

# ERNST & YOUNG/CYBERCHASE TRAVEL EDITION

PS  
GO!

## Cyberchase

### MUSIC TO OUR EARS

**LENGTH:**

Medium

**APPROXIMATE TIME:**

40-55 minutes (plus 15-20 minutes prep time)

**CATEGORY:**

For all ages

#### OVERVIEW

In this activity, kids will discover the benefits of designing for function as they invent musical instruments. Kids will identify what sounds they want their instruments to produce and modify them in order to achieve the desired effects.

#### TIMELINE FOR THE ACTIVITY

Introductory activity: Approximately 5 minutes

Main activity: 30-45 minutes

Follow-up discussion: Approximately 5 minutes



#### EDUCATIONAL OBJECTIVES

After completing this session, children will be able to:

- Discuss the benefits of thinking about and planning an invention;
- Describe the value of modifying invention design to achieve a desired goal;
- Discuss what it means to "design for function";
- Describe how changes in materials and/or design can affect sound.

#### MATERIALS

- A variety of everyday objects to create instruments. Here are some suggestions:
  - w Plastic and paper cups, paper plates, plastic containers
  - w Beans, beads, small bells
  - w Paper towel rolls, toilet paper rolls
  - w Pipe cleaners, straws
  - w Combs
  - w Waxed paper, aluminum foil
  - w Rubber bands
  - w Balloons (Note: Balloons can be a choking hazard. Please do not use if very young children will be participating in the activity.)
  - w Craft sticks, popsicle sticks
  - w Other found objects
- Masking tape, stapler
- Pencils
- "Music to Our Ears," "Ideas to Get you Started" and "My Invention Design" handouts



## **PREP WORK (APPROXIMATELY 15-20 MINUTES)**

- Set up a workspace with tape, a stapler, pencils and materials to make instruments (listed on the previous page).
- Make copies of the following handouts:
  - w "Music to Our Ears" (one per child)
  - w "My Invention Design" (2-3 per child)
  - w "Ideas to Get you Started" (one per child)

## **STEPS TO COMPLETE:**

### **INTRODUCTORY DISCUSSION (APPROXIMATELY 5 MINUTES)**

#### 1) DISCUSS THE PROCESS OF PLANNING BEFORE INVENTING:

- a. **Ask:** If you wanted to make an invention, what do you think would be helpful to do before creating the invention? (Possible answers: think about what you want the invention to do and what you might want it to look like; make a plan of how to create the invention; get necessary materials.)
- b. **Ask** kids to discuss times when they've made plans before doing something. **Listen** to responses.
- c. **Ask:** Why do we make plans? (Possible answer: to help us think about something ahead of time to avoid problems later.)
- d. **Explain:** Inventors take time to plan an invention before they start building. They start with an idea of what they want their inventions to do and make a plan. These plans, or designs, help them think about what their inventions will look like, how they will work and help avoid problems. When inventors follow their plans, they can build an invention that works the way they want. This is called *designing for function*.

#### 2) INTRODUCE TODAY'S ACTIVITY:

- a. **Explain:** Today, you will be inventors, too. You will be making musical instruments using everyday objects, such as cups, plates, straws and paper towel rolls.
- b. **Ask:** What are some things you might want to think about before making your instruments? (Possible things to discuss: What type of sound do you want the instrument to make? What do you want the instrument to look like? What materials do you have available to use?)
- c. **Tell** the group: Today, you can experiment with different materials to design instruments that make a sound you like. When you design your instrument to make a particular sound, you will be *designing for function*, just like inventors.

## **ACTIVITY: MAKING AND PERFORMING MUSICAL INSTRUMENTS (APPROXIMATELY 30-45 MINUTES)**

### 1) GET READY:

- a. **Give** each child one "Music to Our Ears" and one "My Invention Design" handout.

**Explain:** Hacker (from Cyberchase) has stolen all the musical instruments in Cyberspace right before a big parade was supposed to start. We need to invent instruments to help save the parade.

