Site Team Competition (All Team)

MESA Mayhem

Think fast. Move smart. Work together. Embrace the mayhem! MESA Mayhem is a high-energy team challenge designed to test students' creativity, communication, problem-solving, coordination, and STEAM skills. Teams will tackle a series of challenges that encourage physical activity, decision-making, emotional well-being, teamwork, and resilience. From creative challenges to tests of dexterity, communication, and critical thinking, teams will use healthy habits to perform at their best. Stay focused, support your teammates, and rise to the challenge as you compete for MESA Mayhem glory!

On Site Team Competition (All Team)

Lab Breakout: A MESA Escape Room Challenge

The MESA Innovation Lab has just been sealed by its own security system, and only sharp mathematical thinking can get everyone out. Teams race the clock through algebra, geometry, logic, and pattern-based puzzle stations, uncovering pieces of a secret override code hidden throughout the room. Teamwork, clear communication, and creative problem-solving under pressure count just as much as getting the math right. Middle school and high school teams each face a track built for their grade level, so everyone gets a fair shot at cracking the code before time runs out. Do you have what it takes to escape?

Prepared Design Challenge (All Team)

Medical Transport Challenge

Many communities throughout New Mexico face long travel distances, mountainous or rural access roads, and limited access to emergency medical resources. Teams will address this real-world problem by creating a mechanical transport device that can:

- deliver fragile emergency supplies quickly and safely;
- transport the greatest quantity of standardized Medical Supply Units;
- navigate a standardized Rural Access Road to complete a delivery to a remote clinic.

Overview:

The Medical Transport Challenge is a prepared design engineering competition in which students design, build, test, and optimize one transport device capable of completing three medical logistics missions. The same device is used throughout the competition and may incorporate approved mechanical propulsion systems and, under the hybrid rules, one battery-powered motor.

NM MESA • 2027 MESA Day

MEDICAL TRANSPORT CHALLENGE



Prepared Design • All-Team Event



Design one device. Complete three missions.
Deliver medical supplies across challenging terrain.

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The Mission: Solve a Real New Mexico Problem

Some communities face long travel distances, mountainous or rural access roads, and limited emergency medical resources.

Three Missions: YOUR DEVICE MUST...

- Deliver fragile emergency supplies quickly and safely
- Carry the greatest quantity of standardized Medical Supply Units
- Navigate a Rural Access Road to reach a remote clinic

ONE DEVICE

Design, build, test, and optimize a single transport device for all three missions.

TEAM ENGINEERING

Find the right balance:
speed, cargo capacity, traction, stability, and energy.
Make design decisions together.

A design that wins one mission may not be the best design for all three.

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Device Requirements: Pass Inspection First

SIZE

Maximum: 12 in × 12 in × 12 in
Measured at inspection.

WEIGHT

Maximum: 5 lb
Safely portable by one team member.

CONSTRUCTION

Primarily student-built from scratch materials.

Allowed:

Purchased individual parts: wheels, axles, bearings, springs, fasteners, etc.

3D-printed or custom-fabricated individual components.

Not allowed:

Buying and assembling a complete vehicle kit as the competition device.

Hazardous materials.

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Propulsion: What Can Power Your Device?

APPROVED MECHANICAL OPTIONS

- Rubber bands / wound elastic cord
- Springs or torsion systems
- Mousetrap mechanisms
- Wound string, gravity, flywheels
- Balloon propulsion or other approved stored mechanical energy

OPTIONAL ELECTRIC OPTION

One electric motor powered by one AA battery.

Specified example: Mini Electric Hobby Motor, 3V–12V, 25,000 RPM.

Hybrid device rules

A hybrid may have approved mechanical systems plus one battery-powered motor.

Only ONE propulsion method may actively power the device during any single mission run.

All propulsion equipment for that run must already be installed or contained in the device before release.

A different installed method may be selected for a different mission. No external energy or assistance after release.

