Straws and Notes

Estimated Time: 30 minutes

SUMMARY
Even if you're a musician you might not fully understand *how* the sounds that make up musical notes are created. On a piano you can count keys up and down, but why do some notes make chords that sound nice while others make chords that sound mismatched? In this activity you'll see the physical relationship that makes up the aesthetic relationship of octaves and perfect fifths.

WHAT YOU'LL LEARN

- The definitions of octaves and perfect fifths.
- The physical phenomenon of notes and how they are related.

Materials Used	**Resources Used**
● Drinking straws (at least three) ● Permanent marker (optional) ● Scissors ● A ruler ● Pencil and paper for notes	● What Is an Octave? https://www.youtube.com/watch?v=a2jsupw4Bfg&ab ● Recognizing Intervals: Octave and Perfect 5th https://www.youtube.com/watch?v=_Rg54Ie9zMQ&ab

WHAT TO DO

1. Gather your straws all together in one spot and measure the full length of them. They should all have the same length, which you should record to the side.
2. If you blow across the top of one of the straws you will get a note of music. The exact note (if, for example, you wanted to play it on a piano) depends on the particular straws you have and their length but we will call it the *full note* for this activity.
3. Now, create an *octave note* straw (see the "What Is an Octave?" link above for more information). Use your marker to mark one of your other straws at half the length of your full note straw. For example, if you have a 6 inch full straw, mark the octave straw to be 3 inches.
4. Cut the octave straw at the mark to create a half-length octave note straw. When you blow across the top of this one it should play a note which is an octave above your full note. On a piano you would count eight white keys up from your original note to reach this new note.
5. Now, create a *perfect fifth* straw (see the "Recognizing Intervals" link above for more information). Use your marker to mark a different straw (not your original and not the octave one) to a length which is two-thirds of your original straw's length. For example, if you have a 6 inch full straw, mark the perfect fifth straw to be 4 inches.
6. Cut the perfect fifth straw at the mark to create a two-thirds-length perfect fifth straw. When you blow across the top of this one it should play a note which is perfect fifth above your full note. On a piano you would count five white keys up from your original note to reach this new note.

TIPS

- Many woodwind instruments are made using this same principle, though they don't have cut tubes. Instead they have holes at the appropriate interval down the tube: the hole makes the tube effectively shorter while putting your finger over the hole makes it effectively longer again. If you have a larger tube (such as a piece of PVC pipe or a "Jumbo" drinking straw) you can make an extension of this activity by cutting small holes at the right interval to create a single tube that can play the full note, octave note, and perfect fifth note.
- Fifths and octaves are not the only intervals commonly used in music. You can also create a fourth by cutting a straw to three-quarters of the full length. You can also keep multiplying this to get different notes: half the length gives you *one* octave but a quarter (half of a half) gives you *two* octaves and an eighth (half of a half of a half) gives you *three* octaves. If you have really long straws or tubes you can make a full range of notes and still be able to play them.