Do you know what music is? It’s sound. Just like a honking horn or thunder or a crying baby. These sounds are all around us—some people call this noise, others call it music.

In this kit you’ll find everything you need to make music. You’ll build your own instruments—enough to start your own band—learn how they work and how to play your own songs. Along the way, you’ll also discover some really cool science about how sounds are created.

In each activity, you’ll get to act and think like a real scientist. You’ll measure, you’ll compare things and you’ll ask questions. You’ll also make observations using your different senses: You’ll use your eyes to see, your ears to hear and your hands and fingers to feel.

Let’s make some noise!

**Activity #1: Shake it Up!**

If you can shake, you can make music! Let’s build a shaker and see what it sounds like.

**What you need from your kit:**
- Plastic case
- Beads

**What you need to get or use:**
- Cotton balls
- Coins, beans, pebbles, etc.

**Let’s get started!**

**Step 1:** Let’s make some observations! Make sure the plastic case is closed, hold it in your hand and shake it back and forth. What do you hear?

**Step 2:** Open the case and put some cotton balls inside. Close the case and shake it. What do you think will happen? Does it make any music?

**Step 3:** Take out the cotton balls and put the beads inside the case. Snap it shut and give it a shake, shake, shake. Now what do you hear? Those beads are making music!

**Step 4:** Try shaking other things inside the case, like coins, beans, pebbles—whatever you can find around the house. What kind of sounds do they make? The same as the beads or different? What makes the most noise? Which one makes your favorite sound? Can you change the sound by shaking harder or softer or using a different motion?

**Step 5:** Turn on some music—on the radio or your MP3 player or CD player—and shake along to the song. Can you keep the beat of the music with your shaker?

**Step 6:** Hum your own tune—and shake along with it!
**Activity #2: Ring the Bell!**

You saw what happened when you put something inside a shaker. What about when the sound comes from outside? Let’s make a tambourine and find out!

**What you need from your kit:**
- Plastic case
- Ribbon
- Bells
- Plastic beads (optional)

**Let’s get started!**

Let’s make some observations! Hold the bells in the palm of your hand. Do they make any sound just resting there? How about if you shake them in your fist?

**Step 1:** Open up the plastic case and be sure to take out any beads or other items from the previous activity. Lay the case on a flat surface, opened like a shell. Take the ribbon and place it underneath the hinge of the case, leaving an equal amount of ribbon on each side of the case.

**Step 2:** Thread one end of the ribbon through the holes in the bells, sliding the bells down the ribbon until they’re close to the hinge of the plastic case. The bells should be touching each other.

**Step 3:** Take the ends of the ribbon and tie them into a knot, like you’re tying your shoelaces.

**Step 4:** Close the plastic case, with the loose ends of the ribbon tucked inside and the bells on the outside.

Shake your tambourine! How does it sound? Is it the same or different from the shaker? Is it louder or quieter?

Turn on some music or sing your own song and play along with your tambourine! If you want, you can open up the case and put the beads back inside. Now you have a shaker and a tambourine all in one! How does this new instrument sound? Does it sound more like a shaker or a tambourine? Is it really different? How?

**Fun Fact:**
Tambourines usually are played by shaking them or holding them in one hand and tapping them with the other. Sometimes they’re included as part of a drum set and hit with a drumstick. Try these different styles!

**Activity #3: Mystery Sound!**

It looks like a pen or pencil, but this gravity tube is crazy. Let’s see what it can do!

**What you need from your kit:**
- Gravity tube

**Let’s get started!**

**Step 1:** Let’s make some observations! Set the tube on a flat surface. Does it make any sound? What if you roll it back and forth? Does anything happen?

**Step 2:** Now pick up the tube and tip it from one end to the other, like a seesaw. What do you hear?

**Step 3:** How many different sounds can you get the tube to make? Does it sound different depending on which way you tip the tube? How about if you tip it fast or slow? Try moving the tube in as many ways as you can think of and see what happens.

**Step 4:** Can you get your voice to sound like the tube? Try singing along with your tube and use your shaker or tambourine to add some percussion!

**Fun Fact:**
Humans aren’t the only animals that sing. Birds, whales, gibbons (they’re a small kind of ape) and thousands of other animals can sing too.

**SOUND OFF!**

Tambourines are another percussion instrument, like the shaker. They get their sound from metal. As you shake a tambourine, the metal pieces hit each other and create vibrations, which we hear as sound.

**SOUND OFF!**

Did you know that you don’t need an instrument to make music? You can use your own body—it’s called singing! Singing is making music with your voice. You use your lungs as an air supply, your chest and head to amplify the sound (make it louder) and your larynx as a vibrator (the larynx is found in your neck and is also called the “voice box”). That’s why no two singing voices are the same—because the shape and size of these body parts is different for every person.

