

Before we begin:

- We want to know who is here! Please introduce yourself in the chat: Name. School.
- Please mute your microphone to reduce background noise.
- We will leave time for Q & A. Please submit your questions via the Google form that will be shared in the chat.
- This presentation, along with the questions and answers, will be posted on the WESO website.



Zip-A-Dee-Doo-Dah WESO 2022

Event Supervisors:

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Goals for this event:

01

PHYSICS SKILLS

Concepts for zip line -
friction, air resistance,
gravity and average
velocity

02

CREATIVITY

Encourage creativity and
flexibility in building a
cable car with materials
unknown in advance

03

TEAMWORK

Working together to
solve a challenge

Event Format

- GRADES: 2, 3, 4, 5
- TEAM SIZE: 1-3 participants (per grade)
- DURATION: 30 minutes

The detailed event description can be found at: <https://wesoscience.org/events/>

EVENT FORMAT OVERVIEW

- **Written test for grades 4 & 5 ONLY** (5 minutes)
 - 3 multichoice, one free response average velocity calculation
- **Hands-on for all grades** (23 minutes)
 - Using a few household materials, each team will construct a cable car to safely carrying a ping-pong ball down a zip line to achieve a target run time
 - Build the cable car (8 minutes)
 - Testing and modifying the cable car (15 minutes)

WRITTEN TEST

Grades 4 & 5 ONLY

- **2-3 multiple choice questions** testing the physics concepts of the zip line (friction, air resistance, gravity)
- **1 free response question** - average velocity calculation using sample data
 - $v_{avg} = \Delta x / \Delta t$
 - where Δx is change in position and Δt is change in time
 - This formula will not given in the test
- Sample data will be in SI units, and the final answer should be provided in SI units as well

BUILD THE CABLE CAR

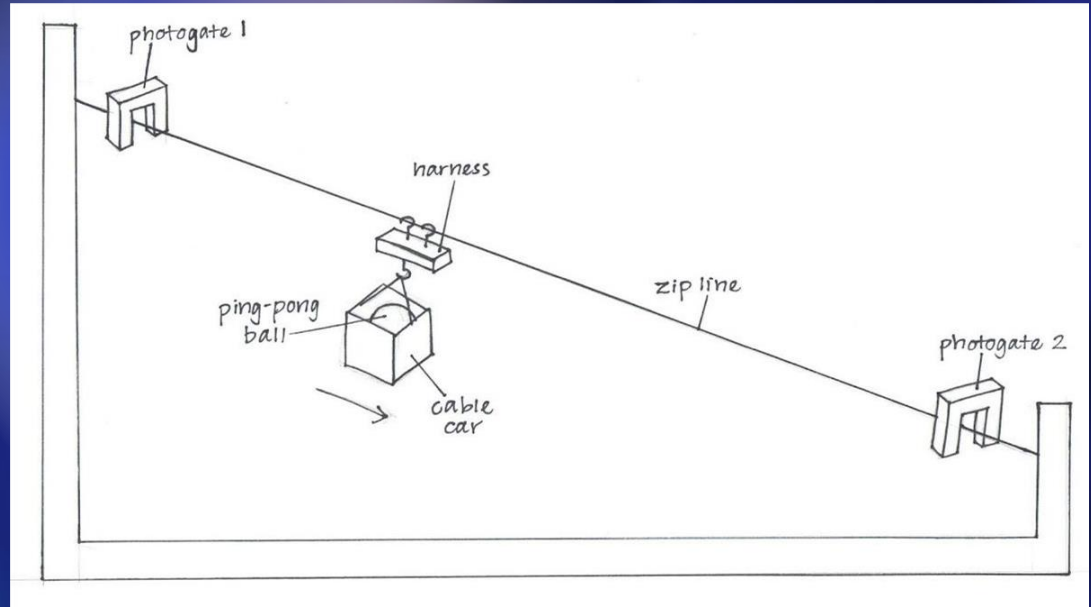
- Using the materials provided, each team will build a cable car to safely carry a ping-pong ball down a zip line
- Target time and zip line dimensions will be disclosed to teams
- 2 test zip lines (not the same dimensions as the competition zip line) are available
- Provided tools: scissors, tape, glue, calculator, zip line harness

Items could include

- 3oz Dixie Bath Cups
- straws
- construction paper
- washers
- cardboard tubes
- paper clips
- yarn
- zip ties
- rubber bands
- pipe cleaners

TEST & MODIFY THE CABLE CAR

- 3 cable car runs
- Teams place ping pong ball in cable car, attach to zip line harness, and release
- After 1st and 2nd runs, team has 2 minutes to modify using the remaining materials
- Run time is measured using photogates



SCORING

- Only the best run time (closest to the target time) of the three trials for each team will be considered
- The team(s) with the least deviation from the target time will be given a cable car rank of 1. The team(s) with the second lowest deviation will have a score of 2, and so on
- GRADES 4 & 5
 - Teams will also be ranked based on their written test score, with the highest scoring team(s) receiving a rank of 1
 - The final score for each team in grades 4 & 5 will be computed as follows:
 - Final score = cable car score + 0.2 * written test rank

EXAMPLE QUESTION

GRADES 4 & 5 ONLY

What force causes the cable car to accelerate down the zip line?

- a). Friction
- b). Gravity
- c). Air resistance (drag)
- d). Spring force

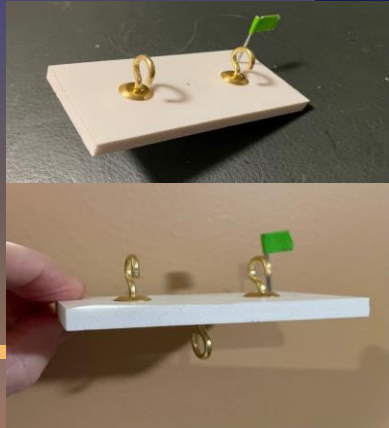


Invisible Cord for Zip Line

Hillman Fasteners Invisible Cord, 25' long, 15lb rated.

Available at many local hardware stores (Stadium Hardware, True Value, etc.)

Event Materials distributed by WESO



Cable Car Harness

1.5" x 3" Komatex block with 2 cup hooks for Zip line and one cup hook to hang the cable car. Flag triggers photogate.

Ask your Head Coach for these items!

Additional Materials useful for practices

Household items could include

- 3oz Dixie Bath Cups
- straws
- construction paper
- washers
- cardboard tubes
- paper clips
- yarn
- zip ties
- rubber bands
- pipe cleaners

Scissors

Ping Pong Ball

Method for timing runs

- Stopwatch
- Photogates

COACHING ADVICE

- Encourage team to think about how to increase/decrease run time
- Release from the same point, in the same way each time - consistency is key!
- Creativity is important, teams will not know what materials they have to build with until they arrive
- You do not need a fancy set up to practise for Zip-A-Dee-Doo-Dah
- For grades 4 & 5, make sure they know how to calculate average velocity
- Don't over coach your team!
- Make sure they support each other
- Most importantly, make it fun!

Questions after tonight?

Please submit questions about this event to weso.events@gmail.com. Enter the event title in the subject line. Answers will be posted on the WESO Blog. You can sign up to receive the blog posts at wesoscience.org.

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QUESTIONS NOW?



- Please submit your questions now using the Google form that was shared with you in the chat.
- We will answer live and post all questions and written answers to the website following the meeting.

Thank you for serving as an event coach and helping us bring back WESO to our community!