


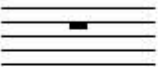

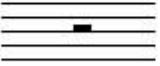






# A Brief Look at the Relationship between

## MUSIC AND MATHEMATICS

The background of the slide is a solid blue color. In the lower right quadrant, there are several faint, concentric circles of varying sizes, resembling ripples in water or a stylized graphic element.

# Basic Music Notation and its Corresponding Numeric Values

## Countin

Name	Note	Rest	
Whole Note			Whole note: 4 beats
Half Note			Half note: 2 beats
Quarter Note			Quarter Note: 1 beat
Eighth Note			Eighth Note: 2 notes per beat
Sixteenth Note			Sixteenth Note: 4 notes per beat or

# Beats per Measure



# Keyboard



# C Major Scale

The image displays the C Major Scale in 4/4 time on a single staff. The notes are C, D, E, F, G, A, B, and C. Below the notes, blue interval markings are provided: a blue 'V' shape above each note, and a blue letter 'W' or '1/2' below each note. The markings are: W, W, 1/2, W, W, W, 1/2.

Note	Interval
C	W
D	W
E	1/2
F	W
G	W
A	W
B	1/2
C	

# Chord Patterns



A treble clef staff showing a triad of notes: C4 (root), E4 (third), and G4 (fifth). Red arrows point from the labels 'Root', 'Third', and 'Fifth' to their respective notes.



A treble clef staff showing a major triad: C4, E4, and G4.

**Major**



A treble clef staff showing a minor triad: C4, E♭4, and G4.

**minor**



A treble clef staff showing a diminished triad: C4, E♭4, and G♭4.

**diminished**



A treble clef staff showing an augmented triad: C4, E4, and G♯4.

**augmented**

# Golden Ratio

$$a/b = b/(a+b)$$



# Mozart

- Fascinated with Numbers
- Calculation on Score
- Random Number composition
- Symmetry in Music
- Recognized brilliance at 3
- First composition at 5
- 1756 – 1791 (only 35 yrs old)

# Frequency and Pythagoreans

C	C#	D	D#	E	F	F#
f	$16/15f$	$9/8f$	$6/5f$	$5/4f$	$4/3f$	$4/45f$

G	G#	A	A#	B	C
$3/2f$	$8/5f$	$5/3f$	$16/9f$	$15/8f$	$2f$

Pythagoreans liked to use proportions

# Transposing

The image displays two musical staves, labeled 'a' and 'b', illustrating the concept of transposing. Both staves are in treble clef.

Staff 'a' is in 4/4 time and contains a sequence of notes: C4, D4, E4, F4, G4, A4, B4, C5, B4, A4, G4, F4, E4, D4, C4. The notes are grouped into four measures of two notes each. The staff ends with "etc." and the letter "a".

Staff 'b' is in 3/4 time and contains the same sequence of notes as staff 'a', but transposed to fit the 3/4 time signature. The notes are: C4, D4, E4, F4, G4, A4, B4, C5, B4, A4, G4, F4, E4, D4, C4. The staff is divided into three measures, each containing two notes and a quarter rest. The word "Charge!" is written below the first, second, and third measures. The staff ends with "etc." and the letter "b".



# Inversion



**Combining**

**Transposing**

**Retrograde**

**Inversions**