**Fun Fact:**
Singing with your lips closed is called humming.
Fun Zone!

Bet you didn't know it, but you already have drums in your house. Ask a grown up if you can borrow plastic buckets or pots that are used for cooking—these come in all different sizes. Place the buckets or pots on a flat surface, open side down. Use your drumsticks or a wooden spoon to hit the bottom of the pots or buckets. Does each pot or bucket sound the same or different? How? What if you put the pots or buckets on different surfaces—hardwood floor, tile, carpet, etc.? Does this change the sound? What other “drums” can you find in your house?

SOUND OFF!

How do drums make sound? When you hit a drum head, it dips down and then bounces back up. This movement causes vibrations in the air in the form of sound waves, which reach your ears.

To understand more about sound waves, try this experiment: Find a long piece of rope, like a jump rope. Have a friend or family member hold one end of the rope while you hold the other. Stand far enough apart from each other so that the rope is off the ground, but not stretched too tight. While your partner holds their end of the rope very still, move your end up and down so that the rope makes waves. This is what sound waves look like!

Activity #4: Bang a Drum!

Drums are the oldest instrument in the world. They've been around for so long because they're so much fun to play. Let's build one!

What you need from your kit:
- Drum heads (2)
- Drum shell
- Drumsticks

What you need to get or use:
- Glue
- Paper towel or mat

Let's get started!

Step 1: Let's make some observations! Set the drum heads (these look like round caps) on a flat surface and tap them with the drumsticks. What do you hear? Let's see how to make it louder!

Step 2: Take the drum shell (a decorated sheet of paper) and shape it into a tube by inserting the tab found on one end of the paper into the slot on the other end. Glue the seam of the tube together. You might want to do this over a paper towel or mat to keep glue from getting onto your work surface.

Step 3: Coat the inside of the drum head sides with glue. Fit a drum head over each end of the drum shell, gluing the shell to the inside of the drum heads.

Step 4: Once the glue has set and your drum holds together, let's make some music! Take the drumsticks and tap the top of the drum. How does it sound now?

Step 5: Beat your drum with the big and small ends of your drumsticks. Can you hear a difference in the sound? What is it? Try playing your drum with other objects—your fingertips, pen or pencil, whatever you can think of. What sounds does this make? More ways to change the sound: Change the way you hit the drum—fast or slow—or change where you hit the drum on the drum heads. How many different sounds can you make with one drum?

Step 6: Turn on some music or sing your own song and keep the beat—you're a drummer!

Fun Fact:

There are lots of different kinds of drums—each one is designed to make different sounds. The larger the shell, the lower the sound it will make. Thicker drum heads make a louder sound—drummers in rock bands use these.

Fun Fact:

Some drums are made out of hollow tree trunks; others are made from metal barrels.
**Activity #5: Record a Tune**

Remember what you learned about singing—how your body uses the air in your lungs to make music? Well now we’re going to use that air to get your recorder to “sing.”

What you need from your kit:
- Recorder

Let’s get started!

**Step 1:** Let’s make some observations! Pick up your recorder and give it a shake. Does it make music like a shaker or tambourine? Tap it with your fingers or drumsticks. Does it sound like a drum? Why not? Because it’s not a percussion instrument!

**Step 2:** To get your recorder to make music, you need to place the mouthpiece between your lips and blow. What does it sound like now?

**Step 3:** How many different sounds can you get the recorder to make? Try blowing harder or softer, faster or slower. What happens? How does it change the sound?

**Step 4:** See the holes on your recorder? They’re kind of like the holes on a clarinet—these are called tone holes. Try putting your fingers over the holes—one at a time, a couple at a time, all at once. What happens to the sound?

**Step 5:** Turn on some music and play along on your recorder or create your own song!

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**Activity #6: String Along!**

Believe it or not, we’re going to turn the box from this kit into a guitar! Let’s see how!

What you need from your kit:
- Box from the kit
- Rods (2—one large, one small)
- Rubber bands
- Guitar neck (looks like long, skinny box)

What You need to get or use:
- Scissors
- Tape

Let’s get started!

**PART 1: BUILDING A GUITAR**

Let’s make some observations! Tap the empty box with your hands, fingers or drumsticks. Does it sound like a guitar? How about a drum? Right now, the box is more like a percussion instrument. Let’s change that!

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**Fun Zone!**

You can make a woodwind out of a piece of grass! Go to the park or check your backyard for the longest, widest piece of grass you can find. Pinch one end of the grass between your two thumbs and blow against the top of their skin. Do you hear a sound? Can you feel the grass vibrating? Try blowing harder or softer, faster or slower to make different sounds.

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**Sound Off!**

Your recorder is a kind of instrument called a woodwind (some are made of wood but others are plastic or metal). They’re usually shaped like a tube and include the flute, clarinet, oboe and bagpipes. Woodwinds make sound when a player blows air into them against a sharp edge (like with a flute) or across a reed (like with a clarinet). In both cases, this causes the air inside the instrument to vibrate and make sound. With your recorder, and instruments like the clarinet, covering the holes changes the sound because it changes the way the air vibrates.

