



Lando Engineering & Design Thinking

Semester Overview - *Space Odyssey*

Summary

Lando classes teach students the skills needed to **solve real world engineering problems** without relying on step by step instructions. Our unique classes give students the freedom to **explore their own solutions** to engineering problems, while our **expert teachers** guide them with tactical hints and suggestions, as well as explanations of core engineering and design concepts. This approach allows them to gain early exposure to complex concepts and ideas, while developing the **mental toughness and perseverance** necessary to solve difficult challenges.

Our curriculum has been designed specifically to foster grittiness and creativity in our students and by the end of our semester, your child will have gained the **confidence and ambition to solve problems** through **iterative design and engineering**. Studies have shown that the combination of grittiness and desire to tackle new problems, without waiting for a provided answer, is a key driver of student performance.

- ***Problem Solving:*** Students enhance their problem-solving skills through constructing a range of structures like houses and vehicles with LEGO bricks. Engaging with LEGO sets, children learn to think critically, connecting diverse pieces to surmount challenges and refine their abilities. This tactile method not only cultivates creativity but also hones their capacity for innovative solutions in a fun and interactive setting.
- ***Creativity:*** Fostering creativity is essential, and our challenges offer an enjoyable and impactful method to encourage kids to think creatively. Every challenge ignites their imagination, demanding innovative approaches to construct distinct structures. Through these activities, children not only cultivate but also actively apply their creative abilities to problem-solving, all within a stimulating and engaging setting.
- ***Collaboration:*** Lando serves as an outstanding tool for promoting teamwork and social skills among children. By engaging in collaborative challenges, kids are encouraged to cooperate, which nurtures a strong sense of camaraderie. The act of playing with LEGOs naturally brings children together, creating an enjoyable environment that not only ensures they have a great time but also teaches them the value of working as a team. Through these shared experiences, children learn essential interpersonal skills in a fun and interactive way.

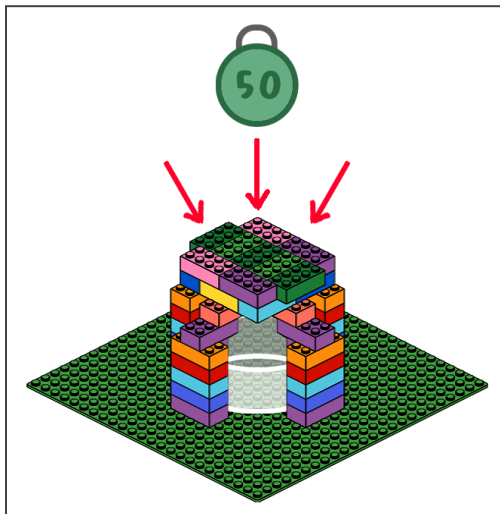
Semester Detail

The following details each challenge completed by our students during our semester. We send challenge reports after every class, showing parents their children's creations and demonstrating the progress students have made. Each challenge report will include pictures of their child's solution and explanation of the challenge they completed.

[See an example Challenge Report](#)

(Weeks 1-2)

Class 1 - Durable Dome

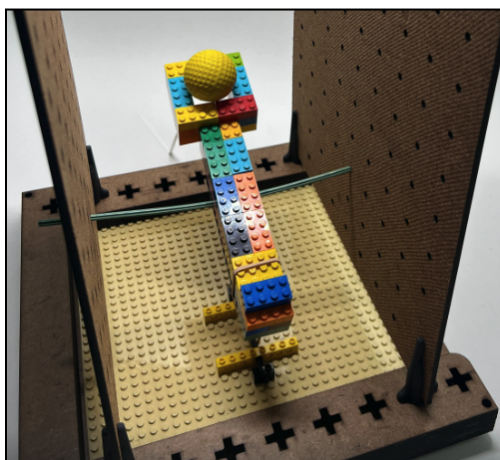


In our dome challenge, students will **learn how to construct resilient domes without any central supports**. The objective is to design domes that can endure the impact of increasingly heavier weights dropped from above. This test will challenge students to think innovatively about **structural integrity and weight distribution**. If a dome isn't built to withstand these rigors, it will break under the pressure, providing a **practical lesson in the principles of strong architectural design**.

Challenge Report Template for Durable Dome:

<https://www.findlando.com/challenge-report/jlsypi1416o>

Class 2 - Catapult



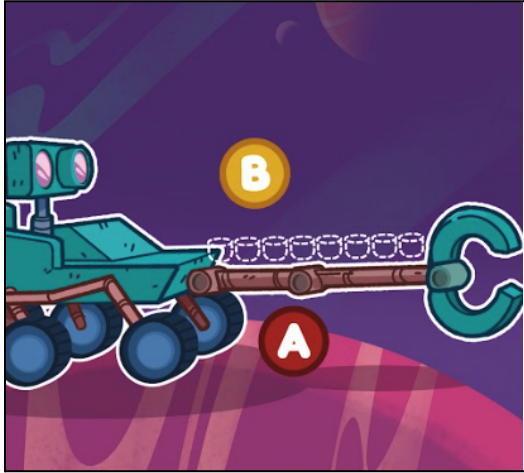
In our catapult challenge, students will explore the **principles of energy transfer and mechanics**. The objective is to design a catapult that can launch objects increasing distances. By experimenting with the arm length, pivot point, and tension of the catapult, students will understand how potential energy can be converted into kinetic energy. Through this engaging project, students will learn not just how to build a catapult, but also **gain critical early exposure to the science** that makes it work effectively.

