Lunch Seminar

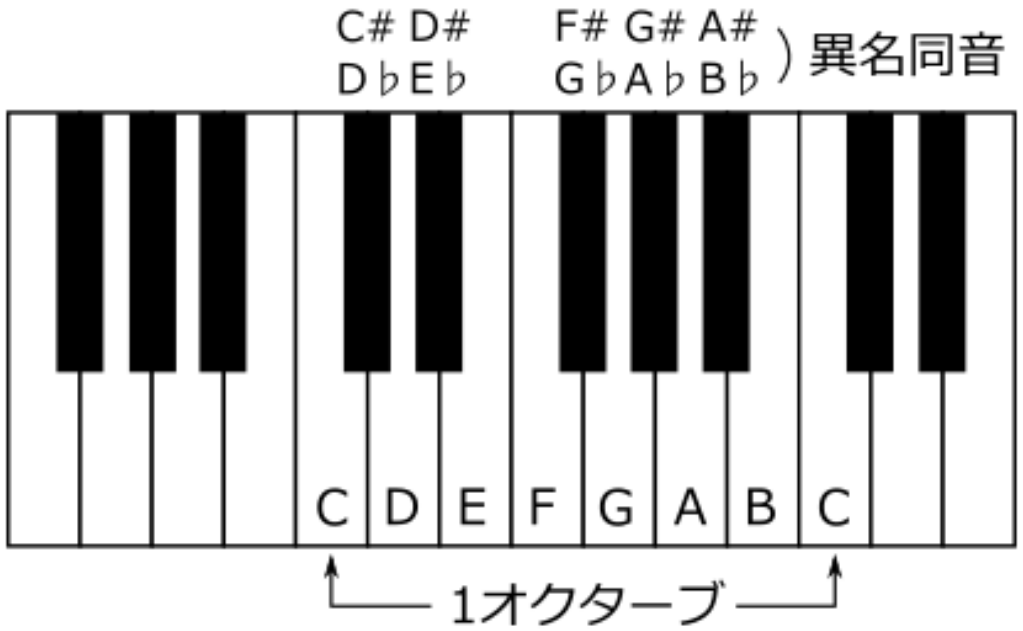
Kenya Otsuka
Department of Intelligence
Science and Technology

KYOTO UNIVERSITY

Self Introduction:

- Name : Kenya Otsuka
- Grade : B4
- Hometown : Hirakata, Osaka
- Hobby : Mandolin

Sound Name:

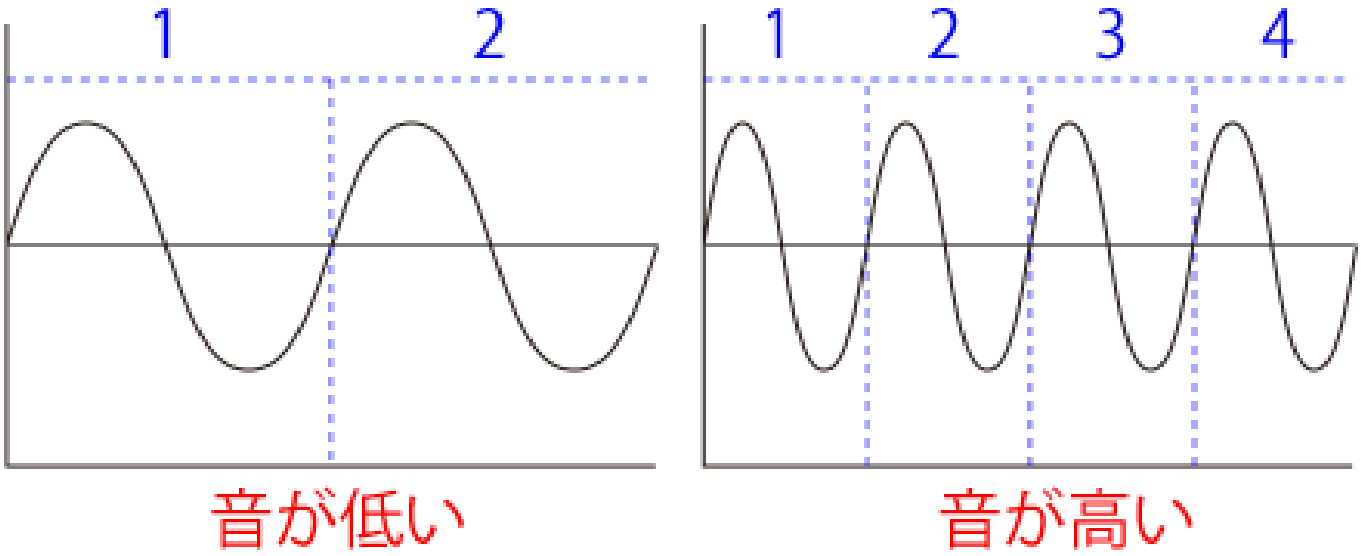


イタリア語	Do	Re	Mi	Fa	Sol	La	Si
英語	C	D	E	F	G	A	B
ドイツ語	C	D	E	F	G	A	H（BはB♭を表す）
日本語	ハ	ニ	ホ	ヘ	ト	イ	ロ

https://mahoroba.logical-arts.jp/archives/2908

Pitch of Sound:
Frequency

- Sound : wave
  - High frequency ⇒ High Sound

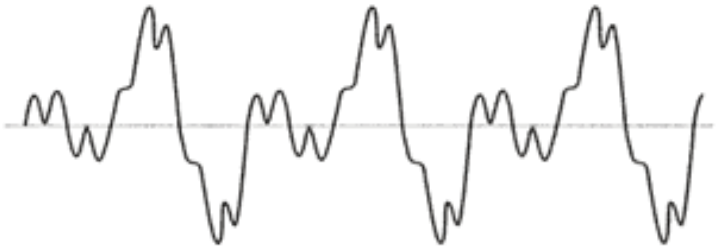


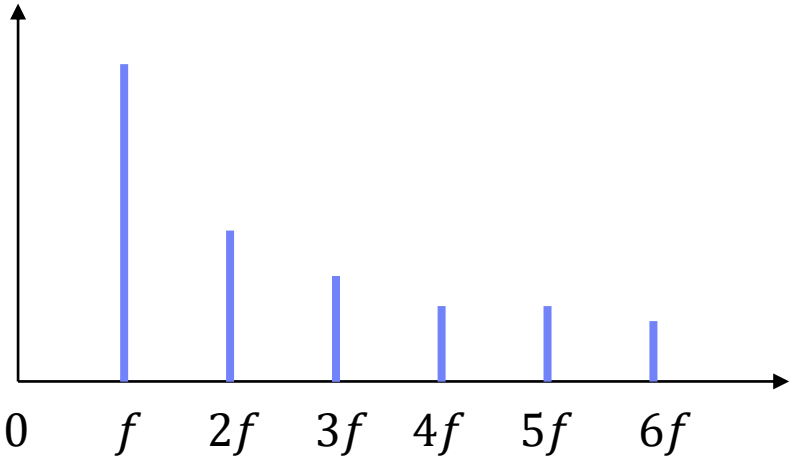
https://dtm-hyper.com/synthesizer/synth_1.html

Pitch of Sound :

Overtone(倍音)

