SCALE CITY

KET

The Road to Proportional Reasoning: NAVIGATION GUIDE & PRINTABLE FORMS

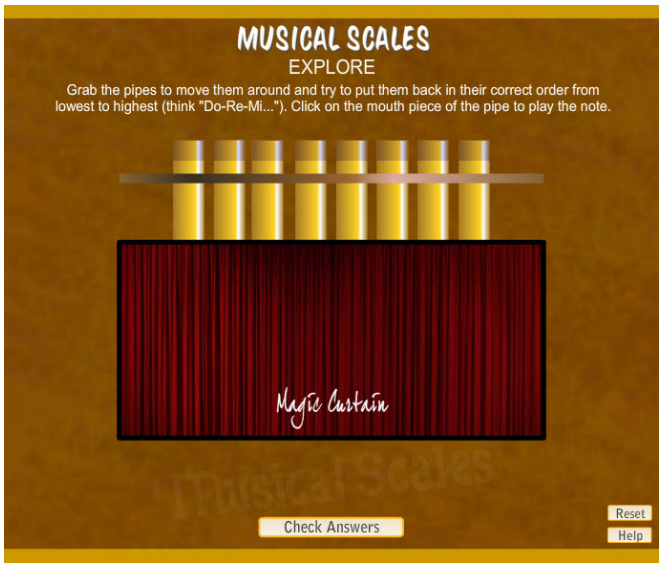
Belle of Louisville: Musical Scales

Welcome to "Musical Scales." This interactive opens to an image of a pan flute. Click the "Start" button to mix up the pipes behind the Mystic Curtain. Grab the pipes and place them back in correct order.

Click on the mouthpiece of the pipe to play the note and try to rearrange the pipes by ear—lowest to highest.

You can also rearrange the pipes in correct order by frequency. You cannot move on to "Calculate" until you have successfully moved the pipes into the right order.

In "Calculate," click the cursor over the mouthpiece of a pipe to find its frequency. (Note: The low C is the longest pipe and the high C is the shortest pipe.) After answering the questions correctly, you will be given a series of notes with the option to play a song on the pipes before moving on to the next page.



In "Calculate," click the cursor over the mouthpiece of a pipe to find its frequency. (Note: The low C is the longest pipe and the high C is the shortest pipe.) After answering the questions correctly, you will be given a series of notes with the option to play a song on the pipes before moving on to the next page.

On the third page, click on the "Ruler" button in the top right corner to measure the pipes.

"Check Answers" will reveal whether your answers are correct. There is a small margin of error, since you might come up with slightly different measurements. The exact answer will pop up in place of your approximate answer.

Text of Help Boxes for "Musical Scales"

The help boxes include interactive directions and mathematical and physics information to help you understand the interactive.

Help 1: Arrange the pipes in order of lowest to highest frequency. If you arrange them correctly, you will have constructed the C Major scale.

Help 2: Hertz (Hz) is the unit of frequency named after German physicist Heinrich Hertz. It is defined as "cycles per second" or simply "per second". So when A4 is 440 Hz, that means it vibrates 440 times per second.

Help 3: Simply put: The initial differences in the products for frequency times length are due to rounding. The frequencies are actually numbers with many, many decimal points rounded to fit on this table. The same goes for the lengths, which are rounded to two decimals but really can be found to a more precise figure. These two cases of small rounding can cause a not-so-small change in the product.

"Musical Scales" Questions

Part 1:

1. What is the frequency of the low C (C4)? _____Hz
2. What is the frequency of the high C (C5)? _____Hz
3. What is the value of the ratio of the two frequencies (high C frequency divided by low C frequency)? _____

Part 2:

1. What is the length of the low C (C4) pipe? _____ in
2. What is the length of the high C (C5) pipe? Use a decimal. _____in
3. What is the decimal value of the ratio of the lengths (high C length divided by low C length)? _____

Part 3:

Complete the data in the table

Table: Musical Scales

Note	Frequency (Hz)	Length (inches)	Frequency x Length
C4	261.63	9.0	
D4			
E4			
F4			
G4			
A4			
B4			
C5	523.26	4.5	

Now look at the data in the table. As the length of the pipes decreases, the frequency increases. And length x frequency equals a constant.

So, pipe length and frequency are:

_____directly proportional _____ inversely proportion