

# Re: Measurement of pitch

---

*Source:* <http://sci.tech-archive.net/Archive/sci.physics/2006-12/msg01269.html>

---

- *From:* "OG" <[owen@xxxxxxxxxxxxxxxxxxxx](mailto:owen@xxxxxxxxxxxxxxxxxxxx)>
  - *Date:* Thu, 7 Dec 2006 19:02:22 -0000
- 

<[matt271829-news@xxxxxxxxxxx](mailto:matt271829-news@xxxxxxxxxxx)> wrote in message  
[news:1165495099.991194.252980@xx](mailto:news:1165495099.991194.252980@xx)

Tom Potter wrote:

"OG" <[owen@xxxxxxxxxxxxxxxxxxxx](mailto:owen@xxxxxxxxxxxxxxxxxxxx)> wrote in message  
[news:4tou9nF156p8vU1@xx](mailto:news:4tou9nF156p8vU1@xx)

<[tdp1001@xxxxxxxxxxx](mailto:tdp1001@xxxxxxxxxxx)> wrote in message  
[news:1165381044.657388.249430@xx](mailto:news:1165381044.657388.249430@xx)

OG wrote:

"John Bailey"  
<[john\\_bailey@xxxxxxxxxxxxxxxxxxxx](mailto:john_bailey@xxxxxxxxxxxxxxxxxxxx)>  
wrote in message  
[news:08ran2labqmc71frg5mat6v05k66o0i3v8@xxxxxxxxxxx](mailto:news:08ran2labqmc71frg5mat6v05k66o0i3v8@xxxxxxxxxxx)

On 4 Dec  
2006  
16:29:27  
-0800,  
[matt271829-news@xxxxxxxxxxx](mailto:matt271829-news@xxxxxxxxxxx)  
wrote:

Hi

At  
what  
time  
in  
history  
were

Re: Measurement of pitch

the  
range  
of  
frequencies  
of  
audible  
sounds  
first  
roughly  
known?  
Who  
made  
the  
first  
scientifically  
accurate  
measurement  
of  
the  
frequency  
of  
a  
sound  
wave,  
and  
when?

"Mersenne's  
description  
in his  
Harmonic  
universelle  
(1636) of  
the  
first  
absolute  
determination  
of the  
frequency  
of an  
audible tone  
(at  
84 Hz)  
implies that  
he already  
demonstrated  
that the  
absolute–frequency  
ratio of two  
vibrating

## Re: Measurement of pitch

strings,  
radiating a  
musical  
tone and its  
octave, is as  
1 : 2.

### Fascinating

And I found this description  
of how he did it  
"The first major step toward  
defining pitch into an exact  
number of  
vibrations per second – its  
frequency – was Mersenne  
in the 1600s,  
who  
stretched a brass wire 138  
feet and counted its  
vibrations by eye. He  
then  
stretched smaller wires until  
they matched the tuning of  
an organ  
pipe  
and  
scaled up the numbers from  
the long wire and correctly  
calculated its  
frequency."

[http://digitalcontentproducer.com/mag/avinstall\\_measure/](http://digitalcontentproducer.com/mag/avinstall_measure/)

Mersenne's method was not as good  
as the method used by the Pythagoreans.

Maybe, but the OP's question was regarding the first  
scientific  
measurement of ACTUAL frequency rather than relative  
frequency, which  
was  
Pythagoras' work.

Apparently "OG" didn't get the message.

Comparing a frequency directly to a frequency standard  
such as middle C, is more precise and more fundamental than

## Re: Measurement of pitch

comparing a frequency to an artificial, politically set, real number, pseudo–frequency such as the second.

As Maxwell pointed out when he formulated Dimensional Analysis, a measurement consists of two parts, a reference unit, and a number that represents the number of these reference units in the quantity to be measured.

The Pythagorians probably used the most stable instrument available to them, as their reference "atomic clock" against which to compare all other things that cycled, vibrated, or could be made to ring, perhaps including days, months, years, etc.

Hopefully "OG" will explain what "ACTUAL frequency" really is.

This seems a valid point. To measure frequency you need some reference time measure, and if huge accuracy is not required then one cycle of a vibrating string (or pendulum if you like) seems as good as anything.

But that is what Tom has a problem with – he seems to oppose the idea of a reference \_time\_ measure, and prefers to have a reference 'pitch', whose actual frequency is irrelevant. This is what the Pythagoreans had.

The string or pendulum in question could no doubt be specified exactly, but I doubt that it could be made physically perfect enough for super–precision time measurements. (And I'm also not sure if the frequency of a string or pendulum doesn't vary very slightly depending on amplitude, so that would need to be specified too.)

And the question remains: could Pythagoras relate the frequency of his vibrating string to other phenomena? Would he have had any clue how many vibrations corresponded to one of his heartbeats, for instance?

There is no report that he did, so probably not; but Mersenne showed that such an approach is fruitful.