

Unit III. Making musical sounds

Key Question: How do musical instruments make sound?



Student name:

Class:



<http://www.cma-science.nl>

Activity 1 – Sound of musical instruments

Here are pictures of several musical instruments. Identify what vibrates to make the sound.



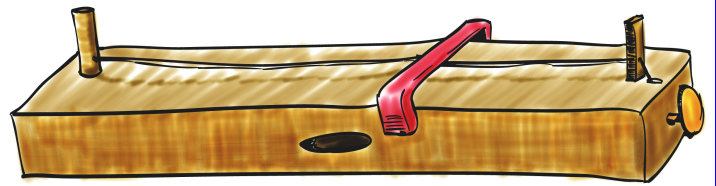
1. Are these sounds more pleasant than the sound of a tuning fork or a school bell?

☐ Yes

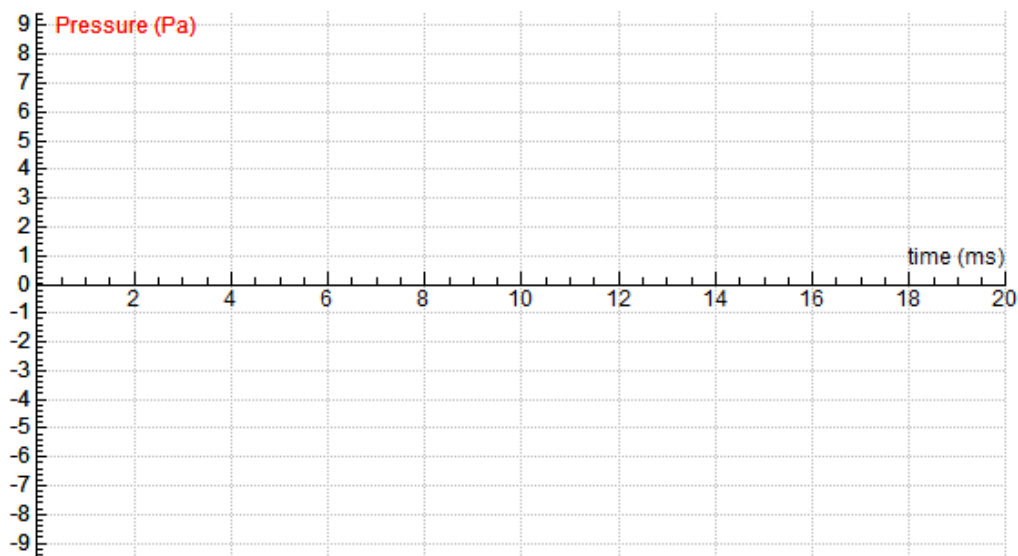
☐ No

Activity 2 – Sounds of a string

Have you ever made sounds with an elastic cord or a string? In this activity you will investigate sound of a string. You need a stretched string. You can use a guitar or a monochord (shown in the picture).



- Pluck the string. At first, allow the entire length of the string to vibrate.
- Record the string's sound with the €Sense sound sensor and draw the recorded sound waveform below.



2. Do you see vibrations? What vibrates here?

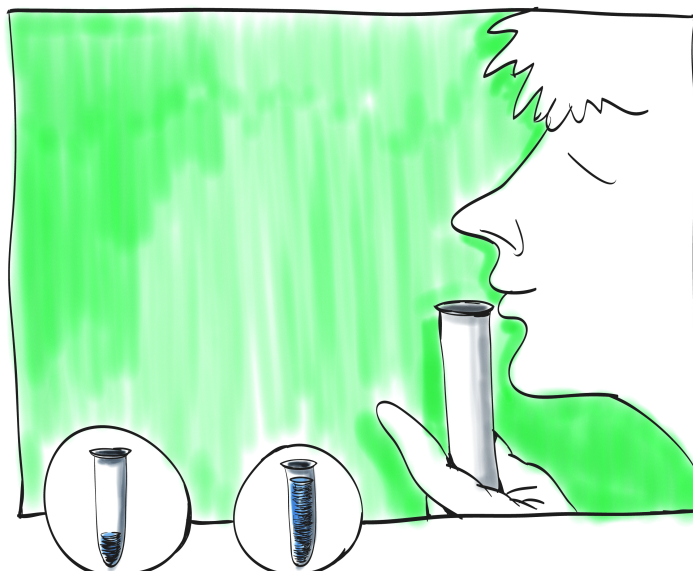
3. How many vibrations do you count in the measurement time interval (20 ms)?

