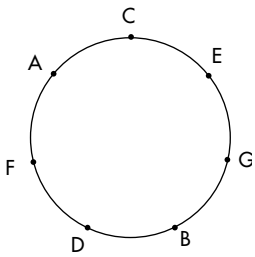


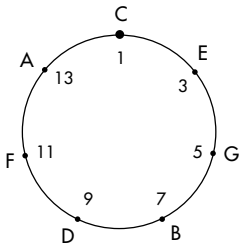
# Chords

Many types of chords are possible, but the most used are built by stacking of thirds, producing a harmony in thirds, called functional or tonal. From a reference degree, numbered 1 and called *root*, we add a third, a fifth, etc. and possibly other degrees according to the chord density desired (3, 4, 5, 6 or 7 notes).

## Thirds circle

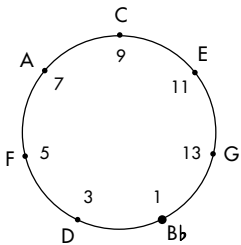


The notes of the thirds cycle can be altered:  
 E → E♭, G → G♭ or G♯, etc. Thus, one can create all possible stacks of thirds.



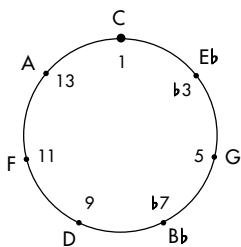
C C7M C7M<sup>9</sup>

Stacking of thirds from C: triad, tetrad and 9th chord.



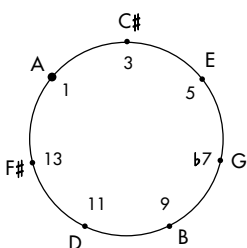
B♭ B♭7M B♭7M<sup>9</sup>

Same stacking of thirds but from B♭, producing the same chord structures.



Cm Cm7 Cm7<sup>9</sup>

Stacking of thirds from C, but with a minor third (E♭).

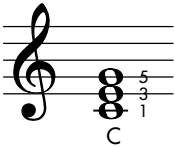
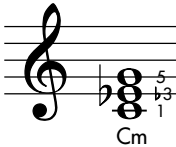
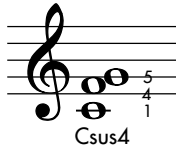




A A7 A7<sup>9</sup>

Stacking of thirds from A: triad, tetrad and 9th chord.


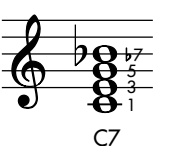
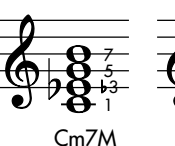
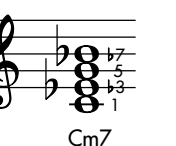






A stack of 3 notes produces a chord called triad. There are major, minor and suspended triads (without thirds). The most common triads have a perfect fifth and are therefore consonant. Others, less frequent, have an altered fifth: augmented or diminished.

### 3-note chords: triads

Triads	major 3rd	minor 3rd	suspended
perfect 5th	 C	 Cm	 Csus4
altered 5th	 CAug	 Cdim	

A stack of 4 notes produces a chord called a tetrad. A tetrad is a triad to which a 7th (major, minor or diminished) has been added. The table below shows the structure of the triad table, adding the appropriate 7th for each type of triad.

### 4-note chords: tetrads

Tetrads	major 3rd		minor 3rd		suspended	
	maj. 7th	min. 7th	maj. 7th	min. 7th	dim. 7th	min. 7th
perfect 5th	 C7M	 C7	 Cm7M	 Cm7		 C7sus4
Aug	 C7M#5	 C7#5				
altered 5th						
dim		 C7b5	 Cm7b5	 Cdim7		

The table below, in a tree form, represents the relationship between triads and tetrads, as well as their respective possible extensions (notated by half notes).

**Chords construction**

	Triad	Extensions	Tetrad	Extensions
Aug				
maj		6 9		
min		6 9		
dim				
sus4		9		

A scale is harmonized by building chords on all its degrees by stacking thirds. The stacked notes are notated by quarter notes and are linked. By repeating the same operation on all the degrees, we obtain all the chords of the scale.