Hybrid vehicles receive no scoring advantage; the same performance rules apply.

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What is prohibited? What Happens At Inspection?

PROHIBITED

- More than one battery or more than one electric motor
- Arduino, programmable controllers, microcontrollers, remote control, or other electronic control systems
- Combustion or chemical reactions
- Compressed gas or CO_2 cartridges
- Pyrotechnics
- External launchers, towing, winches, or outside energy after release
- Pushing, pulling, guiding, towing, launching, or assisting after release

INSPECTION CHECKLIST

Judges verify:

- Fits within 12 × 12 × 12 in
- Weighs 5 lb or less
- Approved propulsion; if electric, no more than one battery and one motor
- No prohibited energy source or electronic/remote control
- Scratch-build rule is met
- Required video submission status is verified

Plan for portability: consider travel constraints when building and transporting the device.

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Competition-Day Procedure

1 Called in groups

Teams complete all three missions. Mission order is random.

2 Prepare

5 minutes to prepare for the first mission.

3 Two runs

You get 2 runs per mission. Be ready when called or the run is a mistrial.

4 Judge's signal

Place device at start line; wait for the judge's GO signal.

5 Reset & move

1 minute to ready the device between runs and missions.

6 Finish

After all runs in all missions, exit the testing area.

After release: no touching, redirecting, or helping the device.

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Mission 1 • Emergency Delivery Run

SPEED + FRAGILE PAYLOAD STABILITY

Goal: Deliver 3 ping-pong balls across a 12-foot course as quickly and safely as possible.

COURSE

Length: 12 ft
Lane width: 36 in
Surface: waxed concrete at Expo NM

PAYLOAD

3 ping-pong balls
Each ball that crosses the finish line earns 5 payload points.

SCORING • 50 PTS

Time: up to 25 points
Payload: up to 25 points
(*Completed course: minimum 10 time points + 15 for payload)*

Key rules

Clock starts when the device's front edge is released; stops when the defined front edge crosses the finish line.

If incomplete: only mission participation points. Run ends after 3 seconds without forward progress, if all balls drop, or if the entire device leaves the 36-in lane.

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Mission 2 • Supply Transport Challenge

CARGO CAPACITY + OPTIMIZATION

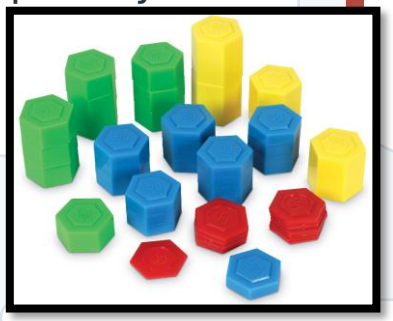
Goal: Deliver the greatest quantity of standardized Medical Supply Units across a 12-foot course.

COURSE

Length: 12 ft
Lane width: 36 in
Surface: waxed concrete at Expo

PAYLOAD

Classroom hexagon weights supplied by judges.
Teams choose the quantity to attempt.



SCORING • 50 PTS

Time: up to 15 points
Payload: up to 35 points
Only weight crossing the finish counts.

Payload points (finished weight)

<50 g — 0 pts	50–74 g — 10 pts	75–99 g — 12.5 pts	100–149 g — 15 pts
150–199 g — 20 pts	200–249 g — 25 pts	250–299 g — 30 pts	300 g (all kit weights) — 35 pts

No mission points if the course is not completed. Run ends after 3 seconds without progress, all weight is dropped, or device leaves lane.

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Mission 3 • Rural Clinic Delivery

TRACTION + CLIMBING + PROPULSION CHOICE

Goal: Carry a medical payload up the official Rural Access Road to a remote clinic.

