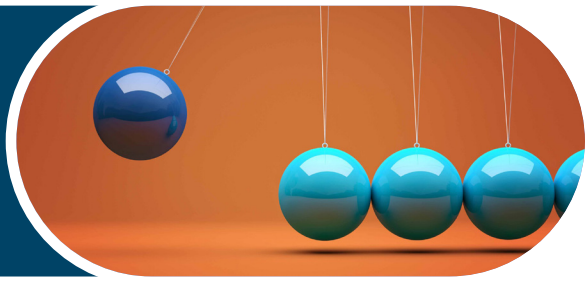
DIGITAL DISCOVERY WORKSHOPS

Teacher Toolkit: Forces of Energy | Grades 3–8



PROGRAM OVERVIEW

Get familiar with the program content.

Program Description

Explore the world of energy as we discover what makes it possible for things to move, change, and grow! Follow the flow of energy while learning how forces can help us transfer energy from place to place, producing the power we use each and every day.

Program Objectives
Participants practice looking for the four signs of energy: light, heat, sound, moving objects.
Participants practice and observe using forces to move objects and transfer energy.
Participants understand that energy system engineers can build technology to transfer energy to our communities using other transfer methods: moving objects, sound, light, heat, or electric currents.
Participants practice observing the transfer of energy through an engineered system.

Program Key Words (English/Spanish)
Energy / la energía
Force / una fuerza
Transfer / transferir
Produce / producir
Model / un modelo
Generator / el generador

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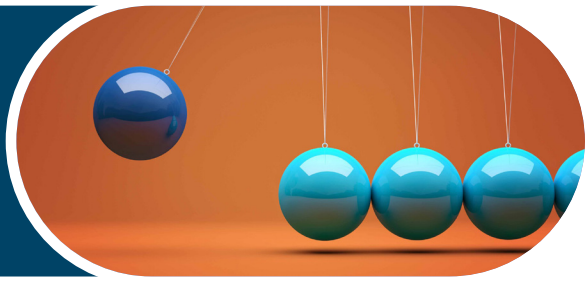
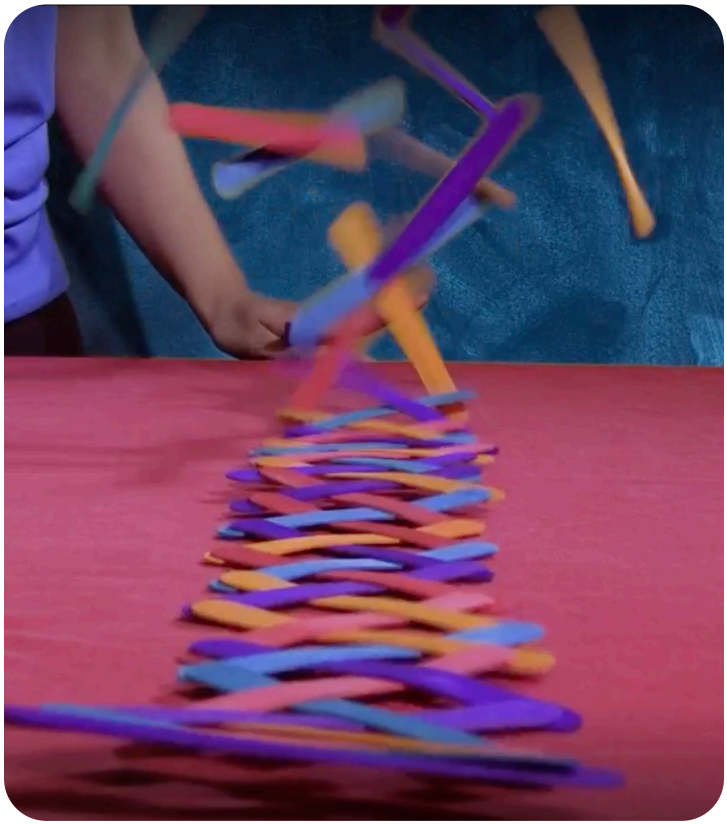


Program Outline

Subject to change

- Introduction of program and expectations.
- What is energy?
- Make observations of campfire.
- Explore some signs of energy:
  - Moving objects.
  - Sound.
  - Light.
  - Heat.
- How do we get energy? It's transferred from elsewhere.
- Explore forces as a way to transfer energy.
- Popsicle stick energy transfer demonstration.
- Follow the transfer of energy:
  - Stirling engine observations.
  - Card sorting activity to show energy transfer.
- Program conclusion.



Required Materials

- ❑ Student Handout: **Click to download** and print double-sided, one per student.
- ❑ Transfer of Energy Challenge Cards: **Click to download**. Print and cut out cards in advance; one card set per student or pair/small group of students.

