



# Virginia 4-H MAKING the Future

\*18 U.S.C. 707

## The Science of Music

### The Science Behind it . . .

#### **How do instruments make sound?**

Instruments produce a sound when a part of it vibrates, producing sounds that are loud enough to be heard by the human ear. These sounds, or musical notes, are produced differently in each of the four main families of instruments: Woodwind, Brass, String, and Percussion.

**Woodwind instruments** (clarinet, oboe) – Air is blown across the reed attached to the mouthpiece of the instrument, vibrating the air down the tube of the instrument to produce sounds. Different notes are produced by covering or opening holes in the instrument tube, changing the reed, and size of the instrument tube.

**Brass instruments** (trumpet, trombone) – Air is blown into the instrument by ‘buzzing’ lips across the cup-shaped mouthpiece, producing a vibration and sound through the instrument. Different notes are produced by changing the length of the instrument or the size of the bell-shaped end.

**String instruments** (violin, guitar) – Strings are plucked or bowed and vibrations from the strings hit the hollow body of the instrument, bouncing off the instrument box to produce sounds. Different notes are produced by changing the tension of the strings or the size of the instrument box.

**Percussion instruments** (drum) – Material is stretched over a hollow container and struck by a hand or stick, producing a vibration that produces sound. Different notes are produced by tightening the material stretched over the container or the size of the hollow container.

#### **Materials**

- ⇒ Plastic bottles (1 per youth)
- ⇒ Funnels (1 per youth)
- ⇒ Hose Connector (1 per youth)
- ⇒ Garden hose – ¾” size (1 length per youth)
- ⇒ Mouthpiece cleaner (if sharing hose connectors)
- ⇒ Straight snips (to cut hose; to share)
- ⇒ Assorted rubber bands (3-5 per youth)
- ⇒ Matchboxes for guitars (1 per youth)
- ⇒ Plastic tablecloth/sheeting (to share)
- ⇒ Round oatmeal boxes w/lids (1 per youth)
- ⇒ Pencils (1 per youth)
- ⇒ Scissors (to share)
- ⇒ Duct tape (to share)

#### **Sources**

- ⇒ Atlanta Symphony Orchestra: Classical Kids Live!: [www.classicalkidsnfp.org/classical-kids-live/](http://www.classicalkidsnfp.org/classical-kids-live/)
- ⇒ Landfill Harmonic: [www.youtube.com/watch?v=fXynrsrTKbI](http://www.youtube.com/watch?v=fXynrsrTKbI)
- ⇒ US Army Band “Pershing’s Own”: [www.usarmyband.com/education-community/education-outreach.html](http://www.usarmyband.com/education-community/education-outreach.html)
- ⇒ Yale-New Haven Teachers Institute: [www.yale.edu/ynhti/curriculum/units/2000/5/00.05.05.x.html](http://www.yale.edu/ynhti/curriculum/units/2000/5/00.05.05.x.html)

[www.ext.vt.edu/topics/4h-youth/makers](http://www.ext.vt.edu/topics/4h-youth/makers)

*Reviewed by Mannin Dodd, Virginia Tech University*

#### **Making and Exploring Further**

Make activities encourage problem solving through trial and error, allowing for individual creativity and experimentation. Youth will ignite their curiosity and expand their critical thinking skills as they move from the planned and guided activity to an open exploration of different materials and methods.

- ⇒ Encourage youth to substitute balloons or punch balls for oatmeal drum head.
- ⇒ Encourage youth to substitute various funnel sizes for trombone bell.
- ⇒ Encourage youth to substitute larger boxes for guitars