- Make your own investigation and find out what happens to the string's sound when:
 - the string is plucked harder;
 - the string is made tighter;
 - the string is made shorter
(to make the string shorter press against the string with your finger);
 - a thicker string is used.
- Write down all your findings. Save your measurements to show to your teacher when he/she asks for evidence of your investigations.

Activity 3 – Sounds of air

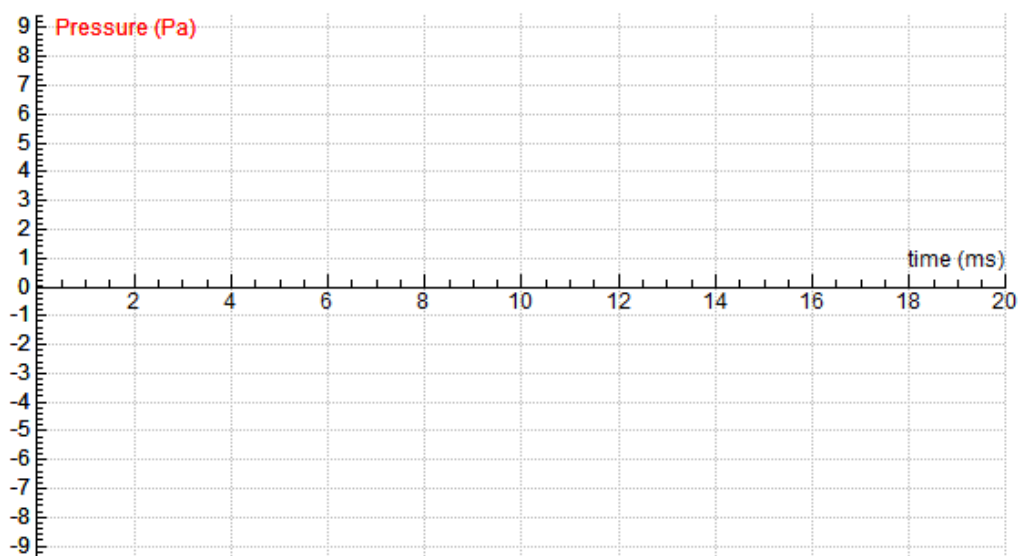
Have you ever blown a whistle or have blown across the top of an open bottle to make sounds? Try this.

- Take a test tube and blow across the top until you can make a clear sound.
- 4. How do you think this sound is made?



- 5. What vibrates here?

- Record the sound with the sound sensor and draw the recorded sound waveform below.



- 6. Do you see vibrations?

