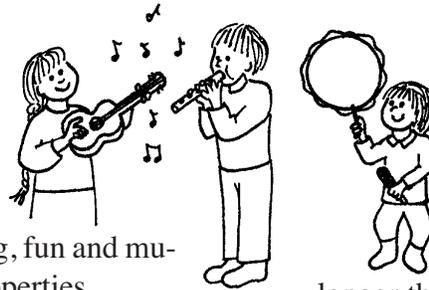


Science and the Sounds of Music

Jim Kreuger, Program Consultant, KSO

Most children here in the Kivalliq love music. Attend any square dance and you will see an audience of little ones with bright eyes and big smiles. This natural interest can be put to use in the classroom and result in interesting, fun and musical lessons on sound and its properties.



Below are some simple musical instrument that your students can make and play with and in the process learn some basic principles of sound.

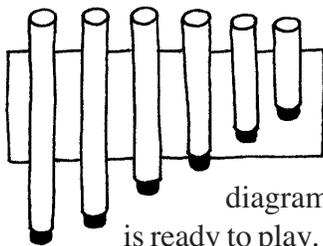
Drinking Straw Pan Flute

Materials (for each flute)

- 2 drinking straws
- 1 piece of cardboard or wood (15 x 5 cm).
- some Plasticine, clay or "sticky tack"
- some glue

Instructions

Cut up the straws in lengths varying from 2 cm to 8 cm. Be sure to cut them straight and clean; jagged or crooked edges will not work. Plug up one end of each of the pieces of straw. Arrange the pieces in ascending order of size and glue them to the cardboard so that the open ends all extend about 1 cm (see diagram below). Now your flute is ready to play. Place the open end of one of the straws on the edge of your bottom lip and blow. If a crisp, clear note does not result, adjust the position of the straw and try again.



How it Works

As the air strikes the edge of the straw it must decide whether to go into the straw or over it. If some air goes in, it travels to the plugged end and bounces back up. When it reaches the top it escapes, momentarily preventing more air from entering the straw. This in and out

To make a tuned flute or oboe use the following note lengths.

- C.....31 cm
- D.....27.6 cm
- F.....23.2 cm
- G.....20.7 cm
- A.....18.4 cm

movement of the air causes vibrations which is, in fact, what our ears detect as sound. By moving the pan flute from side to side, while you blow, the pitch of the notes increase or decrease according to the straw's length. The longer the straw the longer the air takes to go in and out and hence the slower vibrations and the lower the frequency or deeper the pitch. The air travels in and out of the shorter straws faster producing faster vibrations and a higher pitch.

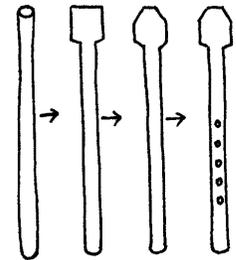
Drinking Straw Oboe

Materials (for each oboe)

- 1- drinking straw

Instructions

Crease one end of the straw flat with the edge of a knife or scissors and cut off the corners so that sides of the straw form two flaps. Place the straw in your mouth, without squeezing the flaps or touching them with your teeth or tongue. Now blow hard. If nothing happens, the flaps are either too close together or too far apart. Adjust your lips accordingly and try again. Eventually you will produce a sound like an oboe, which also contains two flaps that are made of wood and called reeds.



How it Works

The opening and closing of the reeds (flaps) cause the air to vibrate, which is the cause of the sound. By carefully cutting small holes 2 cm apart down the length of the straw you can give your oboe a variety of notes. Cover and open the holes while blowing to vary the pitch. The holes simply allow you to change the length of the straw by opening or closing them. This, in turn, changes the distance the air travels which determines the speed of the air vibrations and thus the frequency or pitch.

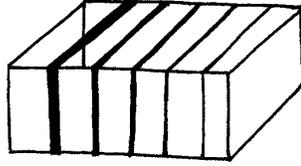
Box Guitar

Materials (for each guitar)

- 1- small cardboard box
- 5 - rubber bands (of various thicknesses)

Instructions

Stretch the rubber bands over a box so that they are parallel and span the open side. Pluck the bands and listen. Do they all sound the same?



How it Works

Plucking a rubber band causes it to vibrate which, in turn, causes the air to vibrate. This vibrating air is detected by our ears as sound. The vibrating rubber band also initiates the vibration of the box which increases the volume of vibrating air thereby amplifying the sound. Experimenting with the tension and thickness of the band will change the frequency of vibrations and therefore the pitch.

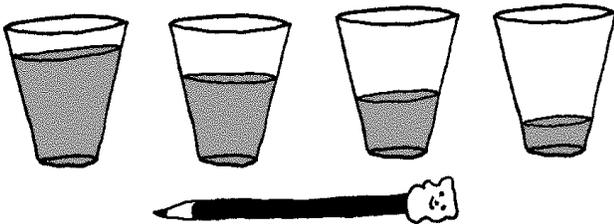
Glass Jar Xylophone

Materials (for each xylophone)

- 6- 8 glass jars or tumblers of uniform size/shape
- 1- pencil with additional plastic eraser on end

Instructions

Fill each jar to a different level with water. Carefully strike each jar with a pencil to produce different pitches.



How it Works

The glass jars act as tubes in much the same way as the straws in the pan flute did. The water provides a bottom to the tube and can be adjusted to give tubes of different lengths. When the jar is struck, the glass above the water vibrates freely, while the glass below the surface is hindered by the water. The vibrating glass creates vibrating air which travels to our ears and is "heard". The longer the glass tube the slower the vibrations and hence the

lower or deeper the pitch is. Adding water shortens the glass tube speeding up the vibrations and raising the pitch.

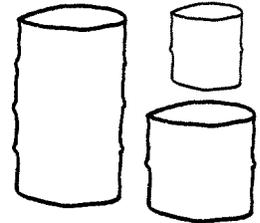
Coffee Tin Maraca

Materials (for each maraca)

- 1- coffee, yeast or coco tin with lid
- some dried beans/popcorn/ rice, marbles, ect.

Instructions

Simply place an interesting assortment of small hard objects (rice, popcorn, ect.) into the tin, replace the lid and shake to your heart's content.



How it Works

As the objects inside the tin rattle around, they cause the sides of the tin to vibrate which, consequently, causes the surrounding air to vibrate which we hear as sound.

Ice Cream Pail Drum

Materials (for each drum)

- 1- ice cream pail or large coffee tin
- 1- pencil with plastic eraser stuck on end

Instructions

The easiest way to make a drum is to turn the pail or tin up-side-down and hit it with your hands or a stick (a pencil with a plastic eraser stuck on end works well). Placing the drum between your knees produces a bongo, while a qilaut can be fashioned by cutting the top 8 cm portion off the ice cream pail and attaching a small handle to the remaining bottom portion.

How it Works

Striking the drum causes it to vibrate which creates air vibrations that we hear as sound.