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**Fun Fact:**

In jazz, the clarinet is sometimes called the “licorice stick.”

**Fun Fact:**

Because they’re strong, woods like cedar and spruce are used to build the tops of guitars. Woods such as mahogany or rosewood are used for the sides and back, because they look good.
SOUND OFF!
How do guitars work? The top of a guitar is called the sound board. This is the most important part of a guitar—it's what makes the guitar's sound loud enough to hear. When you strum or pluck the strings, their vibrations go into the guitar top or sound board. The sound board then moves this energy from the strings to the air inside the guitar body. The hollow body of the guitar amplifies these vibrations (makes them louder) and the hole in the guitar—called a sound hole—lets out the sound for people to hear.

Fun Zone!
You probably have plenty of other boxes lying around your house—try turning one into a guitar. You could start with something simple like a shoebox, a couple of rubber bands and some pencils instead of rods. Use the guitar we just made as a guide. Can you make another one all by yourself? Give it a try!

Step 1: You're going to need an adult helper for these next steps. Ask an adult to cut along the dotted line printed all the way around the outside of the box. You should end up with a box that's about 8" x 10" with one open end. Note: You may want to open the box and cut at an angle to the dotted line.

Step 2: Now take the small piece that you just cut away from the box and have your adult helper cut off the flap, following the dotted line printed on the outside.

Step 3: Put the straight edge of the flap from Step 2 next to the open end of the box from Step 1. Tape the flap to the box.

Step 4: Look on the back of the box and you should see a picture of a guitar. There's a perforated hole in the middle of the guitar—you need to carefully punch out this piece of the box. There are also two slits on the side of the box—punch these out too. After you've punched out these pieces and taken them out of the box, close the flap.

Step 5: Take two rubber bands and wrap them around the box, lengthwise. You'll see four lines printed on the drawing of the guitar. Line up the rubber bands with the two center lines. Is this starting to look and sound like a guitar? Give the rubber bands (your guitar strings) a quick pluck. How do they sound?

Step 6: Let's keep building! Time to add the guitar neck—it's a long skinny box that came with the kit (see illustration 6.) Make sure the top end of the guitar neck box is closed, with the flaps tucked inside. The flaps on the bottom end of the neck piece should be open. Bend the two small side flaps outward. Do not bend the other two tabs.

Step 7: Insert the guitar neck piece into the two slits on the side of the original box. (There should be a small gap in the neck piece that fits over the rubber bands. See illustration 7.) Tape the small side flaps of the neck to the main box—this will help hold the neck in place. (Optional: You can also tape the tabs at the bottom of the neck to the inside of the box for extra support.) You can tape the box shut if you'd like.

Step 8: Wrap two more rubber bands around the box—one on each side of the neck line them up with the two outer lines printed on the guitar. They should overlap the small flaps of the guitar neck that you taped to the box in Step 7.

Step 9: Take the large rod (rod is flat on one side) and slide it underneath the rubber bands at the bottom of the guitar; line it up with the shaded area printed on the guitar. Slide the small rod underneath the rubber bands at the top of the guitar; line it up with the shaded area. Tape both rods to the box.

Guess what? You just built your very own guitar!
PART 2: PLAYING A GUITAR
Here comes the fun part, learning how to play guitar!

Step 1: There are different ways to get a guitar to make sound. You can start by lightly tapping the strings with a pencil or your drumsticks. You can strum your guitar by brushing across the strings with your thumb or fingers. Or you can pluck the strings: Pinch a string between your thumb and finger, pull it away from the guitar body and let it go. Do these different styles make different sounds? How? Which is the loudest? The softest?

Step 2: Let’s try to change the sound. One way is to play the guitar louder or softer, slower or faster. Another way is to change the pitch—pitch means a sound is high or low. How do you change the pitch? Let’s experiment!

Note: It might be easier to try these experiments with the guitar resting on your lap or a table. Some guitars, like the flat steel and slide guitar, are played this way.

Step 3: For Experiment 1, strum or pluck one of the strings somewhere between the two rods. Is the sound high or low? Now strum or pluck the same string, only this time strum it at a point below the thick rod. Now how does it sound? What do you think made the difference? Notice how long the string is between the two rods, and how much shorter it is below the rod. How did that change the sound?

Step 4: For Experiment 2, strum or pluck one of the strings somewhere between the two rods. Does it sound high or low? Now put your finger on this same string, above the green dot, and press the string down against the box. Use another finger to strum or pluck the string again. Does it sound higher or lower? Why? By pressing the string to the box, you made it shorter and changed the pitch. Do shorter strings sound higher or lower than longer strings?

Create your own experiments. Hold down the strings in different places—it’s your guitar; play it however you want! Try writing your own song. Remember, it doesn’t matter what it sounds like—it’s all music!

Have friends and family pick up the shaker or tambourine, the gravity tube, the recorder, the drum and the guitar. Now you have a band—make some music together!