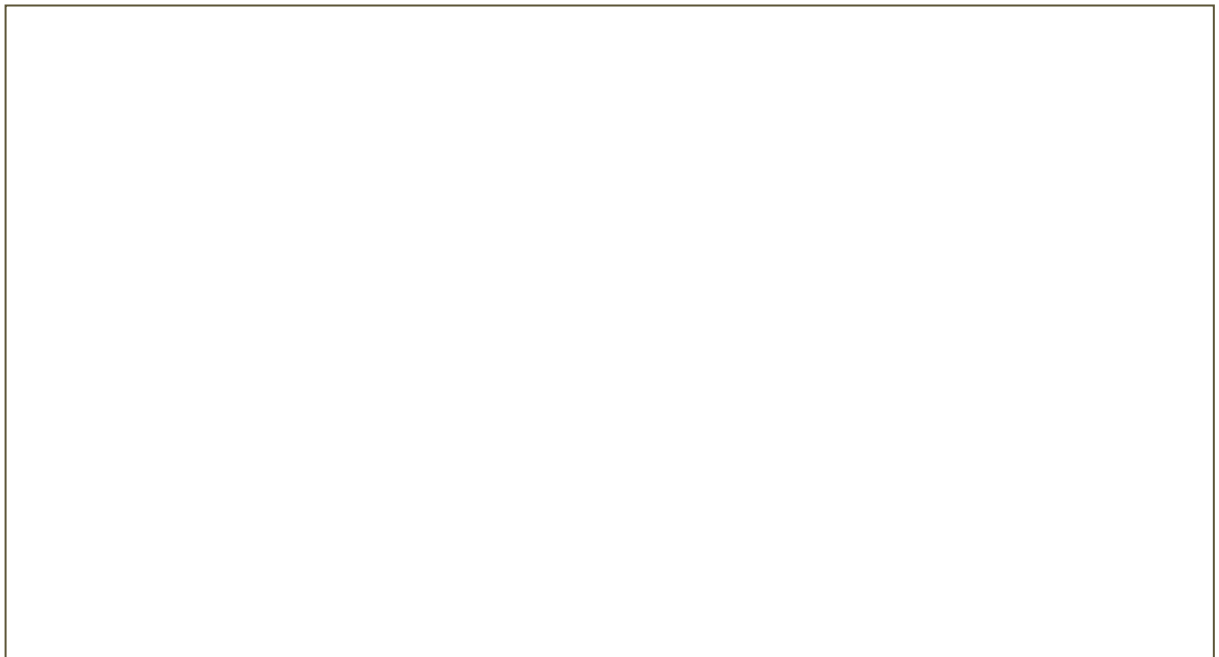
☐ Yes

☐ No

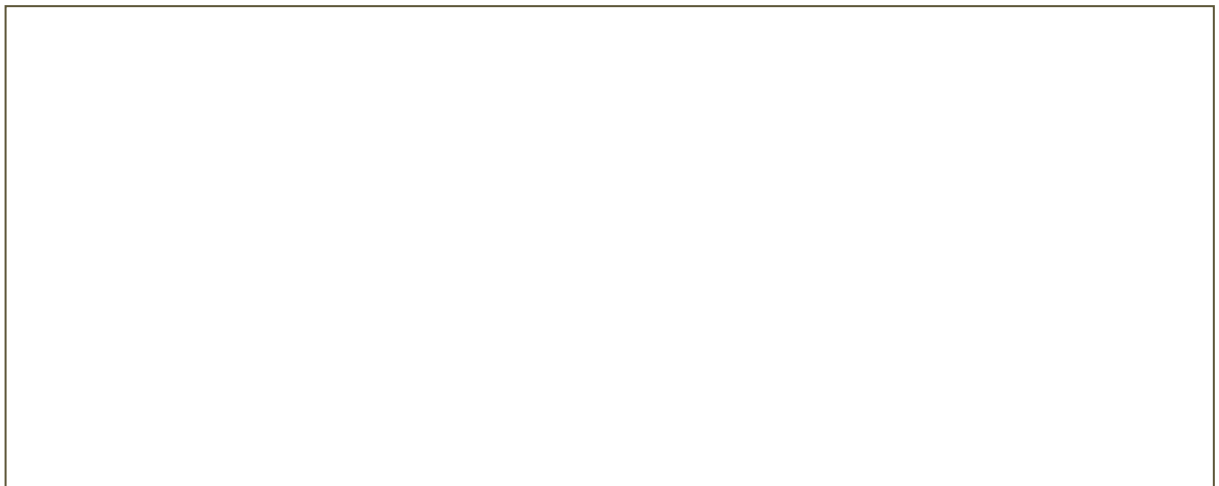
7. If yes then how many vibrations do you count in the given measurement time interval.



- Investigate sounds made with the test tube filled with water, up to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ of the test tube.
8. Compare the resulting sound graphs. How are they similar and how are they different?



