

MUSIC TO OUR EARS

GOAL

Kids discover the benefits of designing for function.

GRADE LEVEL

Elementary school

TIE TO CYBERCHASE EPISODE

In *Designing Mr. Perfect*, the Cyber-Squad learns the importance of designing before building an invention as they try to save Digit from Hacker's evil clutches. (Episode 503)

MATERIALS

(Arrange materials on a table; the kids will choose what they need in Step 3.)

- Masking tape
- Staplers
- Pencils, paper
- Music Makers: plastic and paper cups, paper plates, beans, beads, jingle bells, paper towel rolls, pipe cleaners, paper straws, waxed paper, combs, rubber bands, balloons, craft sticks, plastic salad bar containers, aluminum foil, small boxes, and other found objects.

DISCUSSION

Before building an invention, it is important that engineers think about what they want their invention to do. To be sure they get their desired result, they might list specific objectives and sketch a design. This process is called designing for function. In this activity, kids identify what sounds they want their instruments to produce and make sketches to follow as they build them.

ACTIVITY

Before the class period, look at *Ideas to Get You Started* on <http://www.eweek.org/EngineersWeek/DiscoverE.aspx> in the 2010 Activities section. You'll get tips on making a paper towel tube kazoo, a straw oboe or trombone, a megaphone, goose call, and drums.

Step 1

Invite kids to share times when they've made plans before doing something, for example: calling a friend before visiting.

ASK: Why do we make plans? (To help us think about something ahead of time to avoid problems later). Discuss how engineers make plans, or designs, to help them think about what they want their inventions to do.

Step 2

Have kids work individually. Allow time for kids to examine and make sounds with the instrument-making materials. Then, help them use pencil and paper to plan their design by completing these steps:

- Name of my invention
- Sounds I want my invention to make



- Materials I need to make my invention
- Sketch of what my invention will look like

TIP: Talk about ways some familiar musical instruments make a sound (striking, plucking, blowing, shaking, etc). For the very youngest grades, you may need to list the materials on the chalk or white board, along with some basic sounds: whistle, tweet, squeak, rattle, plink, thud.

Step 3

After kids have designed their inventions, have them collect materials and build.

THEN ASK:

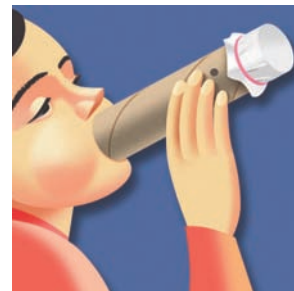
Check your paper design. Is your invention making the sound you originally planned? If not, have them revise their designs to fix the problem or set new goals.

Step 4

Have kids demonstrate their instruments to the group. Make a simple chart on chalkboard showing how many instruments are plucked, shaken, struck, etc.

ASK: What did you learn about the invention process from this activity that you didn't know before?

For fun, have a parade or conduct an "Invention Orchestra" where kids play their music makers in response to your conducting.



CONNECT TO ENGINEERING

Kids may think of an inventor as a "mad scientist," but engineers are inventors! Just as the kids in this activity shared their invented (engineered) instruments with the class, real engineers present their work to colleagues to show how they solved a problem or turned an idea into reality. This way, they learn new ideas and approaches from each other. Engineers don't work in isolation and they work to solve everyday problems (as well as working on big picture issues such as pollution and resource conservation). As engineers solve problems, they follow the steps of the engineering design process.

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