



THE PAPER GIRLS SHOW

EDUCATIONAL GUIDE

EPISODE 8: NOT REMOTELY FUNNY

TOPICS: FORCE, MOTION & DESIGN

EPISODE SYNOPSIS

Reese and Caily are mortified when the paper airplane they use to send notes is intercepted. In Confetti, they take a ride in Seymour's airship and get an idea for a better delivery mechanism.

FEATURED STEAM TOPICS

BIG IDEA – Force and motion are important science concepts that help us to understand how objects move. Motion is the scientific word used to describe types of movement.

EXPLANATION FOR CHILDREN:

Airplanes, including paper airplanes, fly through the air because of forces that you can't always see but are always there acting upon the airplane. A force is something that pushes or pulls on something else. When you throw your paper airplane in the air you are giving your airplane a big push (force) to help it move forward. . Once planes are flying, air moves over and under the wings which is another force acting on the plane. Your paper airplane also gets pulled back down to the ground because of the force of

gravity. Some paper airplanes will fly farther or longer than others because their design helps them to make good use of force so that they have a successful flight.

RELATED CONTENT STANDARDS (CORE CURRICULAR AIMS) IN THIS EPISODE

The standards and curricular aims listed below are linked to this episode's extension activities. Each activity is designed to promote children's thinking and action in physical science and engineering design as they explore ideas about force and motion.

Related Disciplinary Core Ideas

Forces and Motion:

Pushes and pulls can have different strengths and directions.

Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

Type of Interactions:

When objects touch or collide, they push on one another and can change motion.

Relationship between Energy and Forces:

A bigger push or pull makes things speed up or slow down more quickly.

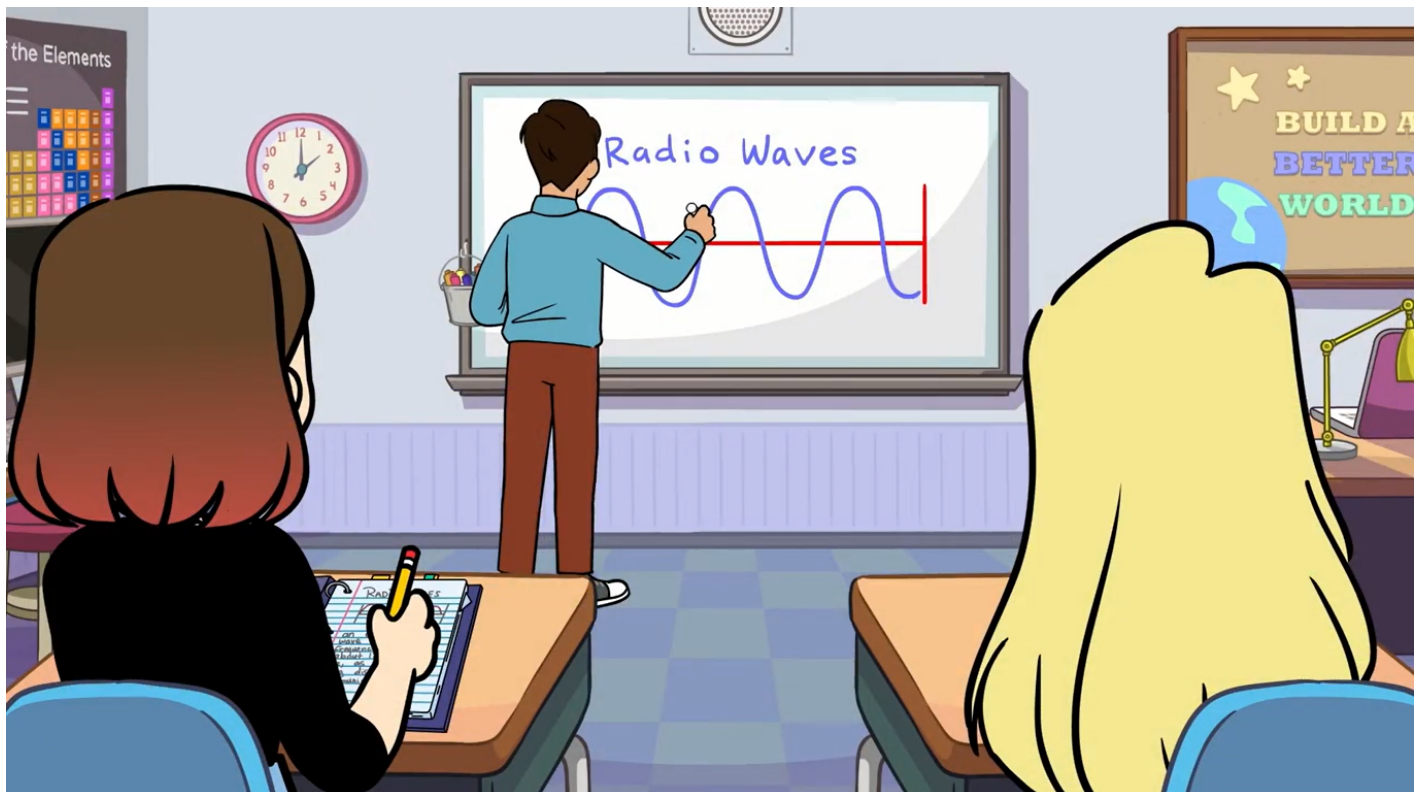
Engineering: Design

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Source: NGSS Lead States. 2013. Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.



