

Accidental Order - The Circle of 5ths

The Circle of 5ths tells you that there are 3 sharps in the key of A. It does not tell you why. Here's the WHY part.

All diatonic scales have the same pattern of whole and half steps. Here is a C scale: C D E F G A B C no accidentals.

The SPACE or tonal step between each tone is:

C	
	whole
D	
	whole
E	
	half
F	
	whole
G	
	whole
A	
	whole
B	
	half
C	

The pattern is: Whole Whole HALF Whole Whole Whole Half or W W H W W W H

If you know this pattern then you can construct a diatonic scale on any tone and the key signature will simply fall into place.

Let's build a scale on the tone "A" without knowing anything about the key signature of "A".

A	
	[whole step]
B	
	[whole step requires the next tone to have an accidental, a sharp. SO, it's C#]
C#	
	[half step]
D	
	[whole step]
E	
	[whole step requires the next tone to have an accidental, a sharp. So it's F#]
F	
	[whole step requires the next tone to have an accidental, a sharp. So it's G#]
G	
	[half step]
A	
	[the scale repeats]

More detail at this link: www.billtroxler.com

This pattern of whole and half steps forces us to use THREE sharps: F# C# and G#. Those accidentals define the key signature of A.

The process works for every tone around the Circle of 5ths.

Try building a scale on Eb

Eb
 [whole step]
F
 [whole step]
G
 [half step requires the next tone to have an accidental, a flat. So, it's A FLAT]
Ab
 [whole step requires the next tone to have an accidental, a flat. So, it's B FLAT]
Bb
 [whole step]
C
 [whole step]
D
 [half step]
Eb

So the key of Eb has three FLATS: Bb, Eb, Ab

In short.....

The octave is a doubling of frequency. For example if the frequency of middle C is doubled, you will hear the C an octave above middle C.

How that doubling is divided – how many parts and what space between the parts – determines what kind of scale is produced.

The overtone series produces a natural generation of all tones of the diatonic scale. The overtone series is heard in every naturally-produced tone. Music synthesizers attempt to recreate the overtone series in order to mimic the voice of specific instruments.

The overtone series is generated by integer multiples of the fundamental frequency. Arithmetically that would go: 200 Hz = 1X the fundamental tone, 2X the fundamental tone = 400 Hz, 3X the fundamental tone = 600 Hz, 4X the fundamental tone = 800 Hz and so forth.

Musically the overtone series starting on the tone C is

C1, C2, G2, C3, E3, G3, C4*, D4, E4, G4*, A4

The number indicates the octave in which the tone appears.

Okay, it's NOT a perfect world. The naturally-occurring overtone on these two tones sounds "flat". The tones are closer to Bb and to F#. The equally tempered scale we use forces these two tones into C4 and G4. This is to say the musical scale of the West is contrived. With very good reason, of course. But it is an artificial scale.

If you push on with the overtone series, eventually it will produce all tones of the diatonic scale. And ultimately the series will produce every possible tone. These will be outside of your hearing range. But the math is elegant!

It is also important to recognize that the first FIVE tones of the overtone series create a triad. C1 C2 G2 C3 E3. or C E G.[spread out over several octaves]

The voice of every instrument and your own vocal quality is created by the unique strength of each overtone. "Soft instruments" like the flute tend to have strong fundamentals and strong, EVEN numbered overtones. "Harsh instruments" like the oboe tend to have strong ODD numbered overtones.

We experience music emotionally. Yet the inner workings are highly mathematical. No wonder the Greeks loved music and the Age of Reason advanced music theory so far.