STEM Wars 2026

Lego Build Challenge

Event Coordinator:
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- Please contact him with any questions.

Challenge Overview

Students will **design and prebuild a LEGO bead dispenser** that reliably releases **small plastic beads** in a **controlled and repeatable way**.

Dispensers may be **manual or automated**, but must demonstrate **intentional control**, not dumping or gravity-only release.

This challenge is judged on **design quality, dispensing accuracy, and craftsmanship**.

Instructions

- Design and construct a **prebuilt LEGO dispenser** that releases plastic beads **on demand**.
- The dispenser must release beads in a **controlled quantity**, not all at once.
- Any LEGO bricks or kits may be used.
- The completed model will be **brought to STEM Wars** for judging.

Project Parameters (Required)

- Maximum footprint: **18 in × 18 in**
- LEGO elements only
- Beads will be supplied at the event (pony beads from Micheals or small dry lentils (peas))
- Dispenser must:
  - Hold **at least 20 beads**
  - Dispense beads into a container or target zone
- Model must stand freely (no clamps or table attachments)

Dispensing Requirements (Concrete)

Each dispenser must meet **ALL** of the following:

1. **Controlled Release**
    - Dispenses **5-15 beads per activation**
    - No full dumping or shaking allowed
2. **Repeatability**
    - Must successfully dispense beads **at least 3 consecutive times**
    - No rebuild or reloading between attempts (except adding beads)
3. **Activation Method**
    - One clear activation:
        - manual (lever, crank, slider, button) **OR**
        - automated (motor, sensor, programmed action)
    - Accidental release is not allowed
4. **Containment**
    - Beads must exit through a **defined outlet**
    - Beads may not spill from unintended openings

Design Requirements

- Internal mechanisms must be **partially visible**
- Decorative elements may not hide how beads are controlled
- The design must make it clear **how and why** beads are released

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Automation Rules (If Used)

- Motors and electronics **are allowed**
- Automated dispensers must:
    - Clearly show how motion controls bead flow
    - Stop dispensing without manual intervention
- Automation does **not** guarantee a higher score

Title Requirement

Each project must include:

- A **title (1–5 words)**
- No written explanation beyond the title

Judging Criteria (Summary)

Projects will be judged on:

- Dispensing control
- Design quality
- Repeatability
- Craftsmanship
- Clarity of mechanism

STEM Wars 2025 – LEGO Design Challenge
Precision Bead Dispenser | Simplified Judging Rubric

Category	10	5	1
Dispensing Control	Dispenses a consistent, controlled amount of beads on each activation.	Dispenses beads inconsistently but with some control.	Dumps beads or releases without control.
Repeatability	Successfully dispenses beads 3 times in a row without adjustment.	Dispenses successfully but requires adjustment or partial reset.	Cannot dispense beads reliably.
Design & Mechanism	Mechanism is clearly designed, intentional, and easy to understand.	Mechanism works but is cluttered or partially unclear.	Mechanism is unclear, hidden, or poorly designed.
Craftsmanship	Build is sturdy, clean, and well assembled.	Build functions but has loose or fragile elements.	Build is flimsy or poorly constructed.
Overall Clarity	Dispenser function is obvious and easy to demonstrate.	Function is mostly clear but requires explanation.	Function is confusing or difficult to demonstrate.

Disqualifications:
Dumping beads · Shaking or tilting to dispense · External supports · Non-LEGO components