

a) Compute frequencies ratios of E & B in the major scale to finish the 'Pythagorean diatonic scale'. Either go up or down by fifths ($\frac{3}{2}$). Look at the chromatic scale to figure out whether to go up or down from existing notes.

C	D	E	F	G	A	B	C
1	$\frac{9}{8}$		$\frac{4}{3}$	$\frac{3}{2}$	$\frac{27}{16}$		2

b) Compare the freq. of E to the freq. $\frac{5}{4}$ which emerges from the harmonic series. To this by finding their ratio (as a simple fraction).

This ratio is called the Syntonic comma.

c) What ratios are there between C & D ?
_{integer}
 D & E ?
 E & F ?
 etc.

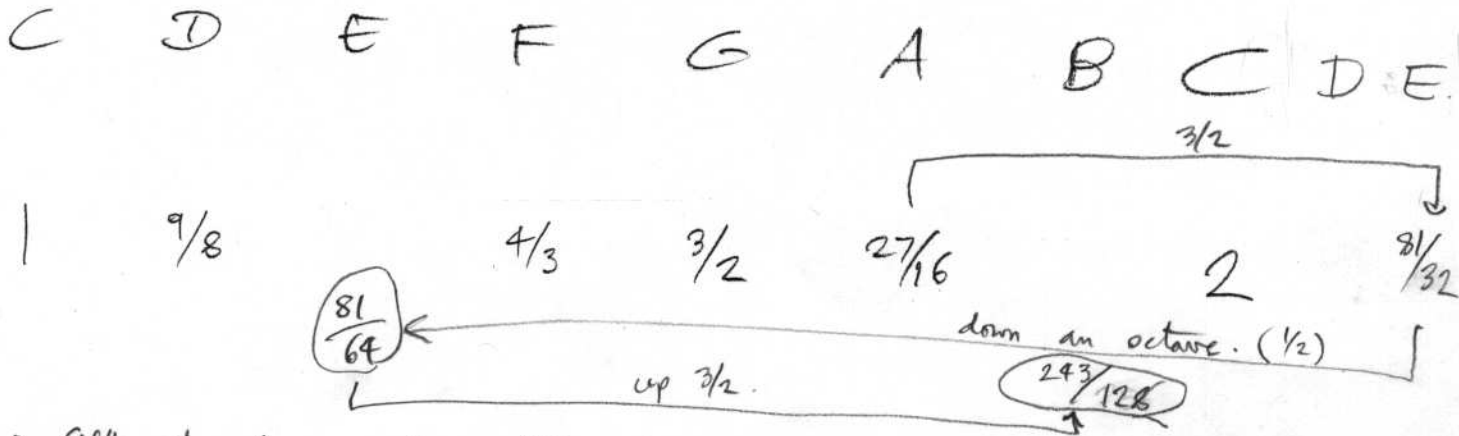
ie the adjacent notes?

MATH 5 WORKSHEET : Tuning systems

4/8/07

SOLUTIONS.

- a) Compute frequencies ratios of E & B in the major scale to finish the 'Pythagorean diatonic scale'. Either go up or down by fifths ($\frac{3}{2}$). Look at the chromatic scale to figure out whether to go up or down from existing notes



E is fifth above A; B is fifth above E (check 7 semitones on piano kbd).

- b) Compare the freq of E to the freq. $\frac{5}{4}$ which emerges from the harmonic series. To this by finding their ratio (as a simple fraction).

Pythag. E (relative to C=1) is $\frac{81}{64}$

Harmonic series E (5:4) is $\frac{5}{4}$

} ratio $\frac{81 \times 4}{5 \times 64 \times 16} = \frac{81}{80}$

This ratio is called the Syntonic comma.

- c) What ratios are there between adjacent notes
- | | | | |
|--|------------|-------------------|--------------------|
| | C & D ? | $\frac{9}{8}$ | = Pythag. tone |
| | D & E ? | $\frac{9}{8}$ | |
| | E & F ? | $\frac{256}{243}$ | = Pythag. semitone |
| | etc. F & G | $\frac{9}{8}$ | |
| | G & A | $\frac{9}{8}$ | |
| | A & B | $\frac{9}{8}$ | |
| | B & C | $\frac{256}{243}$ | |