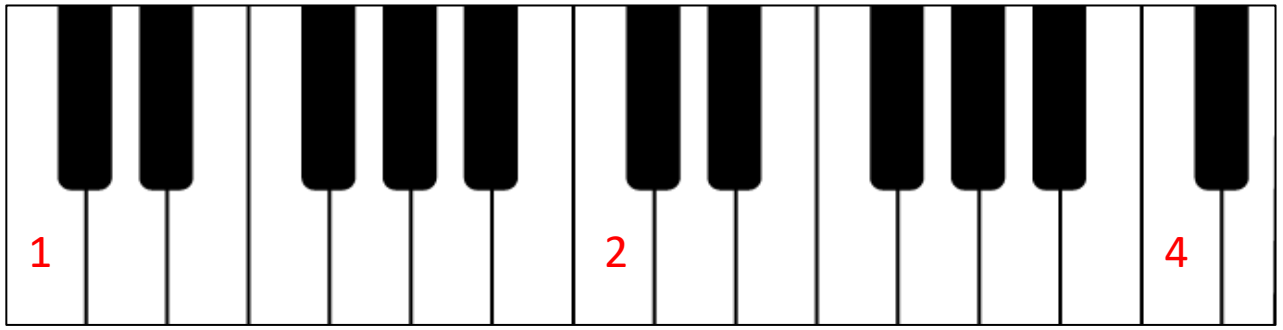
- Real sound is not sine curve.
- Sound of frequency f has $2f, 3f, \ldots$ frequency components.
  - $2f, 3f, \ldots$ components are called overtone (harmonic, 倍音).





Pitch of Sound :
$2f$, Perfect 8th(完全8度)

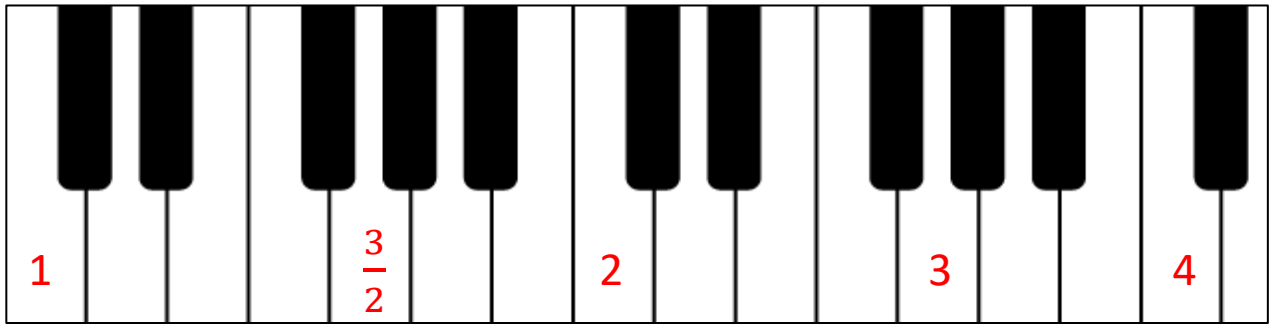
- Sound $2f$ is good with sound f.
  - Sound $2f$ sounds like sound f.
  - These were given the same sound name.
- Sound $2f$ is called perfect 8th (octave, 完全8度).



Pitch of Sound :

$3f$, ${}^{3}/_{2}\,f$, Perfect 5th(完全5度)

- Sound $3f$ is good with sound f.
- Sound ${}^{3}/_{2}\,f$ is also good with sound f.
- Sound ${}^{3}/_{2}\,f$ is called perfect 5th (完全5度).



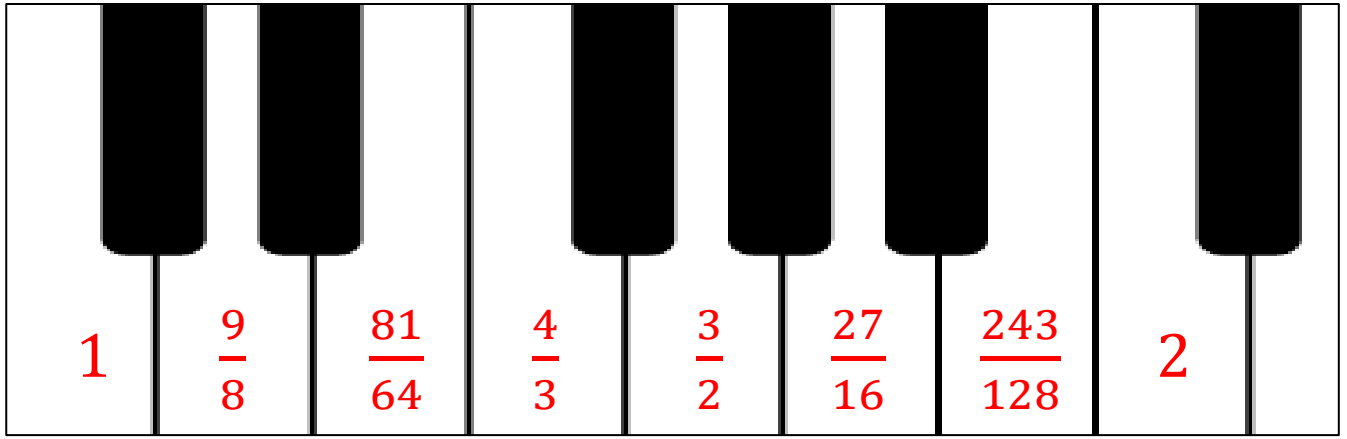
Scale:

Diatonic Scale

F(ファ) C(ド) G(ソ) D(レ) A(ラ) E(ミ) B(シ)

$\frac{4}{3}$ 1 $\frac{3}{2}$ $\frac{9}{8}$ $\frac{27}{16}$ $\frac{81}{64}$ $\frac{243}{128}$

$\div \frac{3}{2} \times 2$ $\times \frac{3}{2}$ $\times \frac{3}{2} \div 2$ $\times \frac{3}{2}$ $\times \frac{3}{2} \div 2$ $\times \frac{3}{2}$

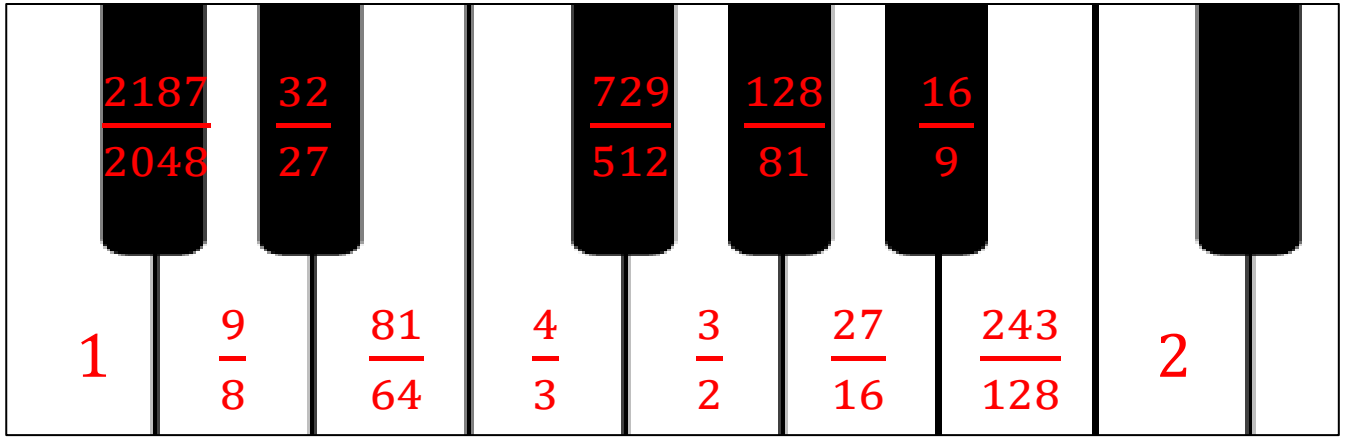


Scale:

Pythagorean Tuning

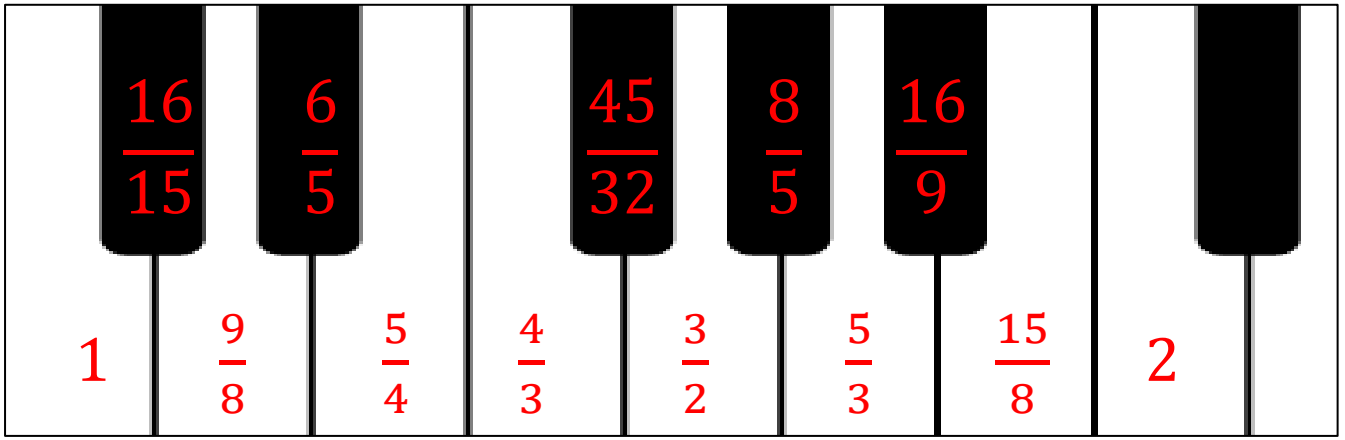
A♭	E♭	B♭	F	C	G	D	A	E	B	F♯	C♯	G♯
$\frac{128}{81}$	$\frac{32}{27}$	$\frac{16}{9}$	$\frac{4}{3}$	1	$\frac{3}{2}$	$\frac{9}{8}$	$\frac{27}{16}$	$\frac{81}{64}$	$\frac{243}{128}$	$\frac{729}{512}$	$\frac{2187}{2048}$	$\frac{6561}{4096}$

1.580 1.602



Scale:

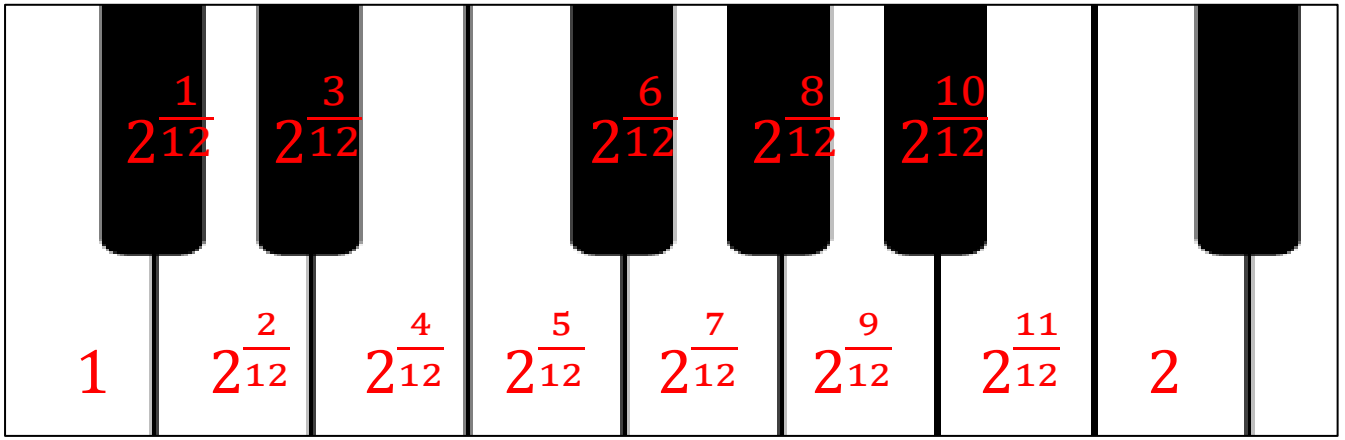
Just Intonation (純正律)



- Advantage
  - Clear triad (C:E:G=4:5:6)
- Disadvantage
  - Difficult to change keys

Scale:

Equal Temperament (平均律)



- Advantage
  - Free to change keys
- Disadvantage
  - Unclear chords