THE RAMP

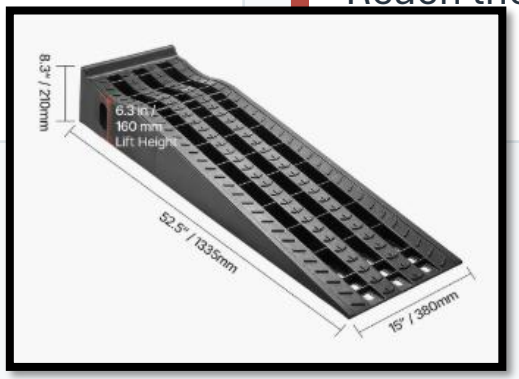
Official ramp supplied by NM MESA
Listed incline: 17°
Listed lift: 6.7 in
22 marked notches

START & RULES

Start 2 ft before ramp base
Sidewall contact is allowed
No touching or redirecting after release

SCORING • 50 PTS

Reach Notch 1: 10 points
Progress increases evenly through Notch 22
Reach the end: 50 points



What this mission tests

Traction • climbing ability • stability • cargo retention • energy management

Run ends after 3 seconds without progress, if device does not reach Notch 1, or if it leaves the ramp. Teams choose the quantity of Medical Supply Units to attempt.

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The full score: 150 points total

MISSION 1

50

Speed + fragile payload stability

MISSION 2

50

Cargo capacity + optimization

MISSION 3

50

Traction + climbing + propulsion choice

Final team score = Mission 1 + Mission 2 + Mission 3 = 150 points maximum.

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Read the judge score sheet • Missions 1 & 2

MISSION 1 — TIMED RUN + PING-PONG BALLS

For each of the two runs, the judge records:

- Mistrial (if applicable)
- Did Not Complete (if applicable)
- Time in seconds
- Number of ping-pong balls finished (0–3)
- Participation points (0 or 10)
- Student initials

The sheet says each run may receive 10 participation points.

MISSION 2 — TIMED RUN + PAYLOAD

For each of the two runs, the judge records:

- Mistrial (if applicable)
- Did Not Complete (if applicable)
- Time in seconds
- Payload attempted (g)
- Payload finished (g)
- Student initials

Only finished weight counts for payload scoring. Below 50 g earns 0 payload points.

Be ready to state your payload choice and let the judge see what crosses the finish line.

