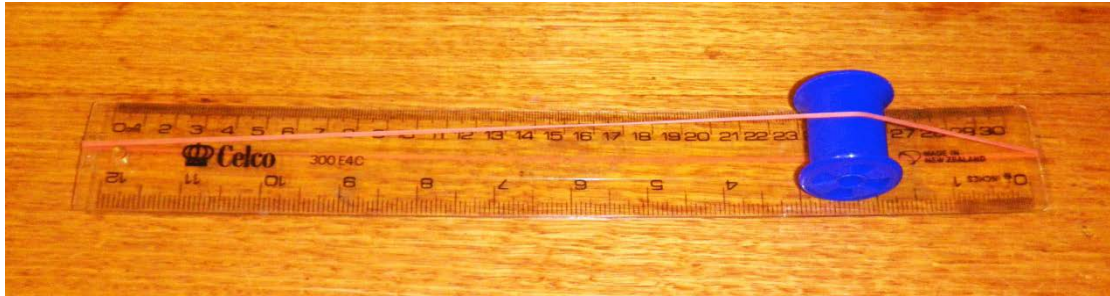


Harmony of the Spheres – Student Activity

Task 1: Musical notes depend on the length of string plucked

Let's examine the idea that mathematics and music are linked by testing whether the length of a string (which we can measure) affects the musical note it makes when plucked.



Materials

- A ruler
- An elastic band
- An eraser or other small solid object that can be placed under the elastic band. I used a cotton reel.

Method

1. Stretch the elastic band lengthwise over the ruler.
2. Insert the eraser under the stretched elastic band.
3. Slide the eraser up to the right end of the band and pluck the left hand side of the band.
4. Progressively move the eraser left plucking the left hand side of the band
5. Observe any changes.

Observations

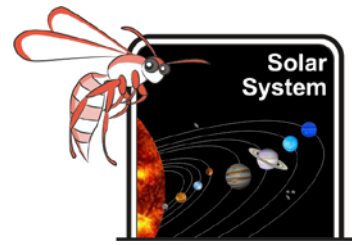
What happens as the eraser moves to the left?

On the picture of a harp, mark which string would produce the lowest note when plucked.



Task 2: Testing the idea of “harmony of the spheres”

The philosopher Pythagoras (580 – 500BC) and his disciples believed the Earth and the other planets circled around a big central fire. Pythagoreans also believed that the distances between the Earth and other heavenly bodies were scaled to musical intervals and created music. They had no simple measurement to check if this was correct, but we can try to test this idea today using the planets which are visible by the naked eye: Mercury, Venus, Mars and Saturn.



Harmony of the Spheres – Student Activity

Materials

- Access to books or the internet to find out the distances of the other planets observed by ancient astronomers.
- A ruler (30cm)
- Large elastic band
- An eraser or other small solid object that can be placed under the elastic band.

Method

1. Determine the distance of each planet from the Sun and fill it into the table below.
2. Work out the distance this would be scaled down to a 30 centimetre ruler.

Planet	Distance from the Sun (millions of kilometres)	Distance along band (centimetres)
Mercury		
Venus		
Earth		
Jupiter		
Saturn		

3. Stretch the elastic band lengthwise over the ruler.
4. Insert the eraser under the stretched elastic band.
5. Slide the eraser up to the right end of the band so that its right side is the distance from the end of Mercury, pluck the left hand side of the band and listen to the sound it makes.
6. Progressively move the eraser left, to the distances of each of the other planets, plucking the left hand side of the band
7. Observe any changes.

Observations

Does this observed and measured data above support or disprove the idea of “The harmony of the spheres”?