**C major scale harmonising**

The image displays the C major scale harmonized by building chords on each degree. Each degree is shown on a separate staff in treble clef. The notes of the scale are indicated by quarter notes, and the chords are represented by stacked notes. The chords are labeled as follows:

- I:** C, E, G, B (C7M)
- II:** D, F, A, C (Dm7)
- III:** E, G, B, D (Em7)
- IV:** F, A, C, E (F7M)
- V:** G, B, D, F (G7)
- VI:** A, C, E, G (Am7)
- VII:** B, D, F, A (Bm7b5)

Each chord diagram shows the fingerings for the notes: 1 for the root, 3 for the third, 5 for the fifth, and b7 for the seventh. The notes are linked by a thick black line, indicating they are part of the same scale.

By generalizing the C major scale harmonising in all possible keys, we obtain the modal table below. Since the major scale structure is maintained in all keys, the harmonising necessarily produces, for the same degree, the same chord structure (same structure for all chords of the same column).

The C key is boxed. Upwards, we go towards the keys with an increasing number of sharps; downwards, towards keys with an increasing number of flats. The scales of the keys F# et Gb are enharmonic, i.e. composed of the same notes, but notated differently.

### Major modal table

	I	II	III	IV	V	VI	VII
<b>F#</b>	F#7M	G#m7	A#m7	B7M	C#7	D#m7	E#m7b5
<b>B</b>	B7M	C#m7	D#m7	E7M	F#7	G#m7	A#m7b5
<b>E</b>	E7M	F#m7	G#m7	A7M	B7	C#m7	D#m7b5
<b>A</b>	A7M	Bm7	C#m7	D7M	E7	F#m7	G#m7b5
<b>D</b>	D7M	Em7	F#m7	G7M	A7	Bm7	C#m7b5
<b>G</b>	G7M	Am7	Bm7	C7M	D7	Em7	F#m7b5
<b>C</b>	C7M	Dm7	Em7	F7M	G7	Am7	Bm7b5
<b>F</b>	F7M	Gm7	Am7	Bb7M	C7	Dm7	Em7b5
<b>Bb</b>	Bb7M	Cm7	Dm7	Eb7M	F7	Gm7	Am7b5
<b>Eb</b>	Eb7M	Fm7	Gm7	Ab7M	Bb7	Cm7	Dm7b5
<b>Ab</b>	Ab7M	Bbm7	Cm7	Db7M	Eb7	Fm7	Gm7b5
<b>Db</b>	Db7M	Ebm7	Fm7	Gb7M	Ab7	Bbm7	Cm7b5
<b>Gb</b>	Gb7M	Abm7	Bbm7	Cb7M	Db7	Ebm7	Fm7b5

As for the major scale, this scale is harmonized by building chords on all its degrees by stacking thirds. By repeating the same operation on all the degrees, we obtain all the chords of the melodic minor scale.

C melodic minor scale harmonising

The image displays the C melodic minor scale harmonized by building chords on each degree. Each staff shows the scale notes and the corresponding chord structure. The chords are: Cm7M (I), Dm7 (II), Eb7M#5 (bIII), F7 (IV), G7 (V), Am7b5 (VI), and Bm7b5 (VII). Each chord is represented by a stack of four notes (root, third, fifth, seventh) with a thick black line connecting the root and seventh notes. The notes are written in a treble clef with a key signature of one flat (Bb).

**I** C Eb G B Cm7M

**II** D F A C Dm7

**bIII** Eb G B D Eb7M#5

**IV** F A C Eb F7

**V** G B D F G7

**VI** A C Eb G Am7b5

**VII** B D F A Bm7b5

By generalizing the C melodic minor scale harmonising in all possible keys, we obtain the modal table below. We find the constant chord structure of one degree in all keys.

The C key is boxed. Upwards, we go towards the keys with an increasing number of sharps; downwards, towards keys with an increasing number of flats.