View Supported NGSS

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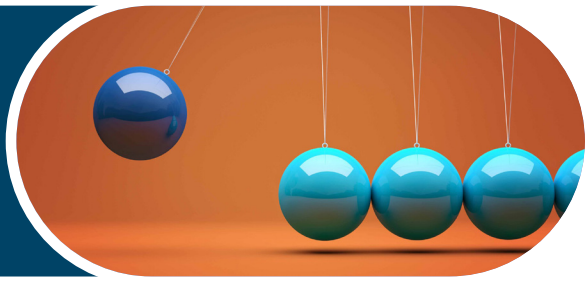

BEFORE THE PROGRAM

DISCUSSION PROMPTS

Use these prompts to lead an optional pre-program discussion and reflection in your class.

- What do you think of when you hear the word energy?
- What are some things you already know about energy?
- What are some examples of things that need energy? Where does the energy we need for these examples come from?
- What do you think of when you hear the word force?

DURING THE PROGRAM

Please have the following worksheets printed and ready for your students to follow along with during the live presentation

PRINTABLE WORKSHEETS

- Required Student Handout: **Click to download** and print double-sided, one per student.
- Required Transfer of Energy Challenge Cards: **Click to download**. Print and cut out cards in advance; one card set per student or pair/small group of students.

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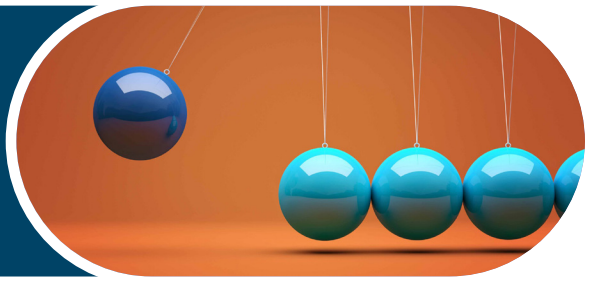
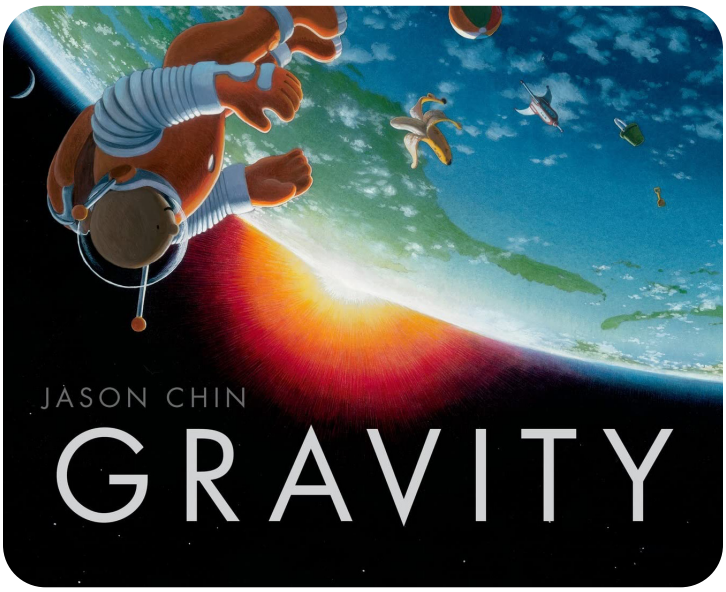


AFTER THE PROGRAM

These optional extension resources can be used within the learning space, or shared with students to do at home with their families.

ACTIVITY GUIDES

- **Use the Force** | **Utiliza la Fuerza:** Invisible forces are at work that move and shape our world. Build off the pencil moving challenge from the Digital Discovery Workshop in this simple activity to move objects without a physical push! Activity time: 15–30 minutes.
- **Dancing Salt** | **Sal Bailarina:** See how energy transfers through sound waves as you try to make salt dance. Activity time: 15–30 minutes.
- **Wind Powered Cars** | **Vehículos Impulsados Por El Viento:** Become an energy engineer and harness the invisible force of wind to power a vehicle of your design. Activity time: 30–60 minutes.



STEAM VIDEO

- Meet Malini Ghosal, a power systems engineer with the Pacific Northwest National Laboratory in this eight-minute video: **Exploring the Power Grid**. Discover how electricity flows through the power grid to make our lives possible, and hear Malini answer student questions about what it's like to be a power systems engineer, how electricity travels long distances, and more!
- Build your own rubber band guitar using simple materials as you explore the physics of sound in this follow-along activity video: **Amped about Acoustics**. Activity time: 20 to 30 minutes.

READING LIST

- Check out the **Forces of Energy reading list** for STEAM books related to the program themes.

For more activities with simple materials, check out the **Curiosity at Home** / **Curiosidad en Casa** *web page. Explore activity sheets by age group and topic in both English and Spanish.*

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