Discover

Introduction: Within the specified time, use large particle building blocks to construct a material transport vehicle, traction device, and mechanical arm. After loading the materials, use the traction device to drag the transport vehicle to the designated area; Then manually unload the materials and finally operate the robotic arm to accurately transfer them to the target position.

≤ 6 years old

Rule revision v1-2025.9.15
Rules added to ROBOBOOM

1. Competition Field

Field dimensions: 0.5m × 1.1m (material: UV knife-coated fabric).

2. Robot Requirements

A. Participants must bring their own equipment. All parts must be large-grain building blocks (brand-agnostic). Recommended kits: LEGO® Basic Set 9090, LEGO® Pipe Set 9076, LEGO® Engineering Set 45002, LEGO® Mechanics Set 9656, or equivalent kits from other brands.
B. No materials other than large-grain blocks are allowed (strings are exempt).



C. Teams are recommended to use equipment cases for transportation.

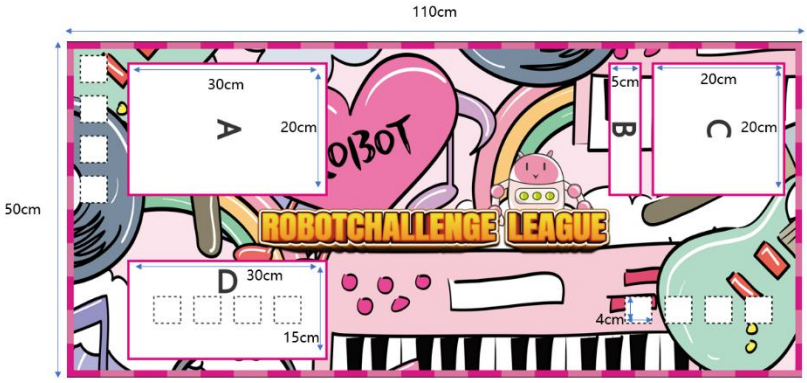
3. Competition Tasks

3.1 Task Overview

A. Contribute to the music festival’s infrastructure with your ingenuity!
B. Build a material transport vehicle, use a towing device to pull it to the designated area, and deploy materials precisely using a robotic arm.

3.2 Field Markings and Props

A. Zones:
Start Zone (A): Transport vehicle begins here.
Stop Zone (B): Transport vehicle ends here.
Towing Device Zone (C): Build towing equipment here.
Material Drop Zone (D): Place materials here.
Materials: 4 DUPLO® balls (any color).
B. Only the field layout and markings are provided during the competition. All building materials and props must be brought by the team.

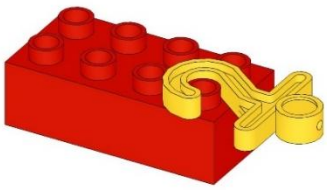


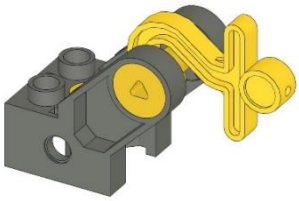
3.3 Build Task

A. Place four 2×2 blocks (any color) in Zones A, B, and D as bases for DUPLO® balls.

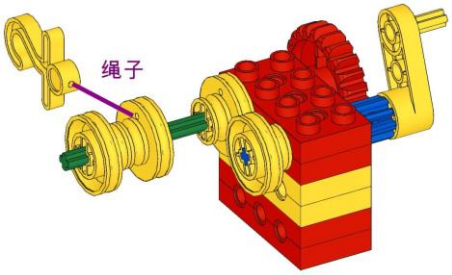
B. In Zone A, build a wheeled transport vehicle. Size must not exceed Zone A (height unrestricted). The vehicle must use axles for movement and include a cargo compartment for DUPLO® balls.

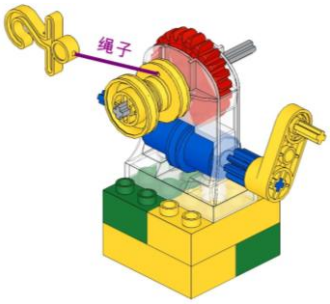
C. The vehicle must have a hook-compatible structure for towing (design flexible, but must function effectively).





