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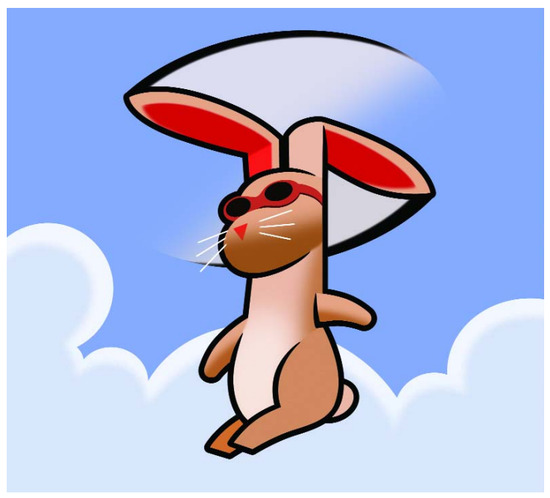
ENGINEERS WEEK® 2007
February 18-24

Build a Better Bunny Copter



In the CYBERCHASE episode *The Fairy Borg Father,* Delete invents a Bunny Copter. This activity asks students: How can you improve Delete's invention so it twirls faster?

GRADE LEVEL

3 to 5

Connect to Engineering

This activity supports refining and optimizing a part of the inventing process practiced by engineers where they experiment with ways to improve the overall performance of an invention. To do this, they make changes to the invention and then test their changes to see whether they have improved its overall performance. In this activity, kids work with Delete's Bunny Copter invention and experiment with changes as they try to make it twirl faster.

MATERIALS

2-3 "Bunny Copter" strips

2-3 paper clips

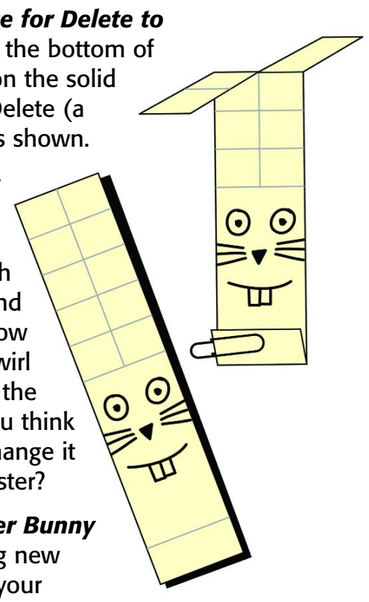
Crayons

Scissors (optional)

Depending on grade level and available classroom time, the activity leader can either distribute pre-cut "Bunny Copter" strips, or give each student an 8.5" x 11" sheet of paper and ruler and then help the students measure and cut their own strips; see "further explorations" below.

DESIGN AND CONSTRUCTION

1. ***Color the bunny's face.***
2. ***Make Delete's invention.*** Starting at the top of a Bunny Copter strip, count down two boxes. Then cut (or tear) along the dotted line to the solid line at the bottom of the 2nd box to make "ears." Fold one ear forward on the solid line, and the other back as shown.
3. ***Make a place for Delete to ride.*** Fold up the bottom of your copter on the solid line. Attach Delete (a paper clip) as shown.



4. ***Test Delete's invention.*** Hold up the copter as high as you can and let it drop. How fast does it twirl before it hits the floor? Can you think of ways to change it so it twirls faster?
5. ***Build a better Bunny Copter.*** Using new strips, make your changes and test new copters until your invention is as good as it can be!