ACTIVITY EXTENSIONS FOR EPISODE TOPICS

In this episode, children are introduced to ideas about force and motion through the design of paper airplanes. Below is a brief listing of activities that invite children to explore and design their own paper airplanes and run tests to see which design flies further. In each activity the emphasis is on the process of thinking, design, and making rather than a perfect end product as children take the lead in their own investigations. Parents and teachers can support children in their work by asking prompting questions such as: What type of design would you like to make?; What made you choose this design? What does this design have that will make the airplane fly the farthest?; How can we test these planes?; What did you notice while the plane was flying? Why do you think that happened?

1. Exploring Paper Airplane Design

Folding paper airplanes requires both knowledge and experience to be successful. In this extension activity, you can invite your students to explore websites that provide step-by-step tutorials for folding airplanes alongside you so that they can explore and practice different designs. Paper airplanes fly best when folding is precise so your students will likely go through many sheets of paper as they learn. Reusing paper from assignments or other classwork will help to reduce paper waste.

PROMPTING QUESTIONS

- What type of plane design did you choose?; Why did you choose this one?
- What is special about the design of your plane?
- How will your plane fly?; What could help it fly further?

A few child-friendly websites with multimodal design instructions include:

Fold n' Fly: <https://www.foldnfly.com>

Origami Way:
<https://www.origamiway.com/paper-airplane-designs.shtml>

Audubon Society:
<https://www.audubon.org/news/these-paper-airplanes-fly-birds>

2. Paper Airplane Races

This extension activity will build off of students' experiences from the Exploring Paper Airplane Design activity. In this experience, each student will create their favorite airplane design and test their design against those of their peers. It will work best to have students run races with no more than four airplanes being tested against each other at a time so that they can play careful attention to running a fair test. You can help support a fair test by placing a marker on the ground to show each child where to stand so the distance remains constant. You can integrate mathematics and measurement by inviting children to measure and record the distances the airplanes flew.

PROMPTING QUESTIONS

- What is the same or different about these planes?
- What will help one fly further than the other?; Why do you think that?
- What could we change or modify to help this plane fly even further than before?

Extension Website:

NATIONAL GEOGRAPHIC KIDS: How Do Planes Fly?, Nat Geo Kids Transportation Playlist

<https://www.youtube.com/watch?v=QggNdV9TmvA> (Opens in YouTube)

3. Newspaper Kites

This extension activity invites your students to create their own kite using simple materials. You will need newspaper, 2 straight, thin sticks about 2 feet long with one stick slightly shorter than the other. You will also need a small knife to notch in the wood. You will need to complete the first step for the children. Cut a small notch into both ends of each of the wooden sticks. Then use a length of string to tie the sticks together in a cross with the shorter stick placed horizontally. Be sure that all of the notches are lined upon the sticks as they will hold the string on the edges of the kite. Using a long length of string, place the string into the notches on the ends of the string. The outline of a kite will be evident. Place the string outline over open newspaper and invite the children to trace a pattern around the kite adding an inch so that, once cut, the newspaper can be folded over the string. Once folded, use glue to secure. Finally, you will need to tie a long string to the back of the kite where the sticks cross. This will be the string that is held as the kite flies.

PROMPTING QUESTIONS

- Why do you think the sticks are important to the kite?; What do they do to help it fly?
- Why do you think the paper is important to the kite?; What does it do to help it fly?
- How can we use the string to help bring the kite down?; What about allowing the kite to fly further away?

Extension Website:

SMITHSONIAN AIR AND SPACE MUSEUM:
**KITES TO FLIGHT-INVENTING WITH THE
WRIGHT BROTHERS - STEM IN 30**

<https://www.youtube.com/watch?v=Kay09sH1UoA&t=4s> (Opens in YouTube)





ABOUT Angela Eckhoff, PhD

Angela Eckhoff, is an Associate Professor of Teaching and Learning and the Director of the Virginia Early Childhood Policy Center at Old Dominion University. Dr. Eckhoff studies the role of creativity in child development and learning, arts-based research and pedagogical practices, and early STEAM learning in both classroom and museum settings.

She is a co-editor of the Full STEAM Ahead column for Teaching Young Children from NAEYC as well as the author of 'Provoking Curiosity' and the four-book "Creative Investigations" series from Gryphon House Inc. Dr. Eckhoff holds a dual PhD from the University of Colorado–Boulder in educational psychology and cognitive science.