D. In Zone C, build a towing device with gear transmission (must be speed-reducing). Include a hook, rope, and winch. Size must not exceed Zone C (height unrestricted).





E. Rope ends may be pre-attached to hooks/winches. Ensure sufficient rope length.

F. Towing power must be manual (human-operated).

G. Build a robotic arm to pick up DUPLO® balls (size and length unrestricted).

H. Non-compliant builds (transport vehicle, towing device, robotic arm, or block bases) will not score points unless they do not hinder task completion.

I. If non-compliant parts hinder tasks, teams may only complete unaffected tasks (e.g., incomplete robotic arm = 0 points for that stage).

3.4 Task Execution

A. Assembly order is flexible.

B. After building, place the transport vehicle in Zone A and manually load DUPLO® balls.

C. Attach the towing hook to the vehicle. Operate the gear system to tow the vehicle to Zone B (partial entry into B counts as success).

D. If parts fall or malfunction during towing, restart from Zone A (no reloading required). Each restart deducts points.

E. After transport, manually place balls onto Zone B’s block bases.

F. Dropped balls during loading/placement may be retrieved (each ball scores half points if dropped).

G. Use the robotic arm to transfer balls from Zone B to Zone D’s block bases.

H. Dropped balls during transfer must be manually returned to Zone B's bases (points deducted per drop).
I. Task ends when all transfers are complete.
J. Tasks must follow sequence. Team members may coordinate roles.

3.5 Scoring Criteria

A. Placing block bases in Zones A/B/D: 10 points.
B. Functional transport vehicle: 30 points.
C. Functional towing device: 30 points.
D. Functional robotic arm: 30 points.
E. Loading balls into vehicle: 10 points/ball.
F. Dropped balls during loading: 5 points/ball.
G. Successful transport: 10 points/ball.
H. Restart penalty: -5 points/restart.
I. Placing balls in Zone B: 10 points/ball.
J. Dropped balls during placement: 5 points/ball.
K. Robotic arm transfer to Zone D: 20 points/ball.
L. Dropped balls during transfer: -5 points/drop.

3.6 Total Score

A. Building score: 100 points max. Task score: 200 points max. Total: 300 points.
B. Time bonus: 10% of total score (based on remaining seconds).
C. Time bonus = (Remaining time ÷ Total time) × 30.
D. Total score = Task score + Time bonus.

4. Competition Requirements

4.1 Time Limit

10 minutes per team (includes assembly and tasks).

4.2 Rounds

2 rounds per team.

4.3 Start of Competition

A. Judges inspect equipment for compliance before each round.
B. Teams place disassembled equipment near task zones and signal readiness.
C. Countdown: 3-2-1, whistle starts the round.

4.4 End of Competition

A. Time ends at 10 minutes; final score tallied.
B. Teams may finish early; time stops when signaled.

4.5 Rankings

A. Best of two rounds determines ranking.
B. Tiebreaker: Team with more remaining time in highest-scoring round wins.
C. Further tiebreaker: Compare secondary scores and remaining times.

"Discover" Scoring Sheet

Judge Items			Value	Points	Score
1	Assembly Score	Placing block bases in Zones A/B/D	0 1 (N) (Y)	10	
		Functional transport vehicle	0 1 (N) (Y)	30	
		Functional towing device	0 1 (N) (Y)	30	
		Functional robotic arm	0 1 (N) (Y)	30	
2	Task Score	Loading balls into vehicle	0 1 2 3 4	10	
		Dropped balls during loading	0 1 2 3 4	5	
		Successful transport	0 1 2 3 4	10	
		Restarts during transport		-5	
		Placing balls in Zone B	0 1 2 3 4	10	
		Dropped balls during placement	0 1 2 3 4	5	
		Robotic arm transfer to Zone D	0 1 2 3 4	20	
		Dropped balls during transfer		-5	
3	Time bonus = (Remaining time (seconds) ÷ Total time (seconds)) × 30 (10% of total score)				
			Total Score		
			Remaining Time:		