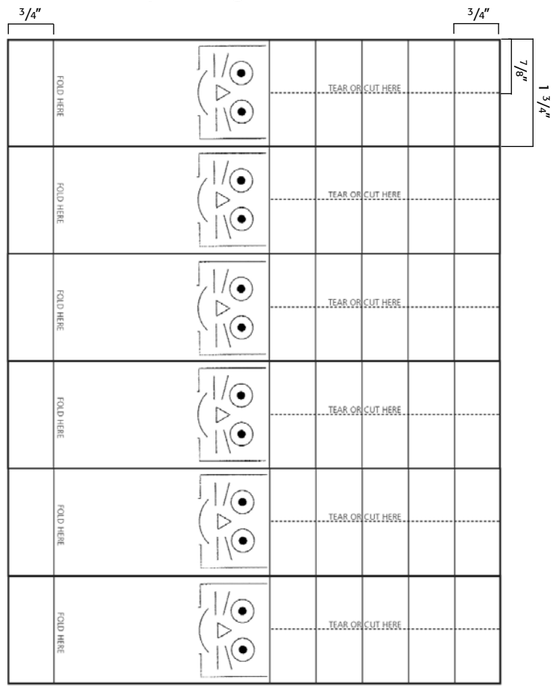
DISCUSSION

How Am I Inventing?

Engineers and inventors are always looking for ways to make something work better. So they test and make changes to an invention to improve it. When you make changes to Delete's Bunny Copter to make it twirl faster, you're doing the same thing. Engineers call this process *refining and optimizing*. You can call it fun!

FURTHER EXPLORATION

Older students may be able to measure and cut their own Bunny Copter strips. Using the length of an 8.5 X 11" sheet of paper, make six 1 3/4 inch wide strips. Using the width, make 5 solid lines spaced every 3/4-inches from the top. This gives you 5 boxes on each strip that measure 1 3/4 by 3/4 inches. Then make dotted lines down through the center of these boxes.



Get inventive with CYBERCHASE on PBS KIDS GO! Check local listings or visit *www.pbskidsgo.org/cyberchase.*

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National Society of Black Engineers
School Science and Mathematics Association
Society of Allied Weight Engineers
Society of Hispanic Professional Engineers
SPIE – The International Society for Optical Engineering
Standards Engineering Society
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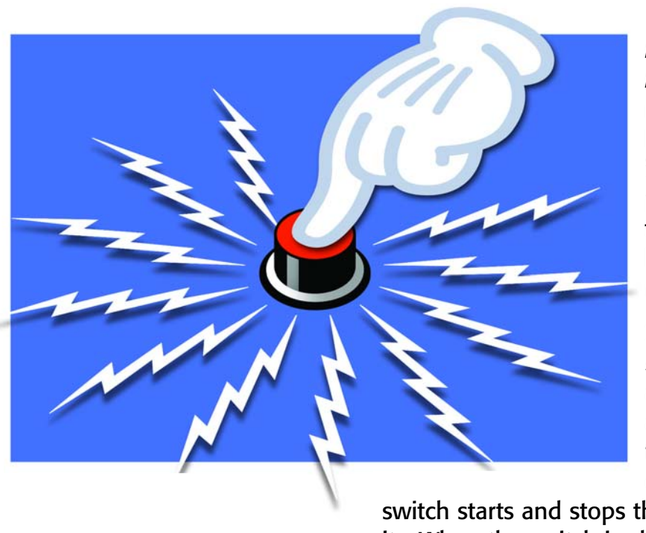
Hidden Alarm



GRADE LEVEL

Most appropriate for grades 5-8. This activity is designed for a group of students to follow written guidelines and build the alarm with minimum supervision, much like a team of engineers working on a specific project.

YOUR CHALLENGE

Here's a chance for a little mischief—just a little. Design an alarm that you can turn on and off and is small enough to hide. Make your friends and family ask, "What's buzzing?"