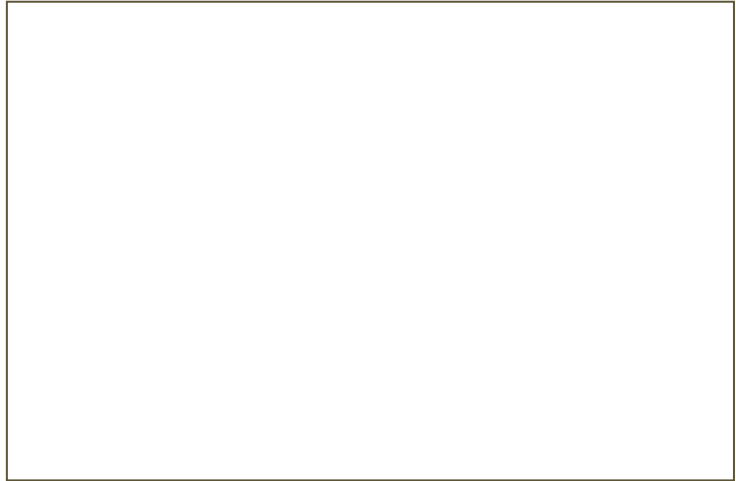
9. How does the pitch change as the test tube gets filled with water? How do you know?



Activity 4 – Build a musical instrument

Your task is to build a musical instrument and test it with the €Sense sound sensor. Your instrument should have a sound that lasts long enough to be recorded with the sound sensor. You should be able to play soft and loud sounds and should be able to change the sound pitch.

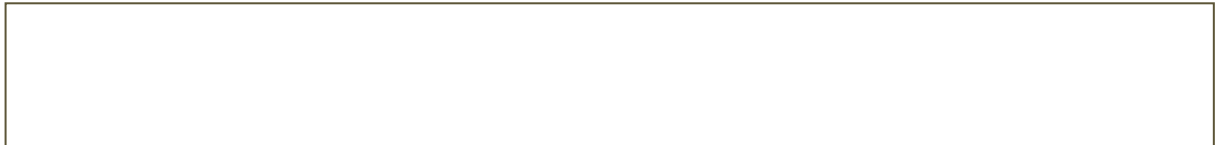
- Design your instrument.
Draw your design and discuss it with your teacher.
- Collect materials you need and build your instrument.
- Record the sound of your instrument.



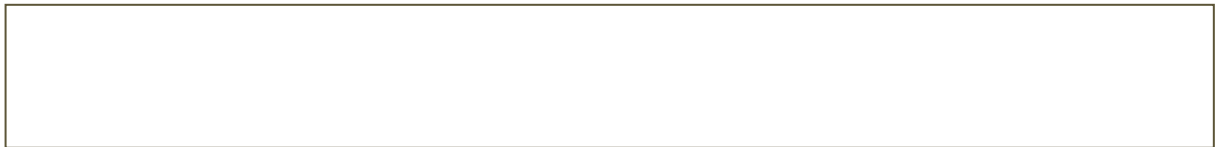
10. How do you change the pitch?



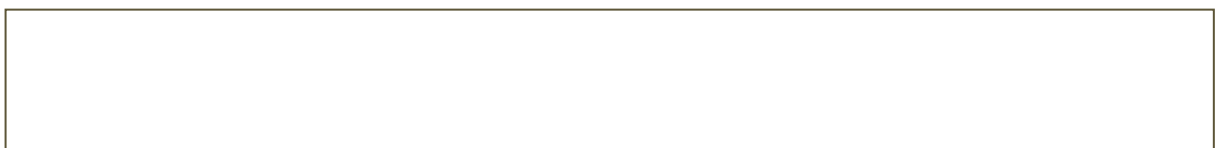
11. How do you change the loudness?



12. How can you get the sound last longer?



13. Describe the quality of your instrument's sound. How do you feel when you listen to it? (examples: pleasant, fuzzy, sharp, clear etc.).



Questions

A. As you shorten a string, the sound made when you pluck it ...

☐ gets lower in pitch ☐ gets higher in pitch ☐ stays the same

B. As you tighten a string, the sound made when you pluck it ...

☐ gets lower in pitch ☐ gets higher in pitch ☐ stays the same

C. Fill in:

A long air column produces _____-pitched sounds.

A short air column produces _____-pitched sounds.

D. Imagine playing the following instruments:

- A violin.
- A saxophone.
- A drum.

How does the player control pitch and loudness for each of these instruments?

E. You can make music with bottles filled with water not only by blowing across their tops but also by hitting them with a metal spoon. Investigate what happens to the pitch of the sound produced in this way as you fill a bottle with water. Write your findings below.