# **LEGO Zipline**



## Mid-Valley STEM-CTE HUB

www.midvalleystem.org midvalleystemctehub@linnbenton.edu Linn-Benton Community College Albany Campus - CC-212



## **LEGO** Zipline

The LEGO Zipline kit enables hands-on STEM learning through building and testing zipline models. Students explore concepts in physics, engineering, and motion while constructing functional zipline systems. The kit supports activities that promote creativity, problemsolving, and teamwork. This kit encourages project-based exploration of basic engineering and physical science principles.



### **Grade Level**

3rd - 12th grades

**Group Size** 

**Time Duration** 

1 to 4 students per kit

60 minutes - multiple sessions

### **Content of Kits**

#### Components

- Zipline twine
- Lawn stake
- 1x Individual zipline kit
- 6x group of four zipline kits

#### **Complementary Kits**

The LEGO Zipline kit pairs well with the Action Camera kit.



## Usage

## **Getting Started**

- 1. Set up a zipline using the included twine and optional lawn stake. Ensure the zipline has a slope to help the gondolas travel forward.
- 2. Have students lay out their pieces to understand the available components for designing.
- 3. Have students design and construct a sturdy LEGO gondola that can attach to the zipline and hold a LEGO figure.

4. Attach the gondola to the zipline, release it, and observe how it moves. Adjust the weight, balance, or angle to optimize performance.

5. Make any necessary adjustments to the zipline to ensure secure endpoints and sufficient rope tension.

## Storage

When storing return all components back to the provided storage container. Ensure the gondolas and zipline are disassembled. Ensure the zipline twine is detangled and neatly wound, and that the lawn stake is clean and free of dirt.

## Troubleshooting

- Zipline Carrier Moves Too Slowly or Stops Check for friction points to ensure the wheels or attachment points move freely. Try adjusting the angle of the zipline to create a steeper slope for more speed.
- **Carrier Spins or Flips** Ensure the weight is evenly distributed on the carrier. Adding small LEGO pieces to balance the load can help stabilize movement.
- Zipline String Sags or Is Uneven Tighten the zipline string and secure both ends firmly to maintain a consistent slope. If needed, adjust the anchor points to create a smoother path.



## **Activity Guide**

#### Beginner

#### Simple Zipline

Build a LEGO zipline and gondolas to explore gravity and friction. Using LEGO, create a gondola to hold a mini-figure, then set up a zipline between two points at different heights. Adjust for stability, speed, or balance by modifying weight distribution and zipline angle. This activity encourages problem-solving and introduces key engineering principles in a fun, interactive way.

#### Intermediate

#### Optimizing the Zipline Gondola

Students will design their LEGO zipline gondolas for speed, stability, and efficiency. Experiment with different gondola shapes, configurations, and weight distributions to minimize friction and maximize smooth movement. Using a stopwatch, students will record travel times, test how factors like zipline angle and gondola design impact performance, and analyze their results.

#### Advanced

#### Cargo Delivery Challenge

Design a gondola capable of safely transporting a small "cargo" item, such as a marble, from one end of the zipline to the other. They must engineer a gondola that can secure the cargo, withstand impact at the landing point, and complete the journey in the shortest possible time. After testing and refining their designs, they will present their findings. This project enhances engineering, physics, and critical thinking skills while applying real-world problem-solving concepts.

#### **Extension Activities:**

#### Zipline Transportation System Challenge

Building on previous zipline projects, the entire class will collaborate to design and construct a multi-stop LEGO zipline transportation system. Students will divide into teams, each responsible for creating a gondola with a specific purpose, such as passenger transport, cargo delivery, or emergency rescue. They will coordinate to ensure that all gondolas function efficiently on a shared zipline network, adjusting designs to accommodate weight differences, speed variations, and docking mechanisms at designated stations. Through testing and iteration, students will refine their designs to improve system reliability and efficiency. At the end of the challenge, they will present their transportation network, explaining design choices and problem-solving strategies. This activity fosters teamwork, communication, and engineering problem-solving while reinforcing STEM concepts in an engaging, real-world scenario.



## **Learning Extensions**

### **STEAM Connections: Engineering - Physics - Design**

#### Learning Objectives:

- Understand Physics Concepts
- Apply Engineering Principles
- Develop Problem-Solving Skills
- Enhance Collaboration
- Encourage Creativity

#### **Career Connections:**

- Mechanical Engineering
- Aerospace and Transportation
- Construction and Structural Design
- Theme Park and Adventure Course Design
- Robotics and Automation

### **Essential Employability Skills:**

- Communication
- Adaptability
- Time Management
- Planning
- Organization
- Teamwork
- Problem Solving
- Creative Thinking





## **Resources and Accessibility**

## **Safety Guidelines**

- Secure the Zipline Ensure the string is tightly fastened to prevent sagging or detachment during use.
- Use Stable Anchor Points Attach the zipline to sturdy objects that won't tip over or shift under tension.
- Keep Hands Clear Avoid touching the gondola while in motion to prevent pinched fingers or disruptions.
- Supervise Elevated Setups If using high anchor points, ensure safe handling and avoid standing on unstable surfaces.

### **Accessibility**

- Adjust Zipline Height Set up the zipline at an accessible height to accommodate students with mobility challenges.
- Offer Alternative Builds Provide modified gondola designs that are easier to handle or assemble for students with fine motor difficulties.
- Use Verbal and Visual Instructions Provide step-by-step guidance in multiple formats, including written, visual, and audio instructions.
- Encourage Collaborative Roles Allow students to contribute in different ways, such as designing, testing, or documenting results, to ensure full participation.

## Library Catalog



## **Library Resources**



## Feedback

QR to feedback survey