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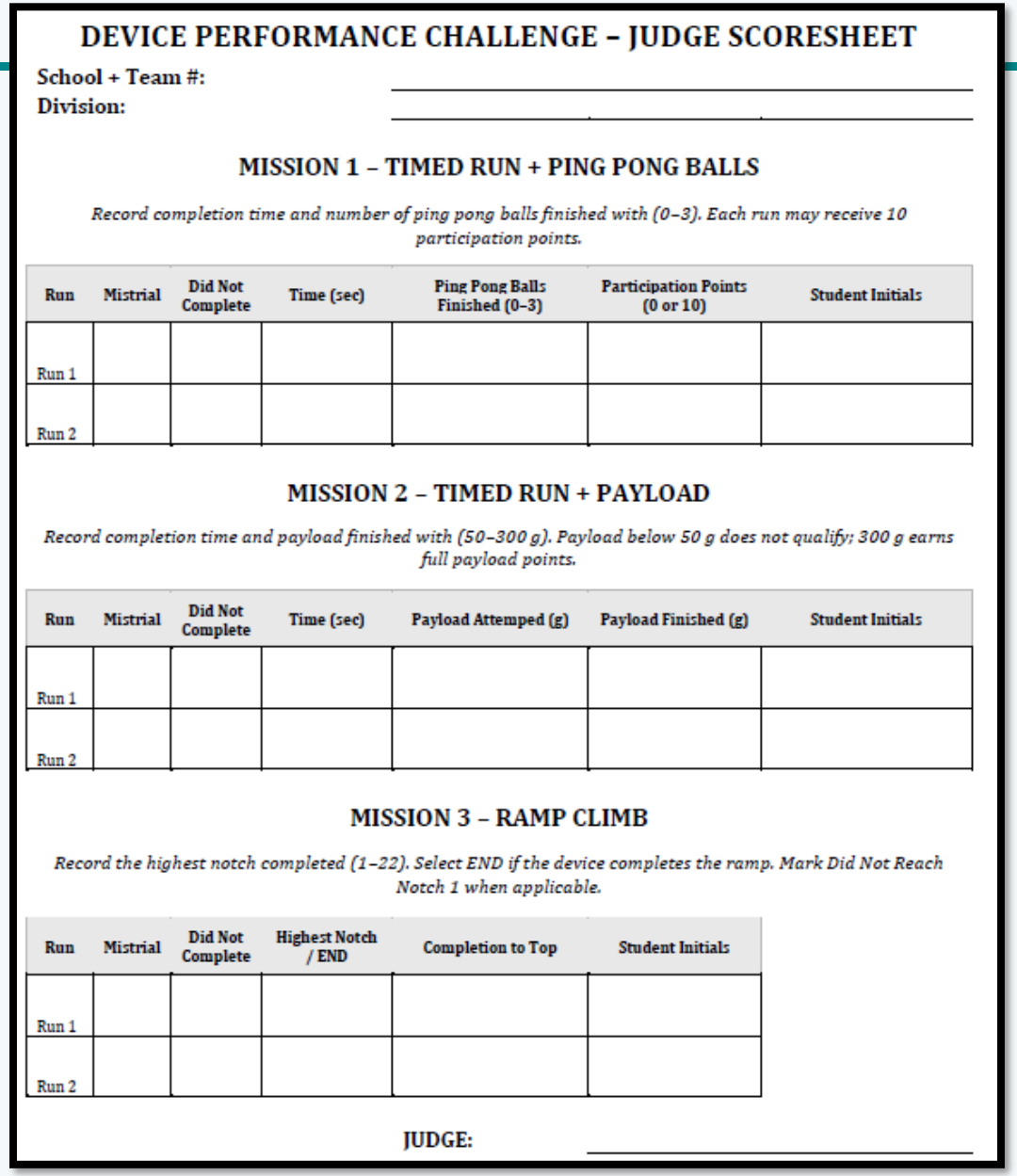
Read the judge score sheet • Mission 3

MISSION 3 — RAMP CLIMB

For each run, the judge records:

- Mistrial (if applicable)
- Did Not Complete (if applicable)
- Highest notch reached (1–22) OR END
- Student initials

Mark “Did Not Reach Notch 1” when applicable.



DEVICE PERFORMANCE CHALLENGE – JUDGE SCORESHEET

School + Team #: _____

Division: _____

MISSION 1 – TIMED RUN + PING PONG BALLS

Record completion time and number of ping pong balls finished with (0–3). Each run may receive 10 participation points.

Run	Mistrial	Did Not Complete	Time (sec)	Ping Pong Balls Finished (0–3)	Participation Points (0 or 10)	Student Initials
Run 1						
Run 2						

MISSION 2 – TIMED RUN + PAYLOAD

Record completion time and payload finished with (50–300 g). Payload below 50 g does not qualify; 300 g earns full payload points.

Run	Mistrial	Did Not Complete	Time (sec)	Payload Attemped (g)	Payload Finished (g)	Student Initials
Run 1						
Run 2						

MISSION 3 – RAMP CLIMB

Record the highest notch completed (1–22). Select END if the device completes the ramp. Mark Did Not Reach Notch 1 when applicable.

Run	Mistrial	Did Not Complete	Highest Notch / END	Completion to Top	Student Initials
Run 1					
Run 2					

JUDGE: _____

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Design Thinking: Prepare for all Three Missions

MISSION 1

How will you keep 3 fragile ping pong balls on board?

Can the device move quickly without bouncing, tipping, or dropping its payload?

MISSION 2

How much weight can you carry and still complete the course as quickly as possible?

How will cargo be secured and weight distributed?