MATERIALS

1 AA battery

1-2 feet of electrical wire (*Ask an adult to help you strip the plastic coating off the ends to expose the wires.*)

1 buzzer (*wires attached preferred*)
Radioshack Piezo Electric Buzzer (1.5-3VDC), Model # 273-053, $3.29 each

Tape (*duct or masking*)

Thin cardboard (*non-corrugated, such as paperboard from cereal boxes*)

Tin foil

Scissors

Wire strippers

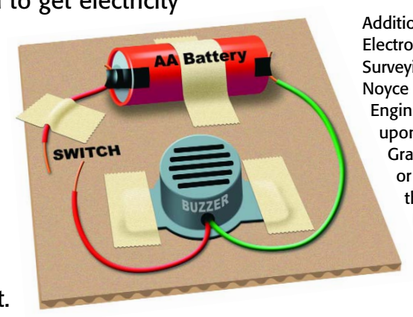
BRAINSTORM AND DESIGN

The thing that makes a hidden alarm cool is that it can be hidden and it can sound an alarm. That's why we call it a hidden alarm! Before you start, think about:

- where you want to hide your alarm
- how small you think it needs to be to fit in your hiding place
- how you'll turn your alarm on and off

BUILD

1. ***Sound your alarm.*** To make your buzzer buzz, you need to get electricity from the battery to the buzzer. To do this, connect the buzzer, battery, and wires so the buzzer buzzes. This makes an electrical circuit.



Is your buzzer buzzing? If not, make sure the buzzer's red wire is attached to the positive (+) side of the battery and the black wire to the negative (-) side.

2. ***Add a switch.*** As you build, you also want to think about ways to turn your alarm on and off. A switch starts and stops the flow of electricity. When the switch is closed (called a *closed circuit*), electricity flows to the buzzer and it buzzes and buzzes and buzzes. Would somebody please open that switch!

3. ***Put it all together.*** Mount everything (your circuit, battery, etc.) onto a cardboard frame. Some people turn their frame into a switch — the folded cardboard acts like a spring that opens and closes the circuit.

TEST

Did your alarm buzz on command? Did it fit in its hiding place? Did you trick anyone? When we were building ours, the wires sometimes got loose and our alarm stopped working. If that happened to you, check your connections.

REDESIGN

Try to make your hidden buzzer more reliable or even smaller. Is there another hiding place you want to try?

INSIDE THE ENGINEERING

Like your hidden alarm, computers basically work by switching circuits on and off. The first computer, built in the 1940's, weighed 30 tons! Since then, engineers have made the parts smaller and better conductors of electricity. Today's average laptop weighs just 6 pounds and is even more powerful than the huge 1940 model!

This activity is adapted from the *Design Squad* Event Guide.
http://pbskidsgo.org/designsquad/engineers

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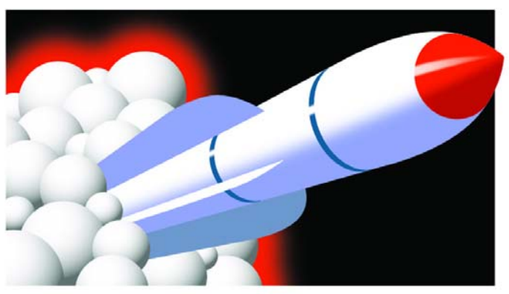
Design Squad premieres on PBS in Winter/Spring 2007.

Build An Air-Powered Bottle Rocket



This activity is provided by the Society of Manufacturing Engineers.

GRADE: High school

OBJECT: Learn first hand about Newton's Laws, gravity, and air pressure.

NEEDED: unobstructed outdoor area, specialized equipment, and several class periods or extracurricular venue. For full instructions go to:

http://www.eweek.org/site/DiscoverE/activities/index.shtml.

More Resources

Junior Engineering Technical Society (JETS)
www.jets.org
Stocks guidance brochures for various engineering disciplines and administers the TEAMS test.

www.discoverengineering.org

Middle schoolers, educators and parents have praised this site. Visitors can skim general information and dig through rich content.

www.futurecity.org

Middle school students work with volunteer engineers to design future urban centers on the computer. They build scale models and compete in regional and national competitions.

www.tryscience.org

IBM and more than 400 science and technology centers have collaborated to launch a very exciting and interactive site.

www.engineeringk12.org

This is sponsored by the American Society for Engineering Education Engineering K12 Center. You'll also want to check out a new guide book to engineering and technology for high school students called "Engineering: Go For It."

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