Challenge Report Template for Catapult:

<https://www.findlando.com/challenge-report/mtfflfgregb>

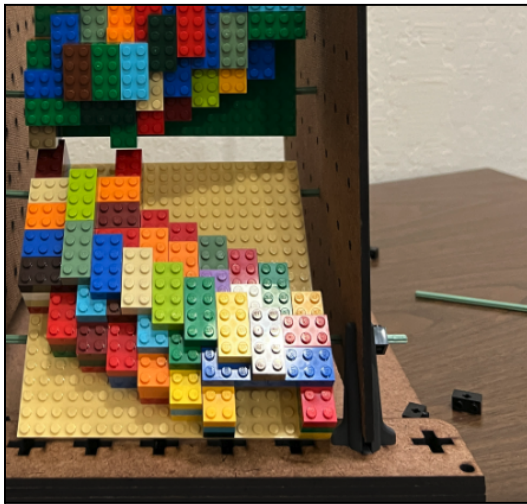
(Weeks 3-4)

Class 3 - Rebuilding a Village



In this class, students **will use 3D pens** to create essential components for constructing a new town on an alien planet. They'll be tasked with **designing and building a variety of critical structures and devices**, such as a functional rover for exploration and strong shields to protect the town from falling asteroids. This challenge **encourages creativity and innovation**, as students brainstorm and materialize solutions for the unique environmental challenges of an extraterrestrial setting. This hands-on project **not only hones their 3D design skills** but also instills a **sense of resourcefulness and adaptability**, crucial for thriving in an unfamiliar and dynamic environment.

Class 4 - Underground Tunnel



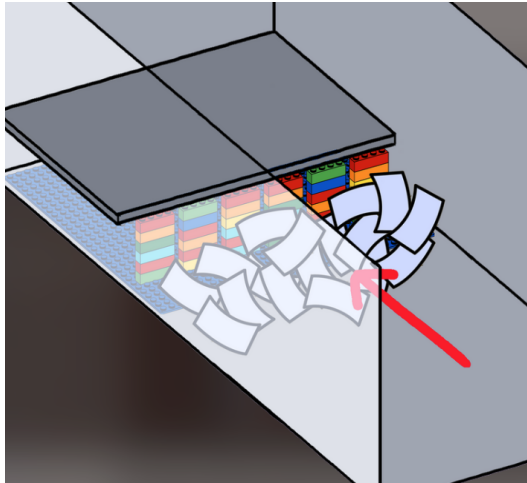
In the underground tunnel challenge, students will tackle the **intricate task of constructing a tunnel** capable of securely and effectively guiding a package through disparate paths, ranging from 0 to 270 degrees. This challenge requires a blend of iterative design and meticulous planning, as students must ensure the tunnel's structure can handle a wide range of angles and objects. The exercise tests not only their engineering skills, but also their **ability to adapt and refine their designs** for optimal performance in a dynamic environment.

Challenge Report for Underground Tunnel:

<https://www.findlando.com/challenge-report/czqjan9slun>

(Weeks 5-6)

Class 5 - Air Filter

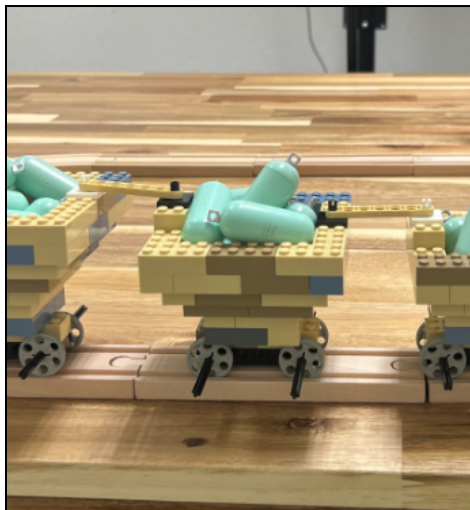


In our air filter challenge, students will learn about the **effectiveness of multi-layered filtration**. The task involves designing filters that combine coarse layers for large particles and fine layers for small particles, ensuring comprehensive air purification. Success will be tested by filtering a mix of differently sized debris, with clean air post-filtration indicating a successful design. This challenge will enhance students' **understanding of air filtration technology** and its practical application in environmental engineering.