### Minor melodic modal table

	I	II	♭III	IV	V	VI	VII
<b>F#m</b>	F#m7M	G#m7	A7M#5	B7	C#7	D#m7♭5	E#m7♭5
<b>Bm</b>	Bm7M	C#m7	D7M#5	E7	F#7	G#m7♭5	A#m7♭5
<b>Em</b>	Em7M	F#m7	G7M#5	A7	B7	C#m7♭5	D#m7♭5
<b>Am</b>	Am7M	Bm7	C7M#5	D7	E7	F#m7♭5	G#m7♭5
<b>Dm</b>	Dm7M	Em7	F7M#5	G7	A7	Bm7♭5	C#m7♭5
<b>Gm</b>	Gm7M	Am7	B♭7M#5	C7	D7	Em7♭5	F#m7♭5
<b>Cm</b>	Cm7M	Dm7	E♭7M#5	F7	G7	Am7♭5	Bm7♭5
<b>Fm</b>	Fm7M	Gm7	A♭7M#5	B♭7	C7	Dm7♭5	Em7♭5
<b>B♭m</b>	B♭m7M	Cm7	D♭7M#5	E♭7	F7	Gm7♭5	Am7♭5
<b>E♭m</b>	E♭m7M	Fm7	G♭7M#5	A♭7	B♭7	Cm7♭5	Dm7♭5
<b>A♭m</b>	A♭m7M	B♭m7	C♭7M#5	D♭7	E♭7	Fm7♭5	Gm7♭5
<b>D♭m</b>	D♭m7M	E♭m7	F♭7M#5	G♭7	A♭7	B♭m7♭5	Cm7♭5
<b>G♭m</b>	G♭m7M	A♭m7	B♭♭7M#5	C♭7	D♭7	E♭m7♭5	Fm7♭5

As for the major scale, we harmonize this scale by building chords on all its degrees by stacking thirds. By repeating the same operation on all the degrees, we obtain all the chords of the harmonic minor scale.

C harmonic minor scale harmonising

The image displays the C harmonic minor scale harmonized into seven lines, each representing a degree of the scale. Each line includes a treble clef, a key signature of one flat (Bb), and a sequence of notes. A thick black line is drawn above the notes of each line, indicating the scale's contour. To the right of each line is a chord diagram for a seven-string guitar, with fret numbers 1, 3, 5, 7, and 1 indicated. The chords are: I (Cm7M), II (Dm7b5), bIII (Eb7M#5), IV (Fm7), V (G7), bVI (Ab7M), and VII (Bdim7).

Line	Notes	Chord
I	C, Eb, G, B	Cm7M
II	D, F, Ab, C	Dm7b5
bIII	Eb, G, B, D	Eb7M#5
IV	F, Ab, C, Eb	Fm7
V	G, B, D, F	G7
bVI	Ab, C, Eb, G	Ab7M
VII	B, D, F, Ab	Bdim7



By generalizing the C harmonic minor scale harmonising in all possible the possible keys, we obtain the modal table below.

**Harmonic minor modal table**

	I	II	bIII	IV	V	bVI	VII
<b>F#m</b>	F#m7M	G#m7b5	A7M#5	Bm7	C#7	D7M	E#dim7
<b>Bm</b>	Bm7M	C#m7b5	D7M#5	Em7	F#7	G7M	A#dim7
<b>Em</b>	Em7M	F#m7b5	G7M#5	Am7	B7	C7M	D#dim7
<b>Am</b>	Am7M	Bm7b5	C7M#5	Dm7	E7	F7M	G#dim7
<b>Dm</b>	Dm7M	Em7b5	F7M#5	Gm7	A7	Bb7M	C#dim7
<b>Gm</b>	Gm7M	Am7b5	Bb7M#5	Cm7	D7	Eb7M	F#dim7
<b>Cm</b>	Cm7M	Dm7b5	Eb7M#5	Fm7	G7	Ab7M	Bdim7
<b>Fm</b>	Fm7M	Gm7b5	Ab7M#5	Bbm7	C7	Db7M	Edim7
<b>Bbm</b>	Bbm7M	Cm7b5	Db7M#5	Ebm7	F7	Gb7M	Adim7
<b>Ebm</b>	Ebm7M	Fm7b5	Gb7M#5	Abm7	Bb7	Cb7M	Ddim7
<b>Abm</b>	Abm7M	Bbm7b5	Cb7M#5	Dbm7	Eb7	Fb7M	Gdim7
<b>Dbm</b>	Dbm7M	Ebm7b5	Fb7M#5	Gbm7	Ab7	Bbb7M	Cdim7
<b>Gbm</b>	Gbm7M	Abm7b5	Bbb7M#5	Cbm7	Db7	Ebb7M	Fdim7