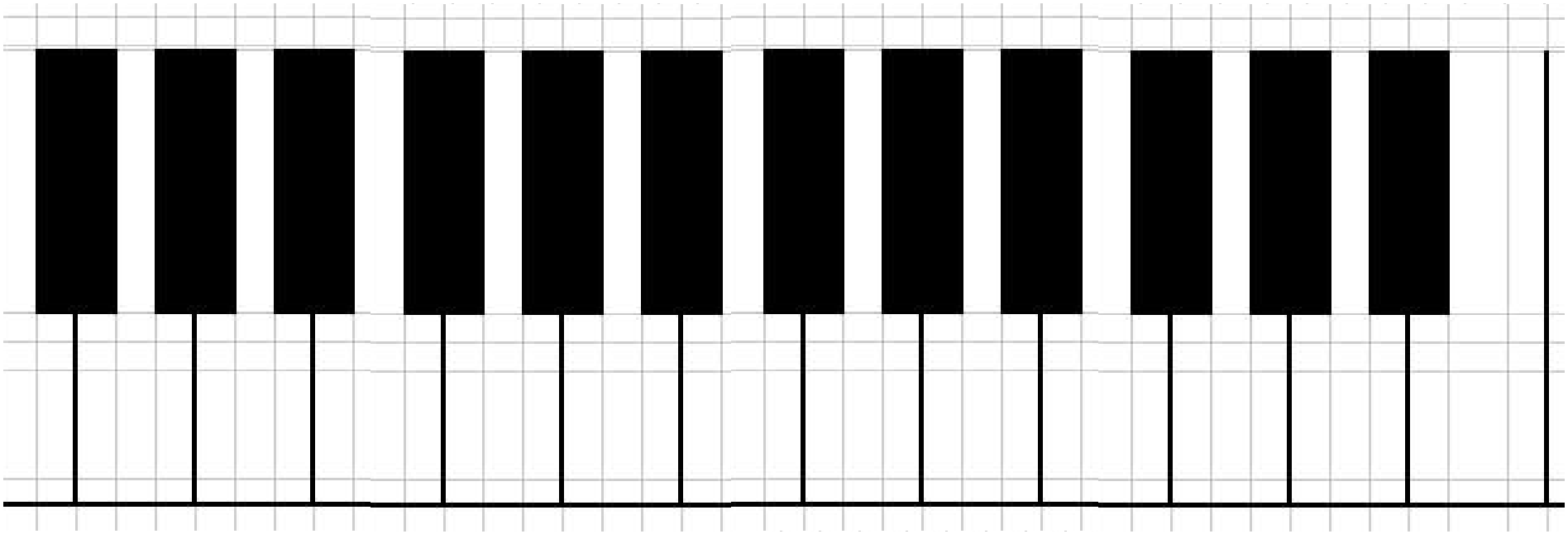
Musical Scales



WHY NOT?

Just scale constructed from major triads:

4 -> 5 -> 6

divide by 4: **1 5/4 3/2**

to get Hz, you could multiply by any number you like,
e.g. multiply by 50: 200Hz -> 250Hz -> 300Hz

tune the white keys of the piano:

C D E F G A B C D

to three triads:

C-E-G: **C D E F G A B C D**

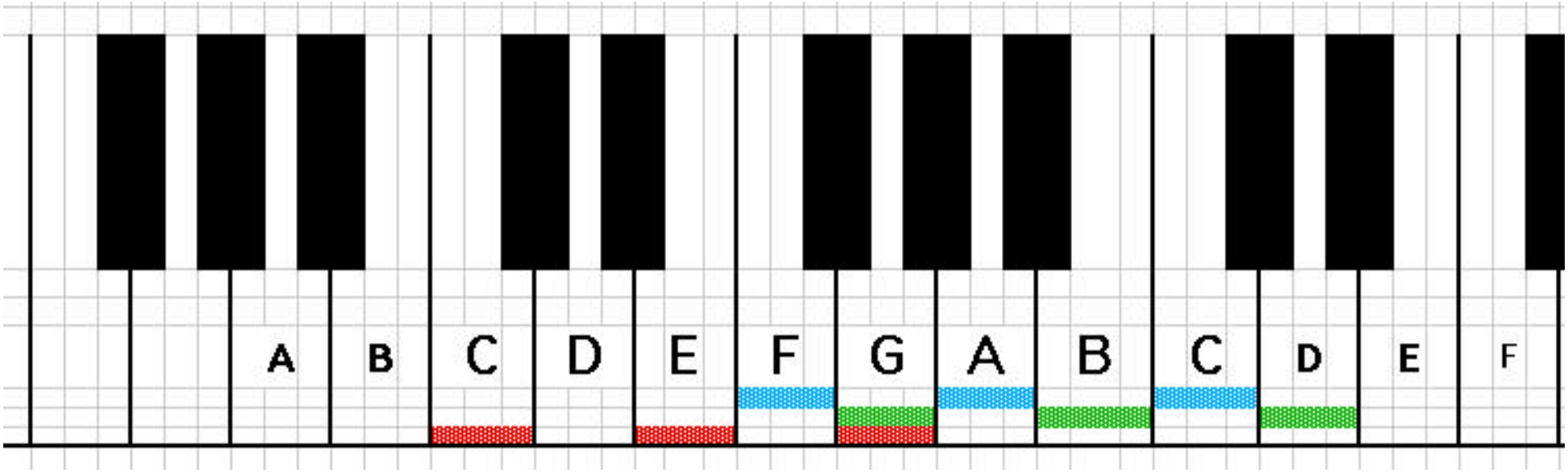
G-B-D: C **D** E F **G** A **B** C **D**

F-A-C: C D E **F** G **A** B **C** D

What are the required frequencies?

Just Scale:

white keys of the piano



C-E-G triad 1 5/4 3/2 2

G-B-D triad 9/8 3/2 15/8 9/4

F-A-C triad 4/3 5/3 2

if we call the first frequency (C) =1
the frequencies become:

	C	D	E	F	G	A	B	C
	1	9/8	5/4	4/3	3/2	5/3	15/8	2
inter-val:	**9/8**	**10/9**	**16/15**	**9/8**	**10/9**	**9/8**	**16/15**	
incr:	**12.5%**	**11.1%**	**6.7%**	**12.5%**	**11.1%**	**12.5%**	**6.7%**	
STEP:	**1**	**1**	**1/2**	**1**	**1**	**1**	**1/2**	

the ”major just diatonic scale"

black keys where there is a whole-tone step!

Names of intervals:

examples on blackboard:

how count?

how find number of semitones?

minor third vs. major third

when are intervals called"just"?

How would we tune a keyboard?

example: of A_4 = 440 Hz, what freq is F_4? G_5?

How calculate frequency ratios?

example:find ratio between F_4 and B_4 in just tuning

The Natural Scale

natural scale: sequence of harmonics (bugle)

frequencies relative to fundamental:

1 2 3 4 5 6 7 8 9 10 ……..

example:
if fundamental is F_4 what tone is the fifth mode?