Challenge Report Template for Air Filter:

<https://www.findlando.com/challenge-report/n6p20ehap6c>

Class 6 - Luggage Train



In our train challenge, students will explore various solutions to the complex task of **transporting weight across train tracks**. This challenge will be tested by navigating the constructed carts along a winding track, providing a practical and engaging way to understand the dynamics of **weight distribution, structural integrity, and efficient design**.

Challenge Report Template for Luggage Train:

<https://www.findlando.com/challenge-report/ggdovxudvw0>

(Weeks 7-8)

Class 7 - Elevator

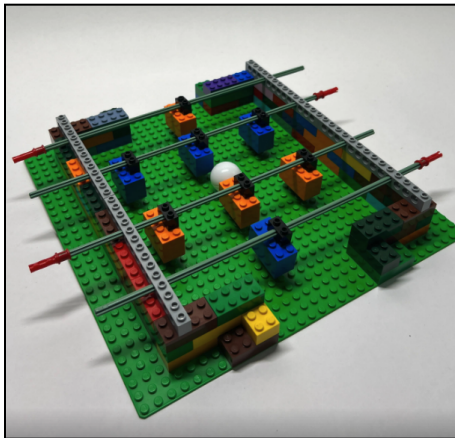


In our elevator challenge, students will delve into the critical concepts of **weight distribution and the use of counterweights**. The challenge involves the elevator lifting increasingly heavier loads, emphasizing the necessity of a well-balanced counterweight system. Success hinges on ensuring that the elevator is properly counterbalanced, the weight is adequately distributed, and the elevator car utilizes proper interlocking, fostering a **preliminary understanding of these fundamental physics principles** in our students.

Challenge Report Template for Elevator:

<https://www.findlando.com/challenge-report/ruyq9x0jddn>

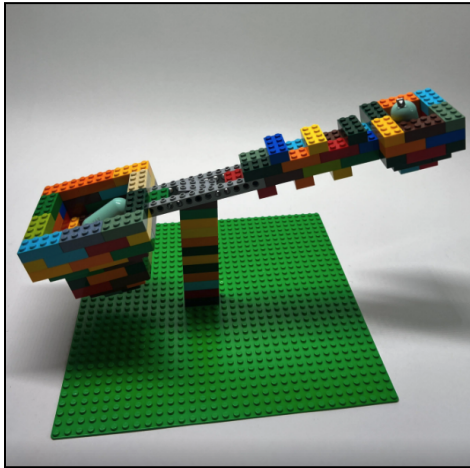
Class 8 - Foosball Table



Our Foosball challenge will be tasked with constructing a **fully functional foosball table** using only lego bricks. This challenge will teach the **intricacies of mechanical design** as they must create an operational playing surface, usable player figures and a reliable scoring system to ensure the table is both durable and playable. Throughout this engaging hands-on project students will push their creativity as they navigate translating a traditional game into a Lego masterpiece!

(Weeks 9-10)

Class 9 - Giant Seesaw



Our giant seesaw challenge teaches students the **importance of torque**. The goal of the challenge is to build a mechanism that can lift progressively heavier objects using only a 100 gram weight. We limit the lego resources available to students, so only by leveraging the power of torque can students **successfully use the same weight to lift heavier objects** (up to 3 pounds!)

Challenge Report Template for Seesaw:

<https://www.findlando.com/challenge-report/i1loxcxxmem>

Class 10 - Giant Dome



Our giant dome will put **everything we've learned in our semester to the test!** The class is split into teams, and each team is tasked with building a giant dome (with no direct supports) that can support a very heavy weight falling from the sky! Proper weight distribution and interlocking are the keys to the construction of a strong and durable dome. This class **culminates your child's learning throughout the semester** and re-emphasizes the importance of teamwork, task delegation, and LEGO engineering fundamentals!

Class Structure

Each of our two hour classes will generally follow the timeline below

Summary	Time	Duration	Activity Detail
Challenge Introduction	0:00 - 0:05	5 minutes	Classroom Introduction: Attendance, review of previous class, norms re-establishment, brief logistics discussion
	0:05 - 0:10	5 minutes	Challenge Setup: Understanding of the story, key vocabulary review
Challenge (Part 1)	0:10 - 0:15	5 minutes	Prototype: Students draw and explain components, then start the challenge
	0:15 - 1:15	60 minutes	Individual Challenge: Students progress through the challenge independently
Break	1:15 - 1:25	10 minutes	Break: Students go to the bathroom, have snacks, and play outdoor games
Challenge (Part 2)	1:25 - 1:50	25 minutes	Individual, Team, or Creative Challenge: Students continue the challenge where they left off.
Clean-up & Dismissal	1:50 - 2:00	10 minutes	Clean Up and Reflection: Students clean up and, time allowing, reflect on their learnings from the day