- b. **Instruct** the kids to look at the "Music to Our Ears" handout. **Explain:** This sheet has instructions to help you create your own instruments. **Instruct** them to look at step 1 on the "Music to Our Ears" handout. **Explain:** In just a minute, you can experiment with the different materials that we have to see what sounds they make. As you play with them, think about what sounds you would like your instrument to make and what materials you would like to use to create your instrument.

- c. **Tell** them: Once you have an idea, write your plan down on the "My Invention Design" sheet. **Hold** up a copy of the invention design handout for them to see. **Explain:** This sheet is where you can record your ideas for a "Music Maker" and sketch out your design, showing what it might look like. Make sure to design your instrument on paper before you build it.

### 2) COME UP WITH A PLAN: **Instruct** the kids to go and explore the materials. **Ask** them to think of what sounds they would like to make with their instruments.

#### *Tips:*

- To help the kids think of sounds they would like to make with their instruments, **discuss** ways that some familiar musical instruments make sounds (striking, plucking, blowing, shaking, vibrating, etc.).
- **Encourage** the children to experiment with different materials and compare the sounds that they make.
- If the kids are having trouble coming up with ideas, use the "Ideas to Get You Started" handout for some suggestions.

### 3) RECORD THE PLAN: After the children have an idea, **instruct** them to fill out the "My Invention Design" sheet, including a sample drawing of their inventions.

*Tip:* After some children have finished filling out their plans, **ask** for a few volunteers to share their design ideas and drawings with the group and to describe the instrument they hope to make.

### 4) MAKE AND TEST INSTRUMENTS:

- a. **Make** the instruments: After children have completed their plans, **instruct** them to create their instruments.
- b. **Play and listen to their instruments:** Once the children have created their instruments, **ask** them to play their instruments and listen to their sounds. **Ask:** Do you like the sounds you are getting? **Instruct** them to compare their inventions with their original plans. **Ask:** Are you getting the sounds you wanted?

*Tip: Explain:* It is fine if your instrument is different from your plan, as long as you are happy with it. Inventors often come up with new, exciting and unexpected discoveries in the inventing process. If you are not happy with your invention, try making changes to it.

- c. **Revise instruments as needed.** If the children are not happy with the sounds of their instruments, **ask** them to try to change it. **Encourage** them to create a new design first on the "My Invention Design" sheet. **Encourage** children to explore different materials and sounds in the process of modifying their instruments.

*Tip: Encourage* kids not to give up if they are unhappy with their instruments. Let them know that experimenting is part of the inventing process. Inventors often have to make many attempts before creating something that works the way they want.

#### 5) MAKE MORE THAN ONE INSTRUMENT (OPTIONAL):

- If some children finish creating and testing their instruments before others, **encourage** them to design and create another instrument. **Give** them another "My Invention Design" handout to plan and design their new instruments.
- **Encourage** kids to try to create the same type of instrument with different materials and then compare the sounds. For example, kids can create a drum with a plastic container and a drum with a paper container and compare the sounds of each.
- **Encourage** children to experiment with different sizes to see how the size of a container affects the sound the instrument makes. For example, if someone is creating a kazoo with a paper towel roll, ask him or her to try creating another kazoo with a shorter roll (like a toilet paper roll) and compare the sounds of the two instruments. If children are creating drums, encourage them to try creating drums of different sizes (for example, a large plastic container and a small plastic container) and compare the sounds that the different drums make.

6) **PLAY THE INSTRUMENTS:** Once all the children have finished, **ask** each child to play his/her instrument(s) for all to hear. Here are some fun ways to have the children perform and have fun with their new instruments:

- a. **Homemade instrument parade** - **Ask** all the children to stand in a line and then parade around the room, playing their instruments as they walk.

b. **Invention orchestra** - **Ask** all the children play their instruments in response to your conducting.