MISSION 3

How will traction, gearing, or stored energy help climb?

Will the device stay stable and retain its payload?

Test, measure, adjust, and test again. Optimize the same device—not three separate vehicles.

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Before Competition Day: Team Checklist

☐ Device fits inside 12 × 12 × 12 in and weighs 5 lb or less.

☐ Device is safely portable by one team member and primarily student-built.

☐ Propulsion is approved; if electric, exactly one battery and one motor.

☐ No prohibited electronics, energy sources, or outside assistance.

☐ Same device can attempt all three missions and carry the appropriate payloads.

☐ Practice two runs per mission and rehearse the 1-minute reset.

☐ Be ready for random mission order and the judge's GO signal.

☐ Required continuous inspection video (maximum 3 minutes) is submitted; status is verified at inspection.

- MESA Day: By the Registration Deadline, Each team must submit one continuous video link no longer than 3 minutes. The video is used for rule verification, preliminary inspection, and engineering communication. It does not contribute points but is required for participation. If a team needs further inspection or there are team questions, in person times will be available.

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MESA Day Track: Required Video Prompts

1. Introduce Your Team: State the school name, team number, participant names, and division.
2. Name and Describe Your Device: Give the device name and briefly explain how it moves.
3. Identify the Propulsion System: Explain each propulsion system installed on the device, including mechanical systems and the one-battery/one-motor system if used.
4. Demonstrate Device Dimensions: Show the device against a ruler/tape, within a 12 x 12 x 12 measuring space, or another clearly measurable reference.
5. Show Device Weight: Place the complete device on a scale and clearly show the reading.

- If unable to show a scale, you must weigh independently and state the weight. Understand if it is not in compliance for competition it will be disqualified

6. Identify Construction Materials: Briefly identify the primary materials and purchased individual components.
7. Explain One Engineering Challenge: Describe one problem encountered and how the team changed or improved the design.
8. Explain Payload Placement: Show where medical payloads will be carried and how the design supports or retains them.
9. Demonstrate Reset Procedure: Show how the device is reset or re-energized between missions/runs.
10. Describe a Future Improvement: Explain one improvement the team would make with additional time.

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AWARDS: (Middle and High School)

Overall Teams: Placing 1st-3rd Overall

- Trophies will be awarded to the top 3 overall teams (1st-3th Place).
- Awards will be presented to individual team members placing 1st – 3rd Place overall.
- 1st Place-$100 Gift Card
- 2nd Place-$75 Gift Card
- 3rd Place-$50 Gift Card
- Awards will be presented to the top team in each individual event (1st Place).
- Additional awards may be provided.





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Water Filtration System
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https://www.nmmesa.org/event/mesa-competitions-2027/

«RETURN TO UPCOMING EVENTS

MESA Competitions 2027

This year our MESA Competition Day will host (2) Competition Tracks, MESA Day and MESA USA. Both track
will run concurrently during the same event. Please note some guidelines are different for ea

All of our MESA Day events will address the topic of "STEM for Health: E
the United Nations Sustainable Development Goals (UN-SD
schools are invited to participate in our MESA

- On Site Team Compet
- On Si Escape
- gn- Medical Transport Challenge
- Optional-School Banner

All of our MESA USA events will address the topic of "Designing for Local Change" and teams are required to incorporate a coding element in their prototype. NM MESA schools are invited to participate in our MESA USA Track as follows: Academic Poster, Design Proposal, Technical Pitch, and Symposium

CALENDAR

DETAILS

MESA Competitions 2027
Thu., April 29, 2027

Expo New Mexico
300 San Pedro Dr NE
Albuquerque, NM 87108

Event Registration Will Open January 2027

Related Resources

MESA USA NEDC Website - For MESA USA Templates

MESA USA NEDC Curriculum

2026-2027 MESA Competitions Handbook

REGISTRATION DEADLINE: Friday, March 26, 2027 at 5PM.

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