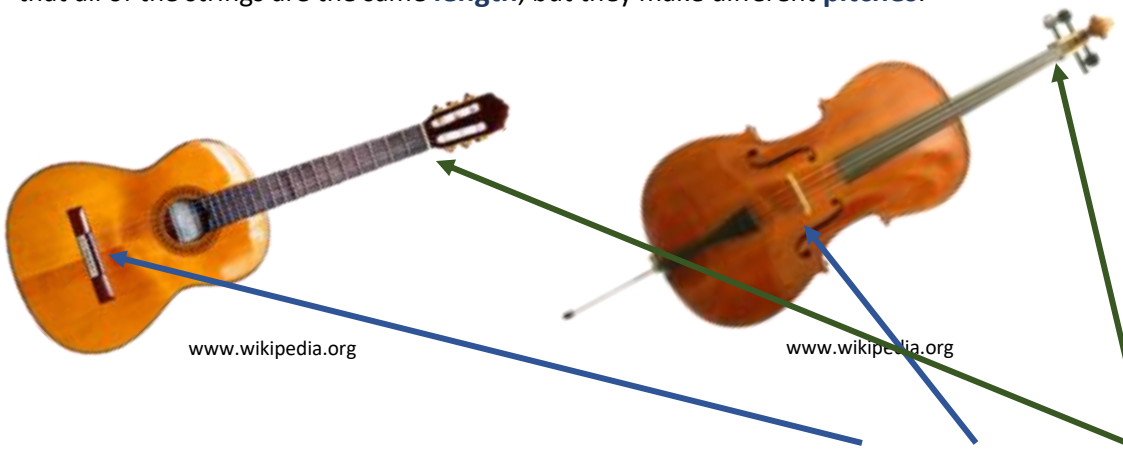
Exploring Sound 5: Other Factors Influencing Pitch

In the last lesson we looked at how the **length** of an instrument affects **pitch**.

There are other factors that also influence **pitch**. If you look at a guitar or a cello, you can easily see that all of the strings are the same **length**, but they make different **pitches**.



The **length** of the string that sounds is the distance from the **saddle or bridge** to the **nut**
All of the strings are the same **length**. So why do they make different **pitches**?

Thickness or Density

It turns out that it doesn't just matter how long a string is. It also matters how much "stuff" there is in it.

So . . .

a thicker string makes a lower sound.

In this close-up of a grand piano, you can see that the lower strings are much thicker than the higher strings

www.wikipedia.org

In physics the amount of stuff in something is called **mass**.

Yes, like the word "massive".

The more **mass** [scientifically] in an object, the more massive [descriptive language] it has.

Some materials have more **mass** than others. For example a block of wood has more **mass** than the same size of a block of Styrofoam. A metal string has more mass per length than a gut or plastic string. So metal strings for violins and guitars can be thinner.

In science **weight** and **mass** are not the same thing. For everyday life they pretty much are.

For those of you who don't have a guitar or cello at home, here's a video of someone playing the different strings on a guitar: https://youtu.be/o-BBES8z8Ac

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Tension

Those of you who place guitars, cello (or other stringed instruments) know that you regularly need to tune them. Special pegs at the end of the fingerboard can be turned to alter the **pitch**.

Turning the tuning pegs changes the tension or tightness of the string.

A tighter string makes a higher sound
A looser string makes a lower sound

Here's a very short video demonstrating how pitch goes up when a string is tightened:
https://www.youtube.com/watch?v=TaD3ysWluSQ

Pianos are also tuned using pegs.

Tuning a piano is a way more complex exercise than tuning a guitar or cello.

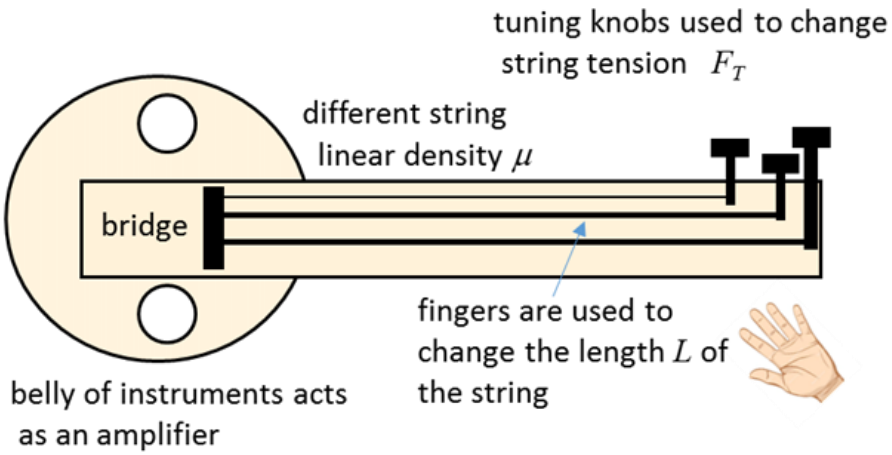
To get into the full complexity would require a lesson on systems of tuning (yes there are different ways to tune notes and have them still be "in tune".

Special equipment is also required for piano tuning.

So . . .

DON'T TUNE YOUR PIANO YOURSELF!

The graphic below shows the factors that affect the pitch of a string.
(The link will connect you to an article that describes the science and math in more depth.)



www.physics.usyd.edu.au/teach_res/hsp/sp/mod31/m31_strings.htm

If you play a bowed instrument (like cello or violin) you probably found at the beginning that your bow speed and pressure also affected the pitch. The bow can actually change both the length and tension of the string by the pressure applied.