*Tips:*

- Point to different kids to have them play one at a time.
- Point to different groups of kids to hear a combination of different instruments at the same time.
- Gradually add in the instruments to the orchestra one at a time: Point to one kid. Then as that kid is still playing, point to another. Continue to do this until all of the children are playing their instruments together. Then point to children one at a time, to have them stop playing, so that the music gradually stops.
- Experiment with getting loud and then soft: ask all the kids to play together very, very softly; then conduct them to gradually get louder and then gradually get softer again.
- Experiment with different rhythms: tap a fast rhythm and have the children play along to the beat. Then tap a slow rhythm and ask them to follow along with their instruments.
- **Ask** for volunteers to take turns being the conductor.

### **FOLLOW-UP DISCUSSION (5 MINUTES)**

1) DISCUSS TODAY'S ACTIVITY:

- a. **Ask** kids to talk about the different ways they discovered to make sounds.
- b. **Ask** for some volunteers to share their plans (on their handouts) and to discuss/show the instruments they created. Ask them to talk about the process they used to create their instruments.

2) OBSERVE AND REFLECT UPON THE INSTRUMENTS:

- a. **Ask** kids to look at all of the instruments that the group made and discuss the different materials and the different sounds they make.
- b. **Instruct** children to observe and name the geometric shapes contained in the instruments.
- c. **Ask** children to reflect upon how the size of an instrument affects the sound it makes. For example, does a kazoo made from a toilet paper roll make a different sound than a kazoo made with a long paper towel roll? How does the sound of a drum made with a small plastic container compare to the sound of a drum made with a large plastic container?

3) REFLECT ON THE INVENTING PROCESS: **Ask:** What did you learn about the invention process from this activity? **Listen** to responses. (Some points to discuss: it can be helpful to have a plan before

creating an invention; sometimes it might be necessary to modify the plan and/or the invention in order to achieve your goal.)

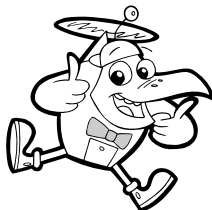
- 4) **DISTRIBUTE EXTRA HANDOUTS:** **Encourage** children to take home the handouts they used during the activity and to take an extra "My Invention Design" handout for further exploration.

**RELATED CYBERCHASE EPISODE:** *Designing Mr. Perfect* (Episode 503) - In this episode, the Cybersquad learns the importance of designing before building an invention as they try to save Digit from Hacker's evil clutches - and from marrying Wicked! Cyberchase is broadcast daily. For details about what times Cyberchase is shown and when different episodes are airing, go to <http://pbskids.org/cyberchase> and click on "TV Schedule" at the bottom of the screen.

**RELATED CYBERCHASE WEB ACTIVITIES:**

To find the following activities and more, go to <http://pbskids.org/cyberchase/allgames.html>:

- "Cyber-Pattern Player"- In this activity, players create cool patterns with sound.
- "Inventors' Workshop"- This fun activity challenges players to solve problems by creating and modifying inventions.



# Ideas to Get You Started...

## Kazoo



- Cut out a piece of waxed paper big enough to fit over one end of a cardboard tube (toilet paper or paper towel roll).
- Securely wrap the piece of waxed paper around one end of the tube and use a rubber band to hold it in place.
- Make sure that there are no gaps between the waxed paper and the tube. If the paper feels loose, use more rubber bands.
- Using a pencil, carefully punch a hole in the side of the tube near the waxed paper.
- Hum or sing into the opposite, open end of the tube.

## Straw Oboe

- Flatten the last 1/2 inch of a straw with your fingers.
- Cut off the top 2 corners of the flattened portion of the straw so that it looks like an upside down V.
- Place the V end in your mouth.
- Tighten your lips and blow through the straw.  
Do you hear a buzzing noise?
- Now cut off an inch of the straw end not in your mouth.
- Listen to the sound your shorter straw makes. What do you notice about the sound? How did it change?

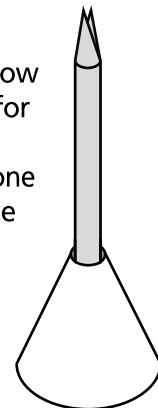


## Straw Trombone

- Make a Straw Oboe.
- Place the Straw Oboe inside a larger straw, with the mouth end sticking out.
- Blow through the Straw Oboe and slide the large straw to change the pitch.

## Straw Oboe Megaphone

- Make a Straw Oboe.
- Cut out a small hole at the bottom of a snow cone cup. Make sure it is just big enough for your Straw Oboe to fit through.
- Place your Straw Oboe through the snow cone cup with the mouth end sticking out of the pointed end of the cup. Tape it together with masking tape.
- Blow through the Straw Oboe and notice what happens.



## Goose Call

- Tie a piece of yarn to a paper clip.
- Have an adult help you poke a hole in the bottom center of a plastic cup.
- Thread the other end of the yarn through the hole in the bottom of the cup so the paper clip is inside the cup.
- Wet your thumb and first finger with water.
- While holding the cup in your dry hand, pinch the yarn where it reaches the cup.
- Pull down on the yarn away from the cup, letting it slide through your fingers.

## Pluck Drums

- Get a plastic cup.
- Get a balloon and cut off the end where you blow into it.
- Stretch the balloon and then place over the top of the cup. The balloon's rubber should be stretchy enough to hold it in place.
- Pinch a little of the balloon over the top of the cup between your thumb and index finger.
- Pull up slightly and let go.

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**Check local listings or visit [www.pbskidsgo.org/cyberchase](http://www.pbskidsgo.org/cyberchase).**

My name: \_\_\_\_\_



# My Invention Design

**Name of my invention:**

\_\_\_\_\_

**Sounds I want my invention to make:**

\_\_\_\_\_

\_\_\_\_\_

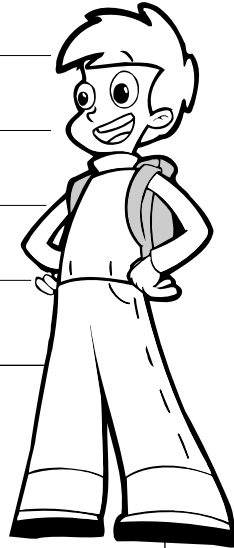
**Materials I need to make my invention:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**What my invention will look like:**



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## Music to Our Ears!

Help! Hacker stole all the musical instruments from the borgs in R-Fair City on the day of their big parade! Can you invent a musical instrument to save the parade?

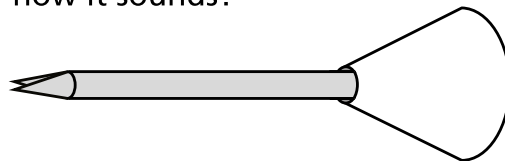
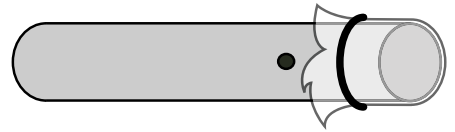
### Materials

For your Music Maker:

- 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, and other found objects
- Masking tape
- Stapler
- "My Invention Design" handout
- Pencil

### Make Your Instrument

- 1 Play with the materials. Find sounds that you like by shaking, striking, or spinning objects.
- 2 Use the "My Invention Design" handout to plan your Music Maker. Make a sketch to show what it looks like.
- 3 Make your instrument and try it out. Does it work the way you planned?
- 4 What changes can you make to your instrument to improve how it sounds?



### How Am I Inventing?

Inventors take time to plan an invention before they start building. They start with an idea of what they want their invention to do and make a plan. When they stick to that plan, they can build an invention that works the way they want. This is called *designing for function*. When you design your instrument to make a particular sound, you're designing for function, too.



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