**Table 2: Relative positions of studs on the *qin***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Stud number: | open | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Fraction of string: | 1 | 7/8 | 5/6 | 4/5 | 3/4 | 2/3 | 3/5 | 1/2 | 2/5 | 1/3 | 1/4 | 1/5 | 1/6 | 1/8 |
| Division into 120: | 120 | 105 | 100 | 96 | 90 | 80 | 72 | 60 | 48 | 40 | 30 | 24 | 20 | 15 |
| Vibrating Frequency: | 80 | 640 | 480 | 400 | 320 | 240 | 400 | 160 | 400 | 240 | 320 | 400 | 480 | 640 |
| Relative note equivalent: | Do | do" | so' | mi' | do' | so | mi' | do | mi' | so | do' | mi' | so' | do" |

Rex’s notes:

The vibrating *frequency* is not related linearly to the hui position. This is because the string is initially divided in two (by a simple fraction) but released immediately after plucking. The hui position needs to divide the string in harmonic fractions so that on release the whole string gives a single pitch, based on the ratios. Hui is pronounced “whey”.

Frequency *ratios* of actual sound produced:

Open x1 C

13 x8 3 octaves C+++

12 x6 2 Oct + Fifth G++

11 x5 2 Oct +Third E++

10 x4 2 octaves C++

9 x3 Oct + Fifth G+

8 x5 2 Oct +Third E++

7 x2 1 octave C+

6 x5 2 Oct +Third E++

5 x3 Oct + Fifth G+

4 x4 2 octaves C++

3 x5 2 Oct +Third E++

2 x6 2 Oct + Fifth G++

1 x8 3 octaves C+++

The harmonic notes are *mirrored* about hui number 7 (+1 octave) because the ratios of the notes must be simple fractions to get the sustain. So, for example, hui 5 and 9 will both give x3 which is 1.5 octaves (1 octave plus perfect 5th).

7 +1 Oct x2

5, 7 +1 Oct + Fifth x3

4, 10 +2 Oct x4

3, 6, 8, 11 +2Oct + Third x5

2, 12 +2 Oct + Fifth x6

1, 13 +3 Oct x8

Note that x7 isn’t marked as a hui on a Guqin.

Of course, harmonics can only be played on *open* strings (not pressed down).