

Pythagoras and his theory of music

Read the poem to your class, or have some children read a few lines each, to learn about how Pythagoras discovered how to make music.



"GOOD LUCK"
JOHNNY BALL

Pythagoras and the Mathematical Theory of Music

Pythagoras, the Greek mathematical sage, existed when iron was all the rage

When everyday blacksmiths hammers rang, to shape the iron tools of man.

But the sounds he heard in his locality, seemed to have some musicality?

For as objects were shaped and hewn, the hammer sounds seemed quite in tune.

Hammers came in four weighs or sizes, of which a set of four comprises

The 12-pound one, then 9, then 8, then 6 or half the first one's weight

Hammer 12 was the heaviest so, if we give it the ringing note of "Doh"

The 9 hammer's note when it is heard, gives "fah" - a higher natural third.

While 8 gives "soh" which he saw of course, was also in tune as a natural 4th,

Then as the sparks flew from the fire, The 6 pound weight rang one octave higher.

To these he added the 16 and 4 weights, one being double and one half eight,

And when six new bells were hewn, they heard that they were all in tune.

Then instruments blown to make a musical sound, followed quite similar rules, they found.

For pipes give notes of tone or strength, according to their various lengths.

The reason being - not the weight, or whether the tubes are curved or straight?

The sound is governed, they became aware, by the volume of vibrating air.

Then instruments with vibrating strings, of equal length could be made to "sing"

By varying the tension with unit weights of 16, 12, then 9 then 8,

Then 6, then 4, though it transpired, the heavier weights gave a note much higher,

So, the maths is just the same they found, but with strings it's the other way around?

Music is controlled by maths, it seemed. So, they explored and thought and dreamed.

"Perhaps even the stars," Philolaus wrote, "might each one have its own pure note.

So that every planet and every moon - and the entire heavens are all in tune,

All with pure notes, each of which it appears, produce the music of the Spheres."

And music theory so began, thanks to Pythagoras this mathematical man.

Until today, when humanity thrives, and music enriches all our lives.

Johnny Ball - 2023

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Read the poem out loud in groups, to learn about how Pythagoras discovered how to make music.



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Making music the Pythagorean way

Follow the instructions to help the children make their own musical instrument using glasses or bottles. Depending on your class, you can prepare the activity and have them just make music, or they can assist with creating the instruments.

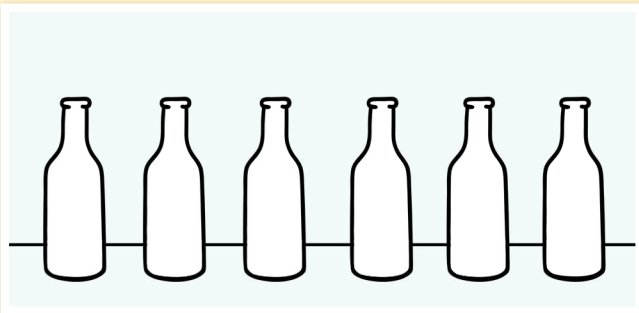


Make your own musical instrument

You will need:

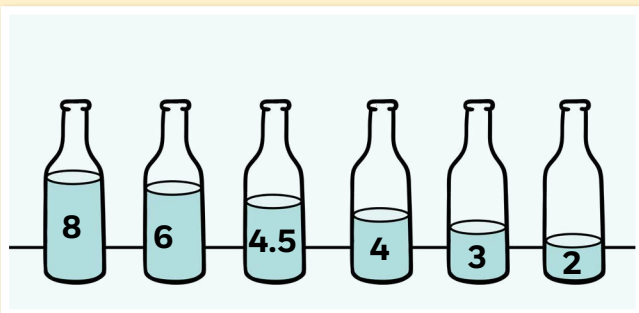
- Six glasses or bottles of the same size.
- Water.
- Measuring jug.
- Something to use as a beater, like a pencil with a rubber on the end.

Place the glasses or bottles on a flat surface, like a table. Be careful not to knock the glasses over!



Now fill the bottles with different amounts of water. The Pythagoreans used these measurements: **16, 12, 9, 8, 6, and 4.**

But we would need really big bottles to do that. So we are going to use half the amount: **8, 6, 4.5, 4, 3, and 2.**

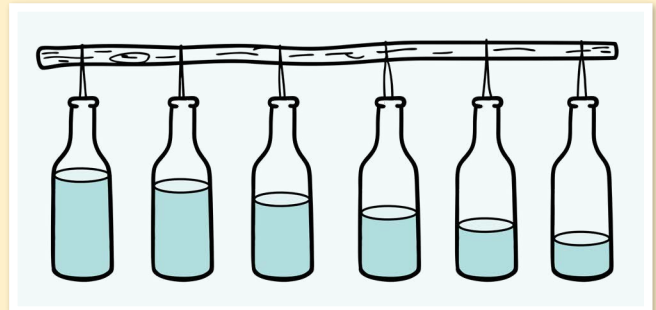


Measure this much water in millilitres which you can see on the side of the jug:

800ml, 600ml, 450ml, 400ml, 300ml, 200ml.

Tap the bottles with a beater to make music. If you are using glass, use a pencil with a rubber on the end and tap gently.

Help the children to tie string around the bottle necks. You can then hang the bottles from a broom handle across the back of two chairs and can use a ruler as your beater.



Make your own music or song.

We'd love to see what music your pupils create. Post videos of their performances and tag us online: **#NumberDay**

Making music the Pythagorean way

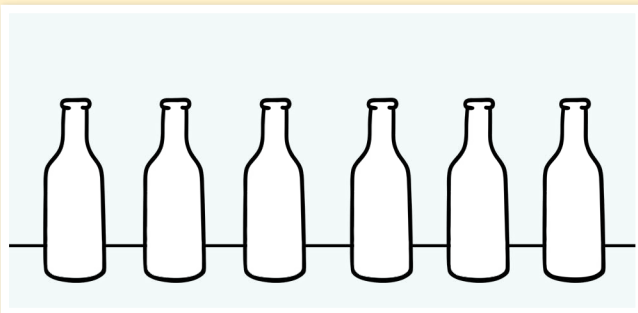
We can use Pythagoras' knowledge to make our own music.

Follow the instructions to make your own musical instrument using a glasses or bottles.



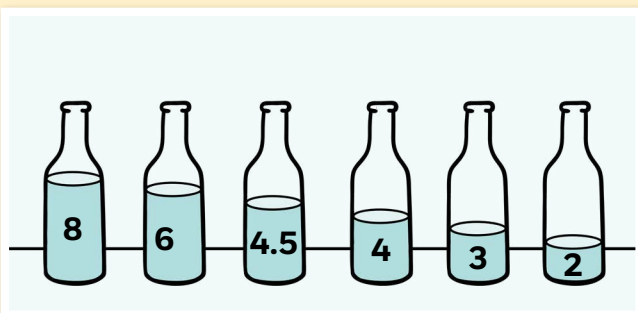
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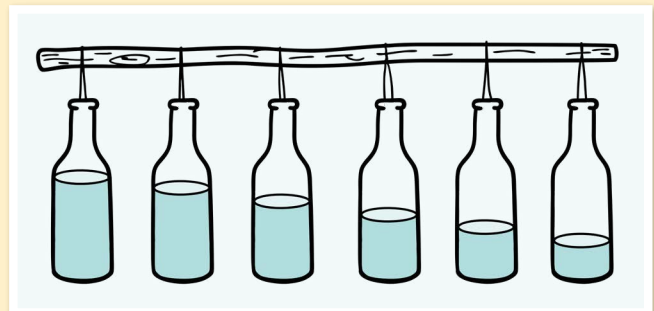


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Your teacher can help tie string around the bottle necks. You can then hang the bottles from a broom handle across the back of two chairs and can use a ruler as your beater.



Make your own music or song. You can